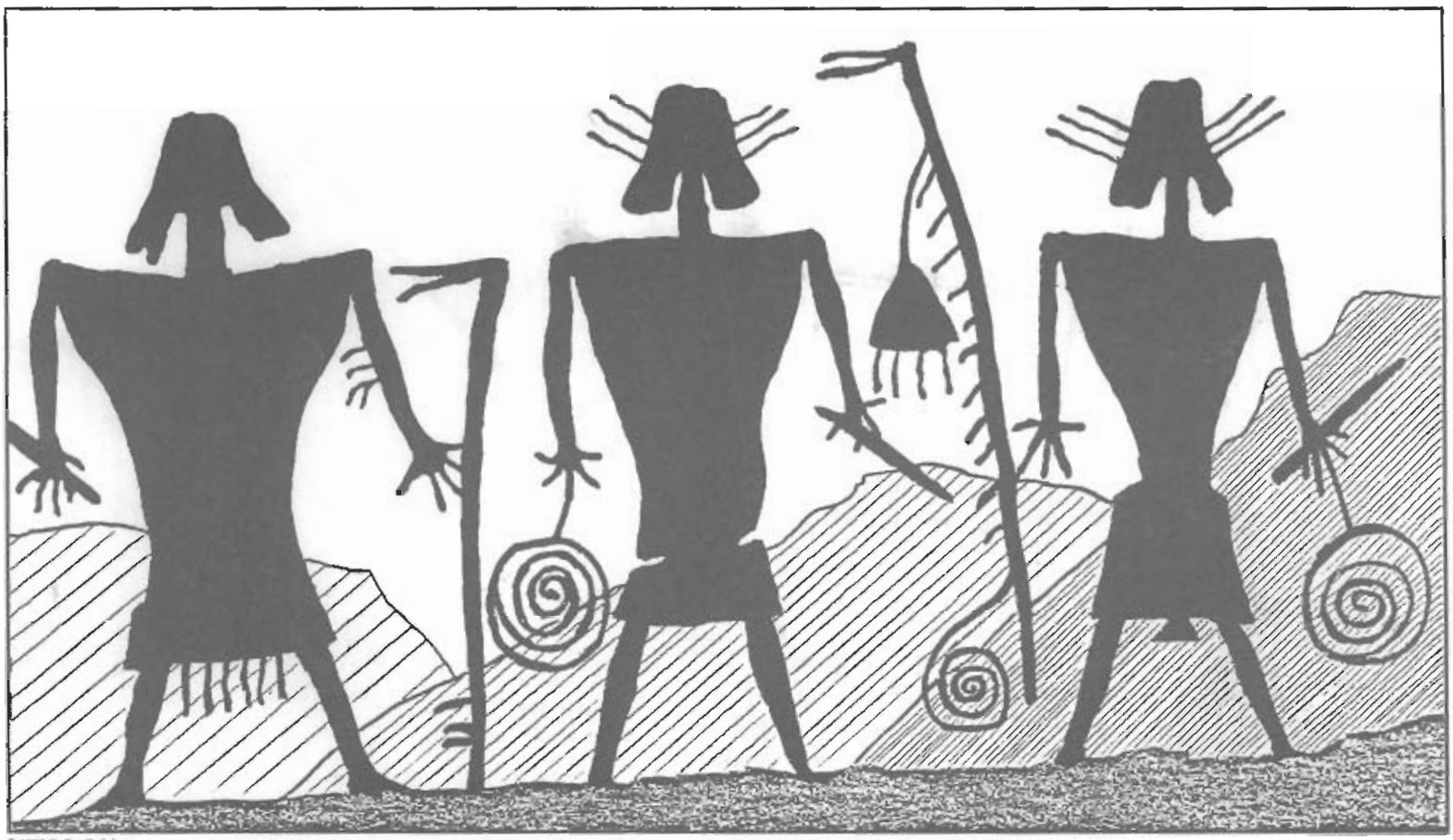
AN OVERVIEW of PREHISTORIC CULTURAL RESOURCES



LITTLE SNAKE RESOURCE AREA
Northwestern Colorado

BUREAU of
LAND MANAGEMENT
COLORADO

CULTURAL
RESOURCES
SERIES

Number 20

Halcyon La Point

A CLASS I OVERVIEW OF THE PREHISTORIC CULTURAL RESOURCES LITTLE SNAKE RESOURCE AREA, MOFFAT, ROUTT, AND RIO BLANCO COUNTIES COLORADO

By Halcyon La Point

BUREAU OF LAND MANAGEMENT

DENVER, COLORADO

1987

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BUREAU OF LAND MANAGEMENT
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This document is printed in conjunction with the Little Snake Resource Area Resource Management Plan. It serves as support for the RMP, plus oil and gas leasing, lands actions, and other BLM activities. In addition, this work is integral to the Craig District Cultural Resource Management Plan.

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DESIGNED BY: Leigh Wellborn
SERIES EDITOR: Frederic J. Athearn

FOREWORD

This publication represents the first portion of the Craig District's Class I overview for archaeology. Over the last several years, Craig District, beginning with the Little Snake Resource Area, developed an overview system that contains an extensive computer database, a compilation of site data, and a narrative overview. This document is that narrative. In it, Halcyon La Point explores the pre-history of the Little Snake area, while also compiling data that has heretofore, been largely scattered. The primary contribution of this work is the consolidation of much data into a highly readable and coherent synthesis of the pre-history of northwestern Colorado.

Additionally, this volume represents the 20th publication in the Cultural Resources Series. Over the last ten years, BLM has printed 20 works of archaeology and history that have been very well-received by the public as well as the professional community. Indeed, some have been award winning. We are pleased to have been able to provide this valuable service and I am particularly pleased to have reached the milestone of 20 editions.

I am proud to make this report available to the public and I know that its contents will be useful for a long period to come. I trust that this work will become a standard for the archaeology profession.

Neil F. Morck
State Director
Bureau of Land Management
Colorado

PREFACE

The following document was developed by Ms. LaPoint in an eight week period at the end of 1984. Prior to the actual writing of the Class I narrative, extensive work was required to establish the correctness of the site record files, contractor, BLM cultural resource report files and the site/project information USGS quad maps files. Once this task was completed, the development of the REX database formats was undertaken. This then led to the encoding of approximately 1300 cultural resource sites and associated project information. The data entry and correcting the REX cultural resource database followed. This appears rather straight forward and simple. It was not. A lot of new ground was broken with this effort. This kind of project had not been done before as a total package or by just one person. It is to Ms. LaPoint's credit and the then BLM Resource Area Management that so much was accomplished in such a short time frame.

It the interim, between the draft being written and October 1986, the Class I narrative manuscript remained just that, a manuscript. The computer database, however, underwent some fundamental changes. REX was changed to ASPEN. Then a new database format, INFOCEN, was brought on line by the BLM. It was decided that INFOCEN would better serve the LSRA cultural needs. The change was made in 1985. The resulting problems of the conversion to INFOCEN plus data storage conflicts have led to some problems with the computer database. These problems are mechanical in nature and are actively being addressed and corrected.

The Class I narrative was again addressed in late 1985. What follows, represented here, is again another concentrated effort of another group of individuals. With a document at the advanced stage of development, it is the non-author portions of work that required considerable work. This effort was provided by Beverly Kolkman, district editor, and Kathleen Phillips, word processor operator. There also are a host of others that helped with the inevitable odds and ends of such work. To all of you, many thanks.

The LSRA Class I overview represents not only the work depicted here but the LSRA computer database system as well. Further, the two other Resource Areas in the Craig District, Kremmling and White River Resource Areas, are developing compatible computer databases. These will provide for a larger database with which to view northwestern Colorado prehistory. When this is completed on a District wide basis, we will have an unprecedented view of northwestern Colorado prehistoric archaeology.

In conjunction with the Craig District cultural database, an entirely separate and different computer database is being developed. This is the Geogrophical Information System (GIS). GIS allows for the analysis and display of a large volume and variety of physically locatable data. This data includes topographic features, soils, water, vegetation, wildlife and of course, cultural. The physical view that can be provided by GIS will allow for a unique data manipulation tool and a first for northwestern Colorado cultural resource management efforts.

The manipulations of cultural data within the database itself, as well as the ability to access the Statistical Packages for the Social Sciences (SPSS) in INFOCEN and in conjunction with the GIS capabilities are going to provide cultural resource management with the means to address the resource questions in this document as well as similar questions in Grady (1984). Moreover, these tools will be available to the Colorado State Historic Preservation Officer's staff and the archaeological community for developing the needed research designs and data collection strategies.

With continued efforts in the Craig District and support from the Colorado State BLM office, this will all be 'on line' by the end of 1988 or early in 1989. The end of the 1980's and the early 1990's are going to be exciting times for archaeology and cultural resource management in northwest Colorado.

Henry S. Keesling
Area Archaeologist
Little Snake Resource Area

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I.

INTRODUCTION

This background document, or class I overview, has been prepared according to the guidelines established in the Bureau of Land Management (BLM) cultural resources manual, section 8111. It describes the prehistoric cultural resources of the Little Snake Resource Area (LSRA) in the Craig District of the BLM.

The objectives of this project were to inventory and compile the existing cultural resource information for the LSRA and to generate a document that would summarize this information in a cultural, historical context. The document will be used as a basic background guide for contracting archaeologists or for cultural resource managers who may be in the region for the first time.

Preparing this document required two principal tasks: writing of a cultural resource overview and the compilation of site records.

The first task involved reviewing publications, cultural resource management reports, and archives that relate to the prehistory of the LSRA. The second task required the collection of site record information about known prehistoric sites in the LSRA. This effort relied heavily on the records maintained by the Colorado Preservation Office and those maintained in various BLM offices.

At the onset, it seemed appropriate that record compilation (and maintenance) of this scale might best be accomplished by developing a computerized data base system. Such a system prototype was developed using the REX data base management package, and the overview was written

primarily from data retrieved from that data base. As with many overviews, the document becomes dated with every new archaeological find, but the data base remains dynamic and flexible, able to produce updated Class I overviews as research and development proceeds.

II.

ENVIRONMENTAL BACKGROUND

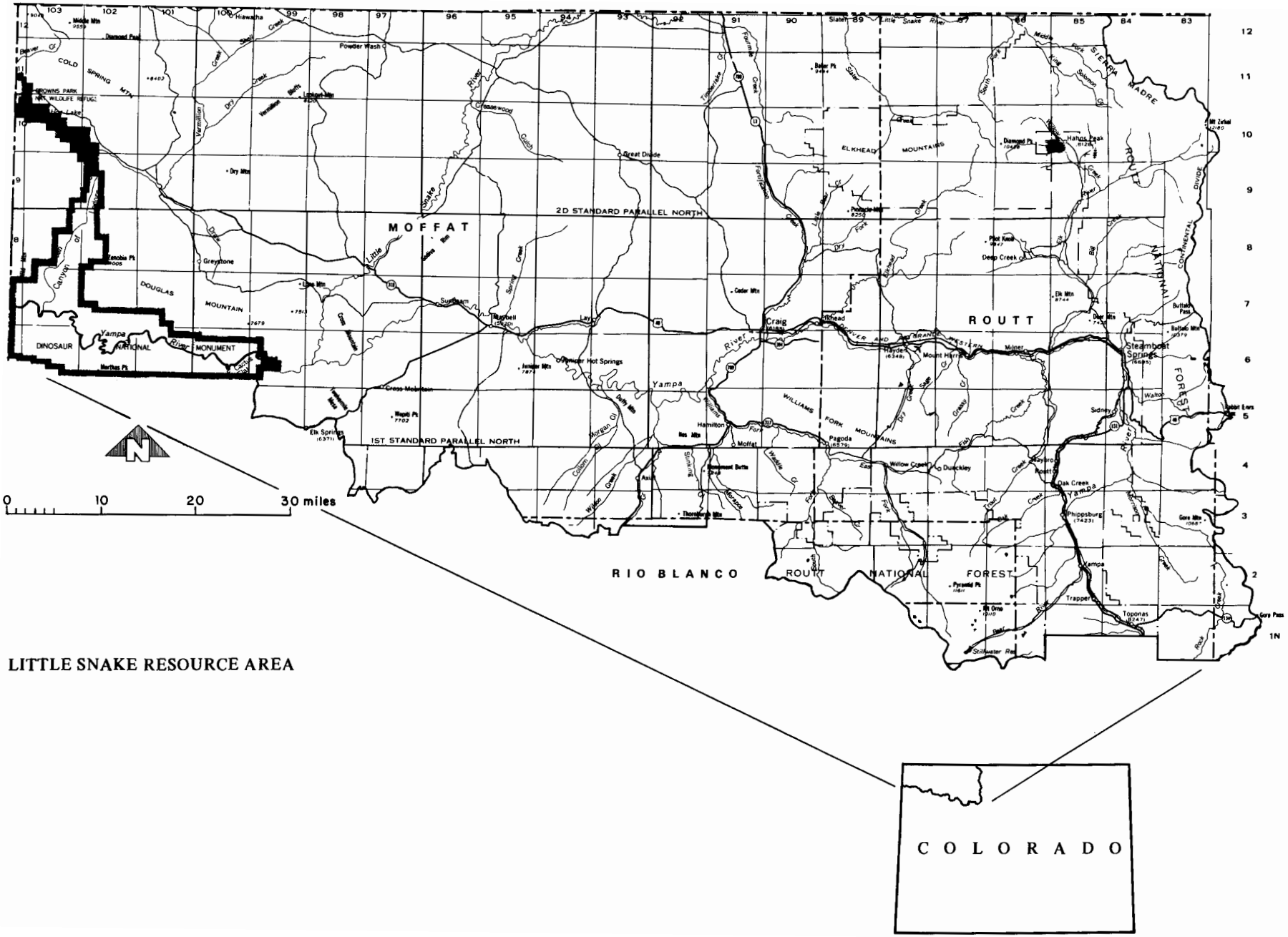
One of the most important factors that influenced prehistoric peoples was the environment and its effect on spatial and seasonal distribution of biotic resources. Settlement distribution is commonly determined by the location of specific resources and the correlation between habitats. These resources provide important information for the understanding of prehistoric subsistence and settlement systems.

Location of Study Area

Land administered by the Little Snake Resource Area of the Bureau of Land Management falls within three counties, which make up the northwestern corner of Colorado: Moffat, Rio Blanco, and Routt (Map 1). The study area is bounded on the north by Sweetwater and Carbon counties, Wyoming; on the east by Jackson and Grand counties, Colorado; on the west by Dagget County, Utah; and to the south by Rio Blanco and Garfield counties, Colorado.

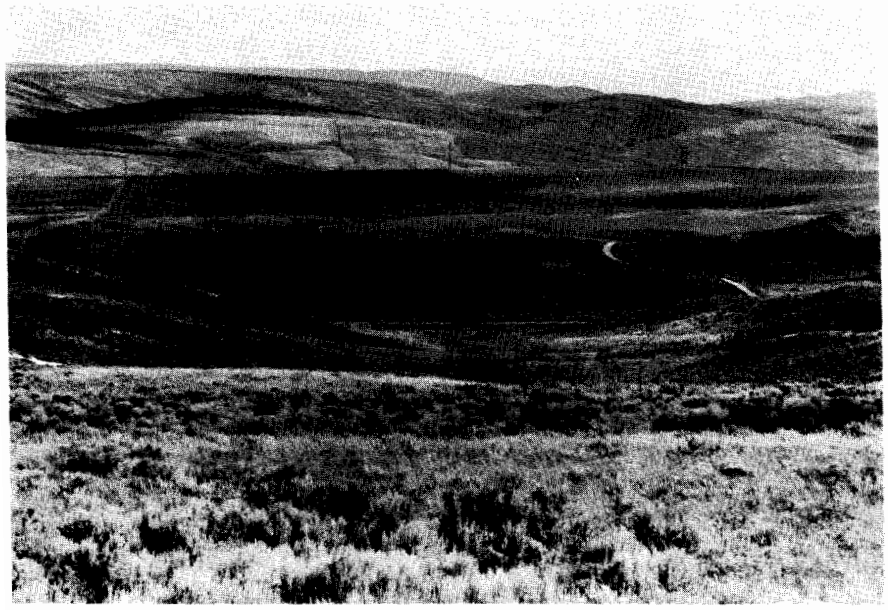
Physiography

The study area covers a region of considerable landform diversity (see photos 1 through 5). It is included within three recognized physiographic provinces of the western United States: the Wyoming Basin, the Middle Rocky Mountains, and the Southern Rocky Mountains. It is roughly centered in the Wyoming Basin, which is surrounded by the Southern and Middle Rocky Mountain provinces.

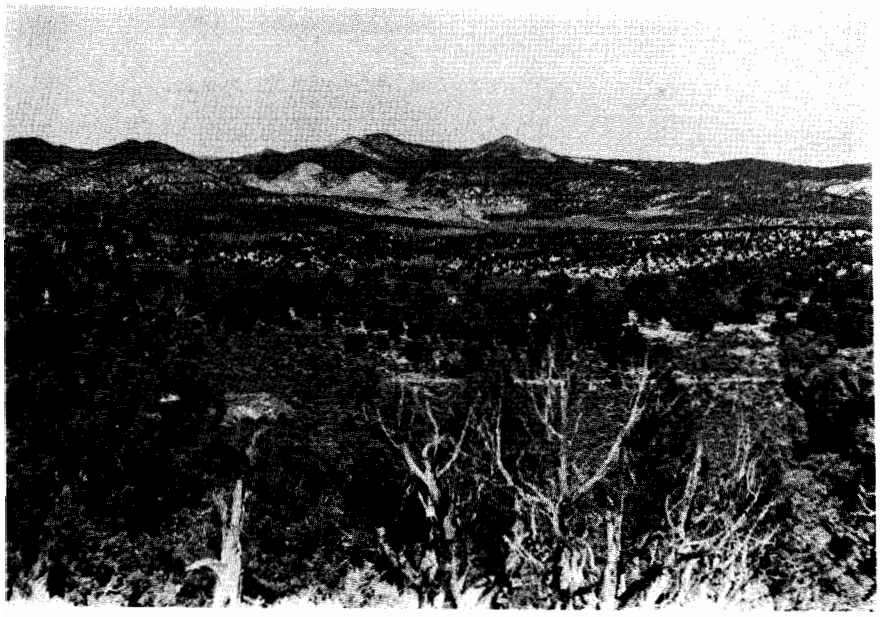


LITTLE SNAKE RESOURCE AREA

Photograph 1
Sagebrush and Pinyon Hills

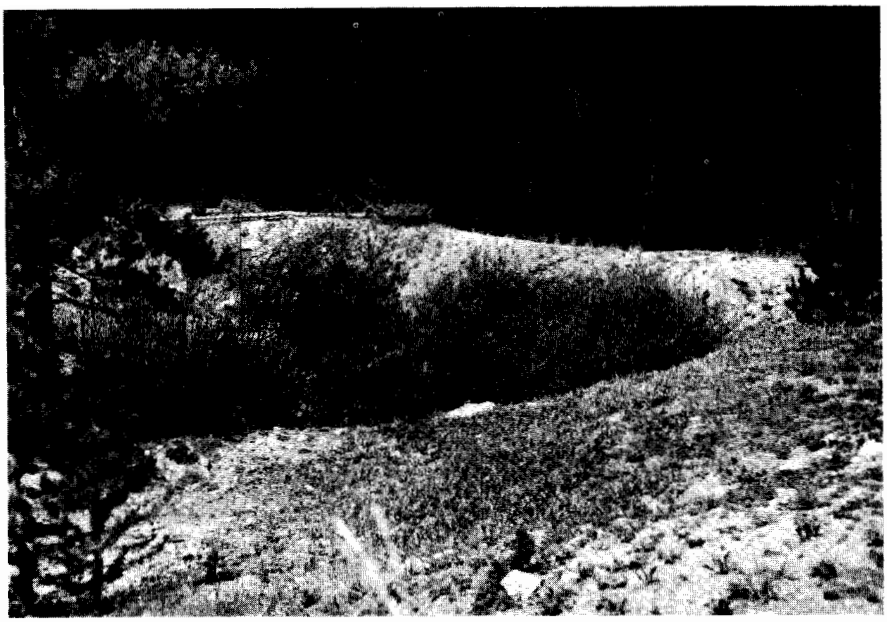


Photograph 2
Sagebrush and Rolling Hills



Photograph 3
Pinyon Juniper/Woodland

Photograph 4
Oakbrush



Photograph 5
Forests

The study area is bounded on the east by the Park Range; on the south by the Axial Basin, Williams Forks, and Danforth Hills; on the west by the Uintah Mountains; and on the north by the Washakie Basin.

Regionally, Northwestern Colorado and Southwestern Wyoming form a topographic corridor connecting the Great Basin and the Great Plains (Mulloy 1954, J. Jennings 1957, and Aikens 1966). This natural corridor may contain clues to the cultural subsystems influencing the spread of peoples and cultural characteristics from core areas outward. Northwestern Colorado is peripheral to, but contained within, the spheres of influence of three major cultural areas: the Northwest Great Plains, the greater Southwest, and the Great Basin. This region has been called the "Great Margin" (C. Jennings 1968), and distinct influences from each of these regions are reflected in the diverse archaeological remains throughout this area.

The southern Rocky Mountain province divides northward into three anticlinal uplifts at the Laramie, Medicine Bow, and Park ranges. There are a series of craggy, strongly glaciated ridges, which include Mt. Zirkel (12,000 ft), just south of the Wyoming border. Precambrian rocks form the core of the Park Range, which in turn forms the eastern border of the study area. Mesozoic and Paleozoic formations form hogbacks along the flanks and dip under tertiary deposits that form a basin to the west of the study area. North and south of this ridge the crests are accordant, and for the most part the slopes are moderate.

The Continental Divide follows the crest of the Park Range. Headwaters of the Yampa River, which flow north between the White River Plateau and the Park Range and turn west at Steamboat Springs to become the primary drainage for the LSRA, are located in that range. The Yampa River is fed by a number of streams, including the Elkhead River and Trout, Fish, Watson, Oak, and Soda creeks.

The Wyoming Basin lies between the Middle and Southern Rocky Mountain provinces and connects with, as well as resembles, the adjoining part of the Colorado Plateau to the south. (For the purpose of discussion, the White River arbitrarily marks the boundary between the two provinces.) The basin also provides a corridor between the Great Plains and the Colorado Plateau. The floor of this basin is a plateau with a maximum east/west dimension of 250 miles and a north/south dimension of approximately the same milage. The altitude of the plateau surface, which is bordered by mountain slopes and studded with isolated mountains, is generally between 6,500 to 7,500 feet.

That portion of the Wyoming Basin within Colorado is usually referred to as the Sand Wash or Yampa Basin, which is a shallow structural basin surrounded and confined by a number of minor uplifts. The basin trends NW/SE and is bounded by the Park Range Uplift to the east, the Uintah Mountains to the west, and the Williams Fork Mountains/Axial Basin Uplift to the south. The northern extremity of the basin is broadly defined by the Baggs Anticline. Drainage is generally westward to the Yampa River, which is fed by Lay, Fortification, and Milk creeks, and the Williams Fork River. The Yampa River is joined by the Little Snake River about 35 miles east of the Utah line.

Sand Wash Basin contains volcanic areas at the west foot of the Park Range, represented by the Elkhead Mountains. These are flat-topped remnants of sedimentary rocks that are capped and protected by sheets of basalt. They range from 2,000 to 3,000 feet. above the plains. Cedar Mountain, northwest of Craig, is a volcanic remnant formed by a surface accumulation of extruded lavas. Subsurface fissures filled with volcanic material are often exposed during degradation (erosional) cycles. These erosional remnants are locally preserved as dikes; one, Fortification Dike, is located 20 miles north of Craig.

The Sand Wash Basin, which was formed on Cretaceous and Tertiary sedimentary rocks, displays a rough, deeply dissected surface. Alkali flats are common in the basin, and eolian deposits or sand dunes of Holocene age are located throughout the basin. Broad areas of small relief are interrupted or separated by scarps and dissected cuestas. One such cuesta, the Williams Fork Mountains, overlooks the anticlinal valley of the Williams Fork River, which flows northwest from the White River Plateau into the Yampa River.

The Axial Basin Uplift is a physiographic structure connecting the Uintah Mountains of the Middle Rocky Mountain province with the White River Plateau of the Southern Rocky Mountain province. It is an anticline with a deeply eroded axis that forms a continuous and sharply outlined trough. The Yampa River flows through the western half of the trough, and the eastern half is crossed by several streams.

Two isolated mountains, Juniper Mountain (Yampa Peak) and Cross (Junction) Mountain, are located along the floor of the trough. Both are structurally similar to the Uintah Mountains and the White River Plateau. The Yampa River cuts canyons through both of these uplifts.

The Danforth Hills, the southern boundary of the LSRA, are located between the Axial Basin and the White River. These hills are a series of folds that have been reduced to lowlands through erosion. This district, which is intermediate in character between the mountain and plateau provinces, structurally links the Southern Rocky Mountain province and the Uintah Range (of the Middle Rocky Mountain province).

The Middle Rocky Mountain province, which borders the western portion of the study area, is represented by the Uintah Range, the largest east-west range in the United States and perhaps the Western Hemisphere. These mountains are essentially a flat-topped anticlinal uplift of Precambrian rocks that separates the Wyoming Basin from the Uintah Basin. The Green River flows south across the Wyoming Basin to the Uintahs, then turns east along Brown's Park, a structural valley containing Miocene-Pliocene sediments. South flowing Vermillion Creek meets the Green River at the eastern edge of the park. The Green River then enters the Uintah Mountains and passes through them at Lodore Canyon. The Yampa River enters the Uintah

Range at its eastern end and traverses it lengthwise until it joins the Green River in the midst of the mountains at Echo Park. Other tributaries to the Green River include Rye Grass and Pot creeks. The Yampa Plateau is a subordinate uplift to the south of the Uintahs. This uplift, as well as the Vermillion Bluffs and Cold Springs Mountains (O-WI-YU-KUTS Plateau), are included in the Uintah Range.

Physiographic changes in this area have been relatively minor over the past 20,000 years, with the last geologic event involving the glaciation of the Rocky Mountains and resultant fluvial deposition in the lower mountains and the basin.

Geologic Stratigraphy

The project area is dominated by sedimentary rocks, ranging in age from Pre-Cambrian through Tertiary. The oldest rocks exposed are Precambrian, which can be found in the Uintah Mountains, at Juniper Mountain and Cross Mountain, and along the Park Range. The stratigraphic sequence for this area is described in Table 1.

Most of the materials used for the construction of chipped stone tools are crypto-crystalline varieties of quartz, which are all of secondary origin and are found occasionally among the primary and metamorphic rocks of the mountains. Secondary varieties are the product of many profound geochemical changes and are therefore confined largely to the oldest members of the sedimentary rock series. They are erratic in their occurrences within the limestones and sandstones on the flanks of mountain masses where the sediments have been folded, tilted, and later exposed by erosion. The entire area of gravels in northwestern Colorado and southern Wyoming are

sources of compact boulders of many grades of quartzite. Many of the sandstone formations of the Rocky Mountain region contain "sheet" zones of quartzite that could be easily secured by prehistoric peoples for manufacturing artifacts that did not require refinement. The Lithology column on Table 1 further describes potential toolstone source areas that may have been attractive to prehistoric groups.

Volcanic outcrops are found in the Elkhead Mountains and are exposed in dikes throughout the Sand Wash Basin. The main body of the Wasatch Formation (early Eocene), which intertongues to the west and north with the Green River Formation (early and middle Eocene is exposed in the floor of the basin), was formed by sediments that were largely steam deposited in a sub-tropical lowland environment. In the late-early Eocene, periodic regional uplift caused local upwarps, blocking stream drainages. From this event, lake basins were developed in parts of Wyoming and Colorado. One of these basins, Lake Gosiute, has provided scientists with a sedimentary record for the Green River Formation. Areas where sediments of the Wasatch Formation and Green River Formation intertongue reflect alternating transgressions and regressions of the shoreline of the lake in response to the prevailing environmental conditions.

A thick pebble and boulder conglomerate is exposed above the Laney Shale (member of the Green River Formation) west of the Little Snake River. Sears and Bradley (1924) suggest that this conglomerate is equivalent to that at the base of the Brown's Park Formation (Miocene). Quaternary deposits are located in limited areas throughout the Sand Wash Basin, with Holocene alluvium occurring along the drainage floodplains. As John P. Albanese (1978) points out, Holocene terraces are of particular interest to

TABLE 1
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
Quaternary						
Unconsolidated Holocene deposits	Qa	Alluvium, including low terrace deposits			Silt, sand and gravel; some clay; moderately sorted and bedded	Little Snake River Green River, Yampa River, and some stream valleys
	Qe	Eolian deposits			Wind blown sand and silt	Northcentral Moffat County along Bighole Gulch, Timberlake Creek, and Mud Spring Draw
Landslide deposits	Ql	Talus rock falls			Coherent glide blocks to heterogenous mixtures of angular rock fragments	Talus and rock falls along steep hills & cliffs. Base of the Uintahs, including Cross Mtn, Elkhead Mtn, Park Range & throughout White River Plateau
Unconsolidated Pleistocene deposits	Qg, Qd	High terrace & morainal deposits			Sand, gravel; angular & unsorted materials; some silt and clay	High terrace remnants along the Middle Little Snake, the Green, & Upper Yampa Rivers, some streams & elsewhere. Glacial drift along streams in the Park Range
Tertiary						
Pliocene	Tv Tui Tbb	Volcanic flows, plugs; intrusive dikes, sills, stocks		Flows, sills	basalts, light-colored tuffs, volcanic breccia; dense	White River uplift & scattered occurrences north to Elkhead Mtns, east along

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
					black hard resistant lava rock.	Walton Peak & "finger rocks" of the Park Range, Cedar Mtn. & Fortification Rocks near Craig
Miocene	Tbp Tbpc	Browns Park Formation		2,200	Light gray to chalky white, fine-to-medium grained tuffaceous quartz sandstone, generally crossbedded, but has some gray cherty flat beds near base. West of the Little Snake a thin exposure of red sandstone containing cobbles and boulders of red quartzite & grey cherty limestone locally derived from Precambrian & Paleozoic bedrock. Smaller pebbles within sandstone are of mafic and felsic igneous and metamorphic rocks, red & white quartzite, varicolored chert, & milky chert.	From near Craig west to the Green River between prongs of the Uinta Mtns; Elkhead Mtns, southern Routt County
Oligocene	Tos	Bishop Conglomerate		0-100	Well rounded boulders & cobbles of quartzite; limestone & schist from	Along the Uintah Mtns on Middle, Bishop & Diamond Mtns in extreme

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
—					the Uinta Mtns.	NW Colorado
Eocene	Tb Tbu Tbl	Bridger Formation	Washakie Formation in Wyoming	0-375+	Gray, drab, greenish & pink mudstone & tuffaceous mudstone & sandstone; white tuff layers & white to buff cherty limestone layers; lavender cross-bedded sandstone.	Western Sand Wash Basin. Locally referred to as "Sand Wash," the formation forms the south center portion of this feature.
	Tg Tgl Tgt	Green River Formation	(Several Members)	0-2,100+	Gray lacustrine fissile shale, oil shale, and grey & buff sandstone and limestone. Interfingers with fluviatile Wasatch Formation. Of special archaeological interest, due to the occurrence of exploitable toolstone sources, is the Laney shale member, the Tipton Tongue, & the Luman tongue. The Laney shale member contains massive to thinly laminated buff, gray, brown, marlstone, shale and muddy sandstone, white to brown tuff & tuffa-	Primarily the north end of the locally known Sand Wash continuing into Wyo. Luman tongue restricted to the Hiawatha basin

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
					ceous sandstone & in shore facies, algael deposits & oolite beds. Soft brown to buff shale and organic marlstone with algael layers of great lateral extent are characterstics of the Tipton Tongue member. The Luman tongue contains series of brown, flaky shale, oil shale, marlstone, carbonaceous shale and limy sandstone beds.	
	Tw Twc Twn	Wasatach Formation	Several Members	0-6750+	Varicolored claystone & shale, brown & whitish-gray sandstone & conglomerate, & minor limestone.	Sand Wash Basin from the Uintas to the Park Range north of the Yampa River.
Paleocene	Tfw	Fort Union Formation	Post "Laramie" Formation	1400-2500	Brown & gray sandstone and shale with coal beds; thick sandstone in lower part.	Primarily found northeast & west of Craig in Sand Wash Basin.

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
Upper Cretaceons	Kl	Lance Formation	"Laramie Formation"	0-1,500	Thin beds of soft muddy sandstone, siltstone, gray shale & coal capped by thick coarse-grained white sandstone	From 4 miles north of Lay in a narrow belt eastward to just north to Elkhead Mtns, also near Slater at the state boundary with Wyoming
		Fox Hills Sandstone	Mapped with over-laying Lance Form-ation	0-50	Sandstone, medium-grained, massive, white to gray	Forms rim rock 1/2 mile north of Craig
	Kls	Lewis Shale	Steel Shale	0-1,900+	Dark gray to bluish marine shale; some calcareous con-cretions; inter-fingers with Mesa Verde increasingly westward	From near Lay east through Craig area, past Hayden south-east to Twenty-mile Park & Oak Creek; north from Hayden in-to Elkhead Mtns; not present south of Axial Basin
	Kmv	MesaVerde Group undivided.		2,750 east 2,500	Brown, gray, and white thick massive resistant cross-bedded lenticular sandstone inter-bedded with gray shale, sandy shale, & coal beds. This group forms cavities as it weathers, a feature called honeycomb weather-ing, which is often	Uinta Mtn. region

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
					large enough to form caves and overhangs.	
	Kwf	Williams Fork Formation of Mesaverde Group	Mesaverde Group	1000(east)-1700(central) 2000+(west)	Shale, thin and few thick sandstone beds, sandy shale and several coal beds. Red burned and baked areas common.	Forms bulk of Williams Fork Mtns and much of Danforth Hills.
	Ki	Illes Formation of Mesaverde Group	Mesaverde Group	1500(east) 1370(central)	Massive to slabby sandstone beds, light gray to brown and interbedded shale, siltstone and coal beds near Trout Creek (top) and Tow Creek (base) Sandstone members.	Exposures on Illes and Duffy Mtns, Williams Fork Canyon. South slopes of Williams Fork Mtns. and Danforth Hills.
	Km	Mancos Shale	Hillard Shale in Wyoming north of Uinta Mtns.	4900-5300	Dark gray marine shale; several thin-bedded silty tan sandstone beds in upper 1000 feet.	In broad southwestward-trending belt along Williams Fork and in large area northwest of Steamboat Springs. Also exposed along Irish Canyon.
		Niobrara Formation Shale	Mapped with Mancos	1300+	Limy shale interbedded with thin beds of platy fossiliferous limestone.	Four miles NE of Phippsburg.

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
	Kfd	Frontier Sandstone Member		50±-150	Thin-bedded, fine-grained fossiliferous limy sandstone.	Uinta Mtn. area.
	Kfd	Mowry Shale Member		50-200	Marine shale, light to dark gray, but weathers distinctive silvery gray. Hard, siliceous.	Uinta Mtns. mostly.
Lower Cretaceous	Kd	Dakota Sandstone	Fuson Shale Lakota Sandstone	90-165	Yellowish-brown, medium to coarse grained, carbonaceous, locally quartzitic, lenticular sandstone in upper and lower parts, separated by dark greenish-gray and variegated mudstone.	Watergap of Yampa River at Steamboat Springs
Late Jurassic	Jm, Jmc Jmce Jmec	Morrison Formation		440-800	Interbedded varicolored siltstone and claystone, light gray sandstone, some chert-pebble conglomerate; scattered lenticular beds of nodular limestone near top.	Along Irish Canyon
		Curtis	Upper Sundance of	0-260	Interbedded sand-	Uinta Mtns.

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
			Wyoming; Stump formation of northern Utah.		stone, shale, oolitic limestone; predominantly olive gray and greenish gray, glauconitic and fossiliferous.	
		Entrada	Sundance Formation to the northeast. Preuss sandstone to northwest	22-360	Sandstone, fine-to-medium grained, buff to light gray. Locally has siliceous cement. Some red or brown mudstone. A chert-pebble zone a few inches thick marks the base.	Juniper Mtns. and Uinta Mtns.
		Carmel	Basal part of San Rafael Group in Utah	0-125	Sandstone, silty; shale and siltstone; some gypsum marine origin.	Only in Uinta Mtns.
	Jms	Sundance Formation	Equivalent to Curtis, Entrada and Carmel	0-260	Yellowish-gray to pale-green glauconitic and oolitic marine limestone and sandstone and crossbedded light-gray to orange sandstone containing local intervening red and yellow	North of Steamboat Springs near Round Mtns.

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
					siltstone beds.	
Lower Jurassic and Upper Triassic	Jtrg	Glen Canyon Sandstone	Navaho Sandstone Nugget Sandstone	0-540	Sandstone, fine-to-medium grained thick-bedded; high cross-beds; gray to red. Prominant cliff forming sandstone in Uintah Mtns.	Uinta Mtns; along Irish Canyon.
Upper Triassic	Trc	Chinle Formation	Popo Agie Formation Jelm Formation Chugwater Formation	127-565	Interbedded siltstone, claystone, shale, locally congolomeratic sandstone; includes a few beds of distinctive siltstone-and-mudstone-pebble conglomerate; varicolored red, gray, green and yellow, but overall color is reddish-brown; some limestone.	Uinta Mtns. along Irish Canyon
		Nugget Sandstone (Bell Springs Member)	Equivalent to part of Chinle to south and west.	0-50	Reddish-brown very fine grained, thin bedded sandstone; purplish limestone concretionary beds.	Present only near Hahn's Peak and Clark, north of Steamboat Springs
	TrPr	Popo Agie Formation	Equivalent to part of Chinle to south and west.	0-120	Pale red to purplish red sandy siltstone overlain by claystone	Present only near Hahns Peak and Clark, north of Steamboat Springs

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
		Jelm Formation	Equivalent to part of Chinle to south and west.	0-100	Sandstone, fine-grained micaceous, grayish-red and reddish-brown and purple; massive bedded.	Present only near Hahns Peak and Clark, north of Steamboat Springs
Lower Triassic	TrM	Moenkopi Formation	Partly equivalent to State Bridge Formation.	480-800	Grayish-green and red siltstone, shale and fine-grained siltstone; partly gypsiferous; few thin beds of limestone.	Uinta Mountains
		Dinwoody Formation		0-300	Shale, sandy shale, thin sandstone beds, light gray.	Only in northwest corner of Moffat County
Triassic and Permian		State Bridge Formation	Partly equivalent to Moenkopi and Park City Formation	0-500	Red and gray siltstone and shale; some sandstone.	Southern Routt County
Permian	Pp TrPcp	Park City Formation	Phsphonria Formation	50-290	Gray, yellow and red siltstone and shale; thin-bedded limestone and dolomite; sandstone; some phosphate, chert.	Uinta Mtns.
Permian and Pennsylvanian	Pw PlPw	Weber Sandstone	Equivalent to Maroon and upper part of Minturn Formation	0-1000+	Sandstone, fine-grained, cross-bedded, thick-bedded, gray to white and buff	Uinta Mtns. especially canyon of Yampa River

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
	llPwm	Maroon Formation	Partly equivalent to Morgan and Weber Formation	0-2000+	Red, yellow and brown mudstone, sandstone, arkose, and conglomerate with some gypsum and thin limestone beds	Southern Routt County
Pennsylvanian	Pm	Morgan Formation	Equivalent to most of Minturn Formation	0-1280	Gray fossiliferous cherty limestone interbedded with red nodular chert, buff sandstone and lesser amounts of red and green shale	Juniper and Cross Mtns, especially well developed at Juniper Mtn, where Yampa River cuts through more than 1000 ft. Quite fossiliferous
		Minturn Formation	Equivalent to Morgan Formation	0-1000	Lenticular beds of arkosic conglomerate, shale and quartzite with some beds of dolomite and limestone	Southern Routt County along King Creek near Toponas
Mississippian	Mm	Madison Limestone	Equivalent to Leadville limestone. Other Formations in Utah.	0-600	Limestone and dolomite light to dark. Porous and cavernous; has many calcite filled cavities; cliff forming	Juniper Mtns, Eastern Uinta Mtns and Cross Mtn. Caverns in Green River canyons
Devonian	MDE	Chaffee Group		0-225+	Dolomite and limestone, partly oolitic; some green shale, quartzite	White River Uplift and Southern Routt County, possibly 20-30 ft of dolomite at base of Madison at Cross and Juniper Mtns.

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
Ordovician	MDE	Manitou Formation		0-155	Upper half thin-bedded siliceous dolomite; lower half interbedded flat-pebble conglomerate and limy shale	White River Uplift and southeast Routt County
Cambrian	MDE	Dotsero Formation		0-106	Dolomite, brownish-gray, thin-bedded; flat-bedded limestone and dolomite conglomerate; thin beds green-gray shale	White River Uplift and southeast Routt County
	Es	Sawatch Quartzite	Lodore Formation	0-400±	Regularly bedded quartzite sandstone, sandstone and quartzite, some dolomite and shale	Southern Routt County overlooking Topanas Creek; White River Uplift
	El	Lodore Formation	Sawatch Quartzite	0-400±	White topped sandstone, quartzite, partly arkosic, with some silty interbedded shale	In Uintah Mtns area, Cross and Juniper Mtns
Precambrian	PE Yg	Unnamed		Thousands	Granitic and Mafic intrusive rocks, gneiss, schist and other metamorphic rocks	Forms the Park Range

TABLE 1 (continued)
GEOLOGIC STRATISGRAPHIC SEQUENCE FOR MOFFAT COUNTY

Age	Map Symbol	Formation Name/Deposit	Former Name or Correlative in Adjacent Areas	Thickness	Lithology	Outcrop Areas or Notable Occurrances
	PEu Yu	Uinta Mtn. Group		24,000	Interbedded red fine-to-coarse-grained conglomeratic partly quartzitic sandstone and red and green shale; hematitic; typically weathers dark reddish brown; sandstone is thick bedded, commonly crossbedded	Eastern Uinta Mtns, Cross and Juniper Mtns
		Red Creek Quarzite		20,000±	Red and green metaquartzite, ambolite and mica schist zones	Only in northeastern Uinta Mtns, where it forms all high peaks

archaeologists because archaeological sites are commonly found on terrace surfaces or within terrace sediments. Attempts have been made to use terraces for relative dating of archaeological sites, and the identification and correlation of these terraces have been conducted over parts of Wyoming (Leopold and Miller 1954) and Colorado (Scott 1965). Based on these studies, the terraces and their associated sediments have been used as time equivalents and correlated over large areas. But, much of this early work was done without the benefit of radiocarbon dates (Albanese 1978). It has become apparent that in many cases Holocene terraces and associated terrace alluvium are not time equivalent over large areas or even, in some cases, within a local drainage base (Albanese 1978). Many of these Holocene terrace surfaces may be evolutional surfaces rather than depositional features, and archaeological sites enclosed in these sediments on a given terrace may vary considerably in age over short lateral distances. Even though the terrace sequence and geomorphic appearance seem to be the same, Holocene terraces in different drainage basins may be of different ages. Until the Holecene alluvial stratigraphic sequence is further defined and supported by radiometric data, caution must be employed when using terrace sequences to date archaeological sites.

Eolian deposits of Holocene age are located throughout the basin in some areas as sand dunes. Evidence for the use of parabolic sand dunes for bison traps during the Paleo-Indian period at the Casper site has been presented by Frison (1978). Sand dunes are common to several areas in the LSRA. These dunes are stabilized and controlled by vegetation, but they occasionally demonstrate areas of active sand movement. Short periods without rain can bring about some sand movement. There probably has been

more than one sand movement in the area during the Holocene. Sites in sand dunes are subjected to deferential erosion and, once exposed, rapid deterioration of perishable material occurs, leaving the only evidence for site occupation, stone artifacts, no longer in their original contexts. Relating cultural levels in areas of deflation is difficult because stratigraphic layers are seldom maintained during sand movement. Conversely, sites in sand dunes may also be buried up to great depths and stand little chance of exposure, except in accidental circumstances--such as pipeline construction.

Climate

For the most part, the study area is situated in the western Colorado semiarid steppe. The climate is highland continental, typical of the mid-latitudes, with winds prevailing from the west. The protective topography of the Sierra Nevada Mountains to the west and the Rocky Mountains to the east greatly modifies the climate from those characteristics that are typical of the mid-latitudes. Because the area is located thousands of miles away from any major sources of moisture, precipitation is generally light in the lower elevations because large amounts of moisture are drawn off the air masses as they cross the Sierra Nevadas to the west. Moist air from the Gulf of Mexico is blocked by the Rocky Mountains.

It is difficult to generalize the climate of Routt and Moffat counties as a whole because of local topographic changes. The rugged topography and varied elevation of western Colorado causes large variations in climate within short distances. Precipitation in the region increases as the

elevation increases from the western part of Colorado to the eastern mountain ranges of the Continental Divide. Average precipitation data show an increase of 7.6 inches from Hayden (elevation 6,375 ft.) to Steamboat Springs (elevation 6,770 ft.), an elevation increase of 395 ft. over a distance of only 25 miles. Precipitation within the study area varies from less than 8 inches in the far western portion to more than 30 inches near the Continental Divide. Table 2 describes the precipitation pattern based on historical measurements at several locations in Routt and Moffat counties. Most precipitaton in the summer comes from cloud bursts, forced by topographic lifting and thermal convection, rather than from regional storms. Lower elevations receive somewhat more precipitation in the summer than in the winter months. The largest portion of precipitation above 8,000 ft. comes in the form of snow during the winter months.

Temperature data throughout the study region exhibit wide variations from one location to another and with respect to annual and diurnal extremes. These fluctuations are attributed to topography and to the

TABLE 2

PRECIPITATION PATTERNS FROM WEST TO EAST

Location	Annual	Summer	Winter	Snowfall
Maybell (5920')	11"			
Craig (6440')	13.7"	7.6"	6.1"	61.2"
Meeker (6240')	15.6"	8.6"	7.0"	69.0"
Hayden (6375')	15.3"	7.8"	7.5"	96.7"
Steamboat (6770') Springs	23.3"	10.2"	13.1"	165.4"

predominantly dry air that allows rapid surface heating and cooling. Average temperatures on mountain tops are often less than 0°C (32°F), and the higher valleys can be extremely cold during the winter months. Table 3 displays the freeze data at selected sites in the Yampa Valley. The growing season ranges from 94 days in Craig to 28 days in Steamboat Springs. There is a possibility of below freezing temperatures occurring in the Craig area year-round and a chance of greater than 95°F temperature occurring during the midsummer months of June, July, and August.

TABLE 3
FREEZE DATA AT SELECTED SITES IN NORTHWESTERN COLORADO
(Adapted from NW Coal EIS 1976, p. II-31)

Location	Freeze Temperature	Mean Date Spring Occurrence	Mean Date Fall Occurrence	Mean Number Days Between Dates
Craig	0.0°C	6/8	9/10	94
Hayden	0.0°C	5/27	8/26	76
Meeker	0.0°C	6/11	9/10	91
Steamboat Springs	0.0°C	6/23	7/21	28

Horticulture

Length of growing season is of particular interest when considering the feasibility of prehistoric agriculture in northwestern Colorado. Dryland farming of maize requires enough moisture in the ground to sprout the seed and keep it growing until the summer storms begin. A good crop depends on midsummer rains, and the climate today does not regularly supply enough

moisture for dryland farming of corn. The growing season is rather short for corn, which requires approximately 90 days to mature.

The presence of stored maize has been discovered in several locations in Moffat County (5MF70, 73, 94) and in Dinosaur National Monument in Colorado (Hell's Midden, Mantle Cave, and Ladder Shelter). The two critical variables, moisture and temperature, could have been modified to support small gardening ventures. Plot aspect on south facing slopes in sheltered locations would extend the growing season, and irrigation or watering could increase the effective moisture. Early explorer and photographer W.H. Jackson (1876) noted corn growing without irrigation by the (Weminuche) Ute in southeastern Utah in 1874. An early harvest time, rather than waiting for full corn maturation, would also shorten the growing season. Professor Hayden's exploration party was entertained with a feast of green corn by the Ute in the LaSal Mountain region (American Naturalist 1877). Among the Southern Paiutes, horticulture was probably not the major subsistence activity during Prehistoric times but was apparently practised by all groups. The absence of this activity among the Ute and Shoshone of western Utah distinguished them from the horticulturalists (Steward 1938).

Historic Euro-American farming was practiced in the parks on the canyon floor of Dinosaur National Monument, but was restricted to orchard and garden crops (Burgh and Scoggin 1948). The growing season normally was May 1 to October 15, a total of 168 days. On the Mantle Ranch in Castle Park, sweet corn, garden crops, and fruit trees were cultivated under irrigation with few crop failures (Steward 1938).

There are few regions in the study area that are more than 50 miles from places where corn growing would have been possible on a prehistoric, marginal scale, probably as a seasonal adjunct to a hunting economy. Brown's Park, portions of the Little Snake and Yampa River valleys, and perhaps the Williams Forks river valley may all have provided potential gardening plots for prehistoric farmers.

This evidence so far points to the possibility that corn may have been grown on a small scale in northwestern Colorado from the Prehistoric period well into the Historic period. Perhaps this tradition of casual, ancillary corn growing survived among certain Ute bands.

Paleoenvironment

Only one paleoenvironmental study has been conducted within the LSRA. Pollen analysis of samples collected from a series of excavated sites southwest of Craig, at Round Bottom, shows no marked changes in floral communities since the end of the Pleistocene (Arthur, et al. 1985).

Data recovered from surrounding regions indicate that for the past 8,000 to 10,000 years (or since the Pleistocene), environmental fluctuations have not been particularly severe. Precipitation and temperature pattern changes probably resulted in shifts in environmental zone boundaries but not in overall changes in the placement of plant communities.

In the southwestern United States, late Quaternary alluvial chronology studies suggest a cyclical occurrance of droughts and comparatively moist times since the end of the Wisconsin glaciation (Antevs 1955; Schoenwetter 1970; Bryson and Wendland 1967; and Haynes 1966).

Ernst Antevs (1948, 1955) hypothesized the occurrence of three major climatic periods: the Anathermal, dated from circa 7000 to 5600 B.C., a time of climatic conditions similar to the present; the Altithermal, 5500 to 2500 B.C., often referred to as the great drought; and the Medithermal, which includes the present and is characterized by conditions of increased moisture, punctuated by a series of droughts.

Later studies have questioned the accurracy of Antevs' scheme and argue the importance of the effect of Holocene climatic oscillations on prehistoric populations. Schoenwetter (1970) identifies shorter-termed climatic oscillations during the past 2000 years; and J. Jennings (1978) sees only localized, short-term climatic changes within a general warming and drying trend since the end of the Pleistocene.

Madsen and Currey (1979) present a more specific outline of paleo-climatic trends. A period of relatively cool weather probably followed the final retreat of the Pleistocene glacial maxima that persisted until approximately 6050 B.C. A minor glacial advance and recession brought about more stabilized conditions from 4050 B.C. until the Christian era, which were generally more moist than the average Holocene conditions.

The last 2,000 years are characterized by relatively greater variability, which may be the result of better data for this time period (Jones and MacKay 1980:9). The first millennia A.D. is characterized by greater available moisture and more even annual distribution of rainfall, followed by general dessication in the southwest ca. A.D. 1200.

Cooler temperatures and increased moisture occurred during a period of renewed glaciation between A.D. 1500 and A.D. 1850. This was followed by a return to warmer temperatures and dessication in the later 1800s.

Recurring periods of alpine glaciation, indicating alternative warmer-drier and cooler-moister conditions, existed since the Altithermal (Benedict 1975). Glacial advances, particularly the Triple Lakes (A.D. 3050 to 1050 B.C.), the Audubon (A.D. 100 to 1000 B.C.), and the Arapahoe Peak (A.D. 650 to 1850 B.C.) have been associated with moderate conditions and interspersed with somewhat warmer and drier interstades.

Excavations conducted in the Canyon Pintado Historic District at Dripping Brow Cave revealed alternating dry and moist conditions, starting with a relatively dry and stable environment before A.D. 700. This period was followed by a shift to more moist conditions around A.D. 850, and a return to a drier environment near A.D. 1100. From A.D. 1300 to A.D. 1500, a renewed, relatively moist period occurred. After A.D. 1500, the area again experienced a drying trend (Creasman 1981).

Studies at the Brady site revealed a shift in alluvial deposition occurring around A.D. 800. Before this time, alluvium was deposited by spring runoff. Post A.D. 800 there was a shift to the present day pattern of summer thunderstorm deposition, where alluvium is drawn from the side canyons feeding into Douglas Creek (Creasman 1981). This shift coincides with observations of drier conditions for this period during a number of studies mentioned above.

Until more local data are available, a very general approach is necessary regarding the application of paleoenvironmental reconstructions from outside areas to the study area. Although local conditions are in part influenced by extra-regional events, local factors still exert a heavy influence. With a generally unchanging vegetative cover overall, present

day floral and faunal species have remained relatively much the same since prehistoric peoples first used the area.

Flora

The vegetational ecology in the study area is a complex mosaic strongly influenced by soils, climate, aspect, altitude, grazing, and general land-use history. Moisture is most often the major limiting factor for the distribution of vegetation on the western slope of the Rocky Mountains (James and Marr 1966).

Eight primary and two secondary vegetative types are found in the study area. The primary types are grassland, sagebrush, mountain shrub, conifer, pinyon-juniper, saltbush, greasewood, and cropland. The secondary types are aspen and riparian.

Conifer. The conifer type usually occurs in areas of highest elevation, coolest soils, highest annual precipitation, and in areas with the most snow accumulation. It grows in the Elkhead Mountains and Park Range, along the north slope of Douglas Mountain, along Irish Canyon and the Vermillion Bluffs, and in some areas of the Uintahs near Middle Mountain and Diamond Peak.

In the eastern part of the LSRA, the dominant conifers are Douglas fir, Englemann spruce, and sub-alpine fir. Douglas fir, lodgepole pine, and ponderosa pine dominate the western part of the study area. Understory vegetation varies with the stand location, density, and stage of succession. Generally, the understory includes mountain brome, bluegrass, huckleberry, lupine, current, and aster. Dense stands have little or no vegetative understudy, but they provide cover for livestock, deer, and elk. Where openings occur in the conifer type, mountain shrub species occur.

Aspen. The aspen type occurs in areas where soils are well developed and soil moisture conditions are good. This is often a transition zone between the mountain shrub and conifer types. Aspen occurs as relatively small, open-to-very dense stands on north or protected slopes at higher elevations. Aspen reproduces vigorously in cut-over or burned areas within the conifer type because of the clonal, common root system nature of the species.

Quaking aspen are the dominant species, with an understory of snowberry, carex, larkspur, geranium, mountain brome, timothy, wheatgrass, and bluegrass. Aspen supports many animal species: deer and elk, whose migration routes and fawning/calving areas often occur in aspen stands; moose; and raptors, which commonly nest in aspen.

Mountain Shrub. At lower elevations (5,000 to 7,000 ft.) the mountain shrub type develops where moisture is adequate throughout spring and summer, and soils are deep and well drained. The mountain shrub type is characterized by its variability--a single species does not dominate the type in very large areas. The variability is the result of differing soil moisture conditions and soil depths found on the mountain slopes of the region. Common species are Utah serviceberry, western serviceberry, and gambel's oak. Scrub oak stands become dominated by serviceberry on sites where moisture is somewhat limited.

The absence of coniferous species on many north-facing slopes supports Brown's premise (1958) of ecological stability in mountain shrub communities. He further suggests that the density of the scrub oak type has not changed considerably since the late 1800s. Scrub oak exists in extensive stands along the Williams Fork Mountains, along the Danforth

Hills, at the base of the Elkheads, and along Cedar Springs and Deception Creek southwest of Maybell.

In the eastern portion of the study area, the mountain shrub type usually exists as a transition zone between aspen and sagebrush types. In the western portion of the study area, it occurs on sandy soil where favorable moisture conditions exist. It is usually surrounded by sagebrush. (The mountain shrub type is found on slopes and sagebrush is found on the flatter, deeper, heavier soils.)

Sagebrush. Sagebrush communities become prominant in lower elevations and drier conditions. This type dominates areas with well drained soils where moisture limits other vegetation. Just west of Maybell, on excessively drained, sandy soil, there is a unique community of nearly pure antelope bitterbrush, approximately 40 square miles in size, that provides important big game winter range and critical habitat for blue grouse and songbirds (Department of the Interior 1976).

The sagebrush vegetative type occupies more acreage than any other type within the study area. It occurs throughout the study area in stands that range from a few plants to an area approximately 1,500 square miles in north-central Moffat County. This type can be found adjacent to all other vegetative types in the area. It is dominated by sagebrush, with a variable understory of perennial grasses and forbs. Annuals fluctuate year to year, depending on spring temperatures and moisture conditions. There are various species of sagebrush in the study area: basin big sage, Wyoming big sage, low sage, and black sage. Sagebrush provides sage grouse with food, cover, nesting, brood-rearing areas, and strutting grounds; it is also an important food source for native ungulates in the region.

Pinyon-Juniper. Pinyon-Juniper is located in areas where available moisture is similar to moisture for sagebrush type, but where the soils are very shallow or nearly nonexistent. It occurs on outcrops or where bedrock is close to the surface, because of the inability of this coniferous species to tolerate the accumulation of fine soil particles around the roots. Northwestern Colorado is near the northern limit of the pinyon, and therefore its occurrence in the project area is limited. Other limiting factors may be historical disturbances such as fire and disease. Juniper is known to recover from disturbance more readily than pinyon (Woodbury 1947).

Pinyon-juniper occurs throughout most of northwestern Colorado and is quite extensive in the far western portions. Tree species of this type are pinyon, Utah juniper, and Rocky Mountain juniper, which is being the most dominant. Typical understory plants are big sagebrush, rabbitbrush, Indian ricegrass, western wheatgrass, prickly pear, antelope bitterbrush, and phlox.

The understory ranges from extremely sparse, enclosed stands and increases, largely as shrubs, when the stands open up. On steep slopes and rock outcrops, the only perennial vegetative layer present may be the trees. This type provides food and cover for mule deer, and raptors use the junipers as nest-sites and perches.

Saltbush/Greaswood. Saltbush and greasewood types are found in areas with the lowest precipitation and elevation. They are the dominant type on saline-alkaline soils that are poorly drained and often underdeveloped. These places include low elevation drainage bottoms, alluvial fans, and basin floodplains. The greasewood type is primarily composed of fairly dense stands of medium height shrubs, dominated by greasewood with a sparse grass-forb understory. Other shrubs that appear in more open stands are

rabbitbrush, fourwing saltbush, and big sagebrush. The understory may consist of wheatgrass, squirrel tail, Indian ricegrass, bluegrass, carex, and cheatgrass. Pronghorn antelope, mule deer, and golden eagle may inhabit this community. Black-footed ferrets may also occur in this habitat.

The saltbush type occurs on soils that are moderately saline-alkaline and are slightly better drained than those supporting the greasewood type. Saltbush is found in large, rolling, semi-arid basins, and on lower foothill slopes along drainage bottoms. This type occurs as mixed stands of low-growing shrubs dominated by Nuttall saltbush, fourwing saltbush, and shadscale. Associated species are big sagebrush, black sagebrush, bottlebrush, squirreltail, spineless horsebrush, spiny hopsage, cheatgrass, Indian ricegrass, western wheatgrass, and Sandberg bluegrass. The saltbush type is generally regarded as a valuable winter range for pronghorn antelope and mule deer, since it occupies lower elevations where large amounts of snow do not accumulate. The black-footed ferret may also occur here.

Grassland. The grassland type occurs in a wide variety of areas that range from deep soils in wet mountain meadows to dry, rocky hillsides. Grassland types in the region have seriously deteriorated, and many areas converted to sagebrush because of historical overgrazing by cattle. Native grassland vegetation occurs in scattered small meadows, in numerous small patches on wind swept ridge tops, and on uppermost south slopes. It is usually found in the shallow soils of exposed ridges, in deep mesa soils, on gentle sloping foothill terraces, and on alluvial fans in valley bottoms.

This type of vegetation is composed of perennial bunch-grasses intermixed with forbs, half shrubs, an occasional shrub species, and annual grasses. In the eastern part of the study area, grasslands are dominated by

needle-and-thread grass, Columbia needlegrass, green needlegrass, brome, and timothy grass. Western wheatgrass, needle-and-thread grass, June grass, bluegrass, sedge, and Indian ricegrass are the dominant species in the central and western portions of this region.

Riparian. The riparian type occurs along main drainages throughout the LSRA, essentially bordering the entire distance of rivers. It is usually too small to be differentially classified from the surrounding vegetation, but can be divided into four subtypes: 1) groves of deciduous trees, 2) marshlands, 3) open grasslands, and 4) rocky canyons.

Deciduous groves include mostly narrowleaf cottonwood, boxelder, dense thickets of willow with red-osier dogwood, and hawthorn. Ninety-five percent of the river bottom trees are cottonwood. Understory species primarily consist of Sandberg blue grass, inland saltgrass, western wheatgrass, smooth brome, rushes, and sedges. The marshlands extend from the river to the adjacent flat lands. Dominant plant species that occur in this subtype include rushes, cattails, sedges, squirrel tail, cheatgrass, Junegrass, and needle-and-thread grass.

Open grasslands consist primarily of inland saltgrass, western wheatgrass, carex, Sandberg bluegrass, and squirrel tail. The vegetation changes to a shrub type, dominated by greasewood, in areas that are more saline-alkaline and where the water table is deeper.

The rocky canyon areas are very small and usually contain little vegetation. Frequently, the only perennial plant species is juniper.

The scarcity and diversity of the riparian type makes this a valuable habit for many bird and animal species. Songbirds, waterfowl, raptors, and sagegrouse nest and rear their young in riparian zones. It is also an

important habitat for bald eagle, sandhill crane, peregrine falcon, and whooping crane. Deer, elk, and moose, as well as other wildlife species not found in other vegetative types such as racoon, mink, and beaver, find food and cover in this habitat.

Some areas of the riparian type have been converted to croplands, which consist mainly of irrigated and nonirrigated dryland wheat fields and hay fields located in natural meadows, in valley bottoms, on adjacent mesas, and along slopes in the river bottoms. Salt accumulation in low places where irrigation is plentiful has produced small saline areas unsuitable for plant growth.

Ethnographic Use of Vegetative Resouces

Although it is not yet feasible to quantify past food resources or biomass, it is possible to suggest that the common or dominant plants that characterize these communities today are not much different than those of the past 3,000 years. Prehistoric populations probably relied on a small series of plants and animals whose range intersected several environmental zones rather than relying on a single environmental zone (Flannery 1971).

As hunters and gatherers, prehistoric populations lived entirely within their environmental means. The area in which they resided provided raw materials needed for food, tools, utensils, fuel, clothing, and medicine. Plants often served more than one use: sage was used as fuel, in basketry, for medicine, for clothing, and for shelter by the historical Ute (Smith 1974). Serviceberry and cottonwood were equally as versatile.

Table 4 lists plant material remains recovered by macro-floral and pollen analyses conducted at excavated sites within or bordering the LSRA. It also includes the hypothesized ethnographic use for the plant. This table represents a storage shelter (42UN1103); two dry shelters (Mantles' Cave, Sheep Shelter); three open-dwelling sites (Whole Place, Fremont Playhouse, Hell's Midden, all located in Dinosaur National Monument); one open campsite; three lithic chipping stations (Muddy Creek, located on Rabbit Ears Pass); and eight open sites, three of which are situated in dune deposits along the Trailblazer Pipeline in southern Wyoming.

This table represents only a fraction of the floral assemblages, because of differential preservation of carbonized remains and the general lack of floral studies at tested and excavated sites in the LSRA. Whole classes of materials, in particular fibers and reeds, are often not represented because of their fragile state. Absence or presence of certain groups of plant material may indicate site function. Storage shelters often lack monocot fibers and common reeds (Liestman 1984:17). The type of plant parts recovered may indicate the level of floral processing or storage that occurred at the site and season in which they were deposited.

The uses ascribed to each species are known from ethnographic accounts of the Gosiute and other Numic-speaking tribes, and from Steward's (1938), Chamberlain's (1911), and Smith's (1974) works with the Northern Ute in northwestern Colorado. Only Indian groups known to have frequented the area in historic times are represented in the table.

Several of the exploitable plants such as goosefoot, pigweed, sunflower, ricegrass, and prickly pear grow at different elevations and in various vegetative communities so that at a given time, a particular species might

TABLE 4
PLANT MATERIAL REMAINS FROM EXCAVATED SITES WITHIN AND BORDERING LSRA.

Plant Material	Scientific Name	Location(s) of Recovery	Ethnographic Use
UNCULTIVATED			
Utah Juniper, Red Cedar	Juniperus Utahensis Scopulorum	Mantle's Cave (Burgh and Scoggin 1948), Muddy Creek (Klesert 1981), 42UN1103 (Liestman 1984)	
Pinyon	Pinus edulis	Mantle's Cave (Burgh and Scoggin 1948), 42UN1103 (Liestman 1984) Trailblazer (Scott 1983)	Shoshone - food (Steward 1938)
Indian rice grass	Oryzopsis hymenoides	Mantle's Cave (Burgh and Scoggin 1948), 42UN1103 Liestman 1984)	Seeds eaten (Steward 1938:26; Lowie 1924:202) food (J. Jennings 1978:87)
Sunflower seeds	Helianthus sp.	Mantle's Cave (Burgh and Scoggin 1948)	Seeds eaten (Steward 1938:30)
Beeweed	Cleome	42UN1103 (Liestman 1984) Trailblazer (Scott 1983)	
Bugseed, tickseed	Corispermum	42UN1103 (Liestman 1984)	
Hedgehog cactus	Echinocereus	42UN1103 (Liestman 1984)	Shoshone - food (Steward 1938)
Prickly pear	Opuntia	42UN1103 (Liestman 1984) Trailblazer (Scott 1983)	Shoshone - food (Steward 1938)
Greasewood	Sarcobatus	Trailblazer (Scott 1983)	
Sagebrush	Artemisia	Trailblazer (Scott 1938)	Seeds eaten (Steward 1938:21)

TABLE 4 (continued)
PLANT MATERIAL REMAINS FROM EXCAVATED SITES WITHIN AND BORDERING LSRA

Plant Material	Scientific Name	Location(s) of Recovery	Ethnographic Use
Ragweed	*Ambrosia* sp.	Trailblazer (Scott 1983)	
Mustard family	*Cruciferae*	Trailblazer (Scott 1983)	
Sedge family	*Cyperaceae*	Trailblazer (Scott 1983)	
Goosefoot	*Chenopodium* sp.	Mantle's Cave (Burgh and Scoggin 1948), Muddy Creek (Klesert 1981), 42UN1103 (Liestman 84), Trailblazer (Scott 1983)	Seeds and green eaten (Steward 1938:23, Trenholm and Carley 1964:27)
Huckleberry	*Vaccinium* sp.	Muddy Creek (Klesert 1981)	Berries eaten (Harrington 1972)
Clover	*Trifolium* sp.	Muddy Creek (Klesert 1981)	Potherb (Rogers 1980)
Pigweed	*Amaranthus*	Muddy Creek (Klesert 1981) 42UN1103 (Liestman 1984), Trailblazer (Scott 1983)	Seeds eaten (Harrington 1972) Shoshone - seeds eaten (Steward 1938)
Squawbush or lemonade bush, skunkbush sumac	*Rhus trilobata*	Muddy Creek (Klesert 1981) 42UN1103 (Liestman 1984)	Berries eaten (Chamberlain 1911:379), Shoshone - food (Steward 1938)
Honeysuckle	*Lonicera*	Muddy Creek (Klesert 1981)	Berry eaten as fruit (Rogers 1980)
Catch fly, champion	*Silene*	Muddy Creek (Klesert 1981)	Potherb (Rogers 1980)
Knot weed	*Polygonum*	Muddy Creek (Klesart 1981)	Seeds eaten (Steward 1938:26)

TABLE 4 (continued)
PLANT MATERIAL REMAINS FROM EXCAVATED SITES WITHIN AND BORDERING LSRA

Plant Material	Scientific Name	Location(s) of Recovery	Ethnographic Use
Dock	Rumex,	Muddy Creek (Klesert 1981)	Medicinal (Rogers 1980), Shoshone - food, medicinal (Steward 1938)
Columbine	Aquilegia caerulea	Muddy Creek (Klesert 1981)	Medicinal (Rogers 1980)
Bedstraw	Galium spp.	Muddy Creek (Klesart 1981)	Potherb (Rogers 1980)
Monkey-flower	Mimulus guttatus	Muddy Creek (Klesart 1981)	Food (Rogers 1980)
Toadflax	Linaria ssp.	Muddy Creek (Klesert 1981)	
Speedwell	Veronica ssp.	Muddy Creek (Klesert 1981)	
Thistle	Cirsium	Muddy Creek (Klesert 1981)	Roots and stems eaten (Steward 1938:23, Trenholm and Carley 1964:27)
Wild lettuce	Lactuca spp.	Muddy Creek (Klesert 1981)	Food (Roger 1980), Gosiute-food (Steward 1938)
Wild mint	Mentha canadensis	Muddy Creek (Klesert 1981)	Medicinal (Gilmore 1977), Shoshone tea (Steward 1938)
Globemallow	Sphaeralcea ssp.	Muddy Creek (Klesert 1981)	Medicinal (Rogers 1980)
Evening primrose	Oenothera ssp.	Muddy Creek (Klesert 1981)	Roots eaten (Rogers 1980) Shoshone - seeds (Steward 1938)
Lodgepole pine	Pinus contorta	Muddy Creek (Klesert 1981)	
Grass family	Graminae	Trailblazer (Scott 1983)	Gosiute-seeds eaten (Chamberlain 1911)

TABLE 4 (continued)
PLANT MATERIAL REMAINS FROM EXCAVATED SITES WITHIN AND BORDERING LSRA

Plant Material	Scientific Name	Location(s) of Recovery	Ethnographic Use
Lily family	Liliaceae	Trailblazer (Scott 1983)	Gosiute-bulbs eaten (Chamberlain 1911)
Plantain	Plantago	Trailblazer (Scott 1983)	
Purselane	Portulaca	Trailblazer (Scott 1983)	
Buffaloberry	Shepherdia	Trailblazer (Scott 1983)	Shoshone - food (Steward 1938)
CULTIGENS			
Corn	Zea mays	42UN1103 (Liestman 1984), Whole-place Village, Sheep Shelter, Mantle's Cave, Fremont Playhouse, Hells Midden (Lister 1951)	
Squash		Mantle's Cave (Burgh and Scoggin 1948)	
Beans		Mantle's Cave (Burgh and Scoggin 1948)	

be mature at one elevation but not at another. With proximity of resources at various elevations, human groups merely had to move short distances to prolong the period of availability. Location of base camps would be shifted through altitudinal zones in response to resource availability. High country adaptation models addressing the problems of hunter-gather resource exploitation have been presented by Wright, Bender, and Reese (1980); their hypotheses await further support and testing.

Steward (1938) divides Shoshone subsistence activities into four seasonal periods. In early spring, when stored foods were running low, the first edible "greens" growing along streams and lowland marshes and on low hills were eaten. By early summer the people left their winter villages to gather seeds and other plants as the resources ripened in the valleys, hills, and high plateaus. Later, summer brought the maturation of roots and berries. By early fall the pinyon nuts were ready for harvest, and families flocked to the nearest locality to gather and store these nuts. Nuts were cached in groves, or if a grove was near the winter camp, they were carried back to camp. Winter was spent in villages that were located in canyon areas or within the pinyon groves where an abundant harvest had occurred. The high country snows, appearing during the fall, forced both human and animal populations to lower elevations, where late ripening crops such as pinyon nuts and juniper berries were harvested and stored.

Grady (1980) reconstructed a similar seasonal round of economic activities for the Piceance Basin based on climate and the prehistoric exploitation of floral and faunal resources, especially deer. This model may be applicable to the LSRA.

This pattern of resource exploitation and seasonal movement is thought to have begun in the Archaic period and survived well into the Historic period. For hunting and gathering groups following this lifeway, which stressed intensive utilization of a wide variety of resources and proper exploitation based on seasonal movement, an extensive knowledge of plants and their availability, as well as local animal behavior, was required.

A third model devised for the Fremont in southern Utah depicts a seasonal situation where the harvesting schedule was controlled to a high degree by the demands of agriculture. This model suggests agriculture as a dominant concern from May through September, with the collection of autumn seeds thereafter, and deer hunting during the winter when their range was limited by deep snowcover and lack of browse in the foothills. Stored foods were relied upon throughout the winter and into the early spring months (J. Jennings 1978).

The practice of extensive horticulture would have had an effect on the gathering of certain plants, which would have conflicted with domestic gardening efforts. A modified seasonal scenario for the Fremont, who may have occupied the LSRA, might be a shift in focus where gardening in a somewhat marginal area of the canyonlands was carried out by certain members of the community, such as the very young and the elderly. The main emphasis, however, remained on gathering wild, more dependable, and storable foodstuffs by adults traveling to the uplands and sending parties back to the villages with harvested foods. In this case, results of the gardening effort is not the main concern, but rather an ancillary effort augmenting the wild plant and faunal resources.

Exceptions to the general pattern of gathering wild foods have been described by Julian Steward (1938), based on ethnographic accounts. The coaxing of native plant species by lowland irrigation was conducted by the Owens Valley Northern Paiute. Certain wild seeds, especially Chenopodium and Mentzelia, were broadcast sown by several groups in east-central Nevada. Horticulture was practiced by Southern Paiute and in post-Contact times by some Shoshone groups.

The presence of Oryzopsis hymenoides, Indian ricegrass, in four of the vegetative communities offers an opportunity to study aboriginal use of the species, especially where it occurs in dune areas. Indian ricegrass seeds ripen between late spring and early summer, depending on rainfall and elevation and ordinarily can only be collected during a short two- to three-week period (Holmer 1979:43). This vital resource bridges the gap between early spring greens and late summer berries and nut resources. The seed is also very drought resistant, lying dormant on the ground for up to 7 years and germinating with the first rainfall. Even with enhanced dune activity, ricegrass could recover quickly and repopulate a sand dune area.

With these attributes, Indian ricegrass may have been an attractive resource, which brought prehistoric populations into dune areas in early summer. This suggestion, made and supported by Holmer (1979), is further documented by ethnographic data from the Basin-Plateau aboriginal communities (Steward 1938:230-231), Wheat (1967), and by ethnographic data from the southern Paiute (King and Casebier 1976). These references describe the seed-harvesting, sand-dune campsites similar to those found by Holmer (1979) during the Split Mountain survey and may well apply to sites located in dune areas of Sandwash and Powderwash in the LSRA.

The restricted range and undependability of Pinus edulis, due to its scarcity and unpredictable seed production, may preclude the use of local pinyon as a major food resource for aboriginal people in the LSRA. Ethnographic accounts note the collection of Pinus edulis by Ute and Shoshone groups. But according to Steward (1938), these groups frequently travelled to western Utah to obtain Pinus monophylla. In areas where pinyon was present, the cones were harvested by the Shoshone during a two- to three-week period in the fall. After harvest, the seeds were too heavy to transport any great distance. Consequently, people wintered near pinyon caches located in the mountainous forests or, if the harvest was nearer to their habitual winter camps, they returned to the camp and packed down the nuts from caches, as needed (Steward 1938:27).

Because of the lack of major producing pinyon groves in the LSRA, there was an early fall food-gathering period within seasonal rounds, as described by Steward. For prehistoric and protohistoric groups in the LSRA to follow Steward's (1938) model, long, early fall journeys outside of the resource area to producing pinyon groves may have been taken. Conceivably, these prehistoric groups may not have returned until spring. An alternate model may be that some other storagable and more prolific food resource may have been substituted, such as Gambel's oak or perhaps deer. However, ubiquitous scrub oak was used only sparingly according to Stewart (1973). This is due to irregular production and possibly the difficulty of preparation for consumption, which requires a large volume of water to percolate out the tannic acids. No oak floral remains have been recovered from excavated sites in the LSRA.

Fauna

Although fauna in the LSRA has not been studied in detail, both nearby and regional studies have shown that a wide variety of wildlife exists in the area. Mammal distribution studies in Colorado (Armstrong 1972), Utah (Durrant 1952), and Wyoming (Long 1965) reveal that at least 47 species of mammals could occur in this resource area. Over 200 bird species have been recorded (BLM 1978:II-63).

Big game present in the LSRA include mule deer (Odocoileus hemionus), pronghorn antelope (Antilocapra americana), elk (Cervus elaphus), black bear (Ursus americanus), mountain lion (Felis concolor), and bighorn sheep (Ovis canadensis). The mule deer are now "the most conspicuous, numerous, and economically valuable big game species in northwestern Colorado." A variety of small game also inhabit the study area.

Mule Deer. Mule deer distribution is throughout Moffat County, with critical winter ranges located along the lower Yampa and Green rivers and around Fortification Creek. Winter range for one of the largest migrating mule deer herds on this continent is located in the Piceance Basin (Bartmann 1968). Mule deer apparently return to the same seasonal ranges each year (Stanton 1974), migrating from brief summer ranges at higher elevations to lower elevations for the winter. Seasonal spring movements coincide with rising temperatures, retreating snow pack, and greening forage. Summer ranges that are occupied are usually diverse mixtures of coniferous forests, meadows, aspen woodland, and alpine tundra. Montane shrub and pinyon-juniper forests are typical winter ranges.

Pronghorn Antelope. Pronghorn are herbivores and represent a unique resource because they are endemic only to North America. They occupy two

basic habitats, grasslands and shrublands. Moffat County contains the largest and most widespread herds in northwestern Colorado. Pronghorn antelope concentration areas are located in the upper reaches of Sand Wash, between Vermillion and Dry Creeks, along the Little Snake River, and near Lay Creek. Winter ranges also occur in these areas, although somewhat expanded, with the additional range along the Green River, where it flows through Brown's Park, near Deception Creek, and in a small area northwest of Elk Springs.

As with mule deer (and elk), pronghorn movement depends largely on snow conditions and thus may vary sharply from year to year. They have been called "one type species," because of their tendency to occupy open range land areas where the expanses are characterized by gently rolling terrain (Kindschy et al. 1978).

Barriers to pronghorn movement restrict habitat availability and possible migration paths. Large bodies of water, large rivers, deep canyons, steep ridges, and extensive stands of thick bushes and trees may also prohibit movement. Slopes approaching 30 percent are avoided by pronghorn.

Elk. Historic distribution of elk in northwestern Colorado is believed to have been extensive. Winter ranges, normally in valley bottoms, on lower portions of narrow, tributary canyons, and on low hillsides, were common.

In Colorado, elk movement between summer and winter range is generally considered only shifts in elevation. Elk summer range is characterized by large, open parks, surrounded by dense stands of conifer forests. Critical winter ranges are located along Fortification Creek, within Brown's Park, and at the lower elevations of the Williams Fork Mountains.

Black Bear. Black bear are usually solitary, secretive, and historically were regarded (along with all bears) as "dangerous, stock killers, and generally undesirable" (NCWC 1982:31). This led to the extirpation of the grizzly bear (Ursus arctos horribilis) and a great reduction of the black bear population in Colorado. Bear distribution data for Moffat County is unknown, although bear distribution for Routt is countywide, with the highest densities in the northern portion. Bear habitat typically includes nonforested areas, where wet meadows, riparian areas, avalanche chutes, and sub-alpine ridge tops are found, and in forested areas, where fruit bearing and seed producing shrubs and trees are common. Denning habitats are reported in a variety of vegetative communities. Wind falls, hollow trees, caves in mature forests, and gambel oak communities have all been used by bear (Jonkel 1978).

Mountain Lion. The Mountain lion is also a large, secretive carnivore, found generally west of the Little Snake River, in Moffat County. No specific distribution information is available for Routt County. Winter ranges are located in the Vermillion, Little Snake, and Sand Wash drainage basins. Lions require a diverse habitat that must include cover for general concealment. Lions are associated with pinyon-juniper stands, ponderosa pine communities, mountain mahogany, and oak brush (Russell 1978). Since lions must maintain contact with prey populations, seasonal distribution shifts are in concert with prey distribution, particularly mule deer.

Bighorn Sheep. Bighorn distribution in northwest Colorado is thought to have been historically quite extensive. Sheep are known to have ranged in the rugged country of Routt County and in the Yampa and Green River

canyons. Bighorn presently occur along both sides of Ladore Canyon in Dinosaur National Monument and have been transplanted in Cross Mountain and along Beaver Creek. Bighorn sheep are highly social, behaviorally specialized animals that return to the same ranges year after year (Geist 1971). Seasonal ranges and migration routes are passed from generation to generation, through learned behavior. Therefore, these animals cannot adapt easily to habitat change. Most herds show either migration from summer to winter ranges or seasonal drifts to wintering areas (Wishart 1975).

Small Game and Nongame Mammals. Small game mammals include: snowshoe hare (Lepus americanus), white-tailed jackrabbit (Lepus townsendii), nuttall's cottontail (Sylvilagus nuttallii), desert cottontail (Sylvilagus audubonii), and red squirrel (Tamiasciurus hudsonicus). Small game mammals, considered by Colorado statue as "varmints," occurring in the LSRA are: porcupine (Erethizon dorsatum), muskrat (Ondatra zibethicus), skunk (Spilogale putoris and mephitis), raccoon (Procyon lotor), two species of gopher (Thomomys spp.), yellow-bellied marmot (Marmota flaviventris), squirrel (Spermophilus spp.), white-tailed prairie dog (Cynomys leucurus), and coyote (Canis latrans).

Principal furbearers found in this area are beaver (Castor canadensis), muskrat (Ondatra zibethicus), mink (Mustela vison), weasel (Mustela spp.), marten (Martes americana), badger (Taxidea taxus), bobcat (Felis rufus), ringtail (Bassariscus astutus), and fox (Vulpus vulpes, Urocyon cinereoargenteus).

Common nongame mammals in the study area include: pika (Ochotona princeps), Ord's kangeroo rat (Dipodomys ordii), wolverine (Gulo gulo), river otter (Lutra canadensis), black-footed ferret (Mustela nigripes), lynx

(Felis lynx), five species of vole (Sorex spp.), eleven species of mouse (Perognathus spp., Zapus spp., Reithrodontomys spp., Onychomys spp.), chipmunk (Eutamias spp.), woodrat (Neotoma spp.), shrew (Sorex spp.), and fourteen species of bat.

Several mammals in the LSRA with threatened or endangered status are lynx, wolverine, otter, and black-footed ferret. Mammals, now locally extinct but once occurring in the study area, include grizzly bear (Ursus horribilis), gray wolf (Canis lupus), and bison (Bison bison).

Birds. Upland gamebirds occurring in this study area include: blue grouse (Dendragapus obscurus), sage grouse (Centrocercus urophasianus), sharptail grouse (Tympanuchus phasianellus), and mourning dove (Zenaidura macroura). Sage grouse is the most common bird found in sagebrush vegetation, and they return to the same traditional strutting grounds each year to carry out mating rituals. Mourning dove occur throughout the area during the spring and summer, migrating out of the area in winter.

Waterfowl. The Green, Yampa, and Little Snake rivers provide good spring and summer habitat for many migratory species of waterfowl. Over 50 different species of waterfowl and shorebirds have been recorded within the resource area boundaries. Four species of geese breed and/or migrate through the study area. All species of dabbling duck are quite common during spring and winter migrations, although the resource area is not a major duck breeding area (NCWC 1982:13). The mallard and green-winged teal are the most common wintering species in the Yampa River Valley (Boeker 1953). The greater sandhill crane, considered an endangered species in Colorado, often mate and nest in this area.

Raptors. Cliffs in this area also provide abundant nesting habitat for raptors such as the golden eagle (Aquila chrysaetos), bald eagle (Haliaeetus leucocephalus), red-tailed hawk (Buteo jamaicensis), and falcon (Falco spp.). Numerous other perching and nonperching bird species occupy the woodlands and shrublands of this region, but most occur only as summer residents and migrate out of the area during the winter months.

Fish. Only 13 species of native fish exist in the Colorado River basin. They include mountain white fish (Prosopiun williamsoni), mountain sucker (Catostomus platyrhynchus), cut-throat trout (Salmo clarki), sculpin (Cottus bairdi), speckled dace (Rhinichthys spp.), round tail chub (Gila robusta), and squaw fish (Ptychocheilus lucius).

The upper Yampa and its tributaries are typically trout waters. The Yampa characteristically changes from cold water to warm water in an westward direction, changing from waters dominated by trout, white fish, and suckers in Routt County to waters dominated by chub, carp, squawfish, catfish, suckers, and trout at the confluence of the Green and Yampa rivers in Moffat County.

The Yampa is significant for squawfish, currently on the Federal List of Threatened Wildlife and Colorado List of Endangered Species. Numerous adult species are found in the river. They migrate from upstream, above Juniper Canyon, to just outside of Craig. Occasional specimens of humpback chub and razorback sucker, also endangered species, have been found in the lower Yampa up to Cross Mountain Canyon.

Ethnographic Use of Faunal Resources

Assuming the variety and number of wildlife species located in this area today was not historically very different, the faunal species would have been an important factor in the subsistance economy of prehistoric hunting and gathering groups. Table 5 lists faunal remains from excavated sites located within, or near, the LSRA and their ethnographic uses by Numic groups known to have occupied the area. Caution is necessary, however, when relating present behavior and distributions of animal species to the prehistoric periods. Habits of most larger game animals have been altered because of the introduction of domestic animals, control of predators, fencing, habitat changes, controlled hunting, and other modern factors.

Many of the larger animals, such as elk and bighorn sheep, were large enough to be considered attractive prey to hunting and gathering groups. But, in most cases, the small populations of these animals, as compared to deer and antelope, probably precluded their use as a reliable and stable food source. Bears were hunted by the Ute groups, but to a lesser extent than either elk or bighorn, because of their lower numbers and because of the bear's strength and ferocity.

The presence of bison in the area is of particular interest because of its importance in the diet of early big game hunters. Bison frequented the parks and valleys of the Colorado Rockies, even ranging above timberline, although they were never as numerous as on the plains. The Dominguez-Escalante expedition of 1776 noted bison near the present-day town of Rangely (Chavez 1976). E. Willard Smith and others hunted bison along the Yampa and Little Snake rivers (Hafen and Hafen 1955). The last recorded

TABLE 5
FAUNAL REMAINS FROM EXCAVATED SITES IN LSRA AND BORDERING AREAS

Common Name	Sceintific Name	Location of Recovery	Ethnographic Use
Bison	Bison Bison	Deluge Shelter (Leach 1970) 5MF605 (Eddy et al. 1982), ColoWyo Sites (Wood 1980), Mantle's Cave (Pillmore 1948), Hell's Midden (Lister 1951)	Ute-hide blankets, tipi covers, sweat lodge cover, meat (Smith 1974), Shoshone-food (Lowie 1924;Trendholm and Carley 1964; Steward 1938)
Bighorn Sheep	Ovis canadensis	Deluge Shelter (Leach 1970), 5MF605 (Eddy et al. 1982), ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Ute-food, ladles, glue (Smith 1974), Shoshone-food (Lowie 1924; Steward 1938), robes (Trendholm and Carley 1964)
Elk	Cervis canadensis	Deluge Shelter (Leach 1970) 5MF605 (Eddy et al. 1982) ColoWyo Sites (Wood 1980) Mantle' Cave (Pillmore 1948)	Ute-tipi cover, food, clothing, cordage (Smith 1974; Lowie 1924), Shoshone-food (Trendholm and Carley 1964; Steward 1938)
Beaver	Castor canadensis	Deluge Shelter (Leach 1970) 5MF605 (Eddy et al. 1982), Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Ute-food (Smith 1974), Shoshone-robes, food (Trendholm and Carley 1964; Steward 1938)
Woodrat	Neotoma cinerea Neotoma lepida	Deluge Shelter (Leach 1970) ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Shoshone-food (Lowie 1924)
Marmot	Marmota	Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Shoshone-food, pelts (Steward 1938)
Ground Squirrel	Spermophilus sp.	Deluge Shelter (Leach 1970) 5MF605 (Eddy et al. 1983) Mantle's Cave (Pillmore 1948)	Ute-food (Smith 1974) Shoshone-food (Lowie 1924; Steward 1938;Trenholm and Carley 1964)

TABLE 5 (continued)
FAUNAL REMAINS FROM EXCAVATED SITES IN LSRA AND BORDERING AREAS

Common Name	Scientific Name	Location of Recovery	Ethnographic Use
Red Squirrel	Tamiasciurus hudsonicus	ColoWyo Sites (Wood 1980)	
Mule Deer	Odocoileus hemionus	Deluge Shelter (Leach 1970), 5MF605 (Eddy et al. 1982), Walton Creek (O'Neil 1980), ColoWyo Sites (Wood 1980), Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Ute major hunting emphasis (Smith 1974), clothing (Lowie 1924)
Cottontail Rabbit	Sylvilagus audubonii Sylvilagus nuttallii	Deluge Shelter (Leach 1970) ColoWyo Sites (Wood 1980), Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Ute-food, clothing (Lowie 1924; Smith 1974), Shoshone - food (Lowie 1924; Trenholm and Carley 1964), clothing (Lowie 1924; Trenholm and Carley 1964)
Blacktail Jackrabbit	Lepus Californicus Lepus townsendii	Deluge Shelter (Leach 1970) ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	
Prairie Dog	Cynomys leucurus	Deluge Shelter (Leach 1970) ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Shoshone-food (Lowie 1924; Steward 1938)
Muskrat	Ondatra zibethicus	Deluge Shelter (Leach 1970) 5MF605 (Eddy et al. 1982) ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	Shoshone-pelts (Steward 1938)
Bobcat	Felis rufus	Deluge Shelter (Leach 1970, ColoWyo Sites (Wood 1980)	

TABLE 5 (continued)
FANUAL REMAINS FROM EXCAVATED SITES IN LSRA AND BORDERING AREAS

Common Name	Scientific Name	Location of Recovery	Ethnographic Use
Coyote	Canis latrans	Deluge Shelter (Leach 1970) Mantle's Cave (Pillmore 1948)	Ute-pelts (Smith 1974), Shoshone-pelts (Lowie 1924) clothing (Trenholm & Carley 1964)
Red Fox	Vulpes vulpes	Deluge Shelter (Leach 1970) Mantle's Cave (Pillmore 1948) Hell's Midden (Lister 1951)	Ute-pelts (Smith 1974)
Porcupine	Erethizon dorsatum	5MF605 (Eddy et al. 1982) ColoWyo Sites (Wood 1980)	Ute-comb (Smith 1974) Shoshone-comb (Lowie 1924)
Colorado Squawfish	Ptychocheilus lucius	Deluge Shelter (Leach 1970) 5NF605 (Eddy et al. 1982) ColoWyo Sites (Miller and Behnke 1979)	
Bonytail Chub Roundtail Chub	Gila robusta	Deluge Shelter (Leach 1970) ColoWyo (Miller and Behnke 1979)	Shoshone-food (Steward 1938)
Snail	Lymnae sp. Gyraulus sp.	Deluge Shelter (Leach 1970)	
Canada Goose	Branta canadensis	5MF605 (Eddy et al. 1982) ColoWyo Sites (LOPA 1981)	
Deer Mouse	Peromyscus sp.	5MF605 (Eddy et al. 1982) ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	
Black Bear	Ursus americanus	5MF605 (Eddy et al. 1982) ColoWyo Sites (Wood 1980)	Ute-food, pelt, fat (Smith 1974)

TABLE 5 (continued)
FAUNAL REMAINS FROM EXCAVATED SITES IN LSRA AND BORDERING AREAS

Common Name	Scientific Name	Location of Recovery	Ethnographic Use
Domestic Dog	*Canis familiaris*	5MF605 (Eddy et al. 1982)	
Horse	*Equus caballus*	5MF605 (Eddy et al. 1982) Walton Creek (O'Neil 1980)	
Pronghorn	*Antilocapra americana*	5MF605 (Eddy et al. 1982) Walton Creek (O'Neil 1980) ColoWyo Sites (Wood 1980)	Shoshone (Steward 1938)
Magpie	*Pica Pica*	ColoWyo Sites (LOPA 1981	Ute-feathers (Smith 1974)
Mallard	*Anas platyrhynchos*	ColoWyo Sites (LOPA 1981)	Ute-food (Smith 1974)
Teal	*Anas* sp.	ColoWyo Site (LOPA 1981)	
Mtn. Bluebird	*Sialia currucoides*	ColoWyo Sites (LOPA 1981)	
Hawk	*Buteo* sp.	ColoWyo Sites (LOPA 1981)	Ute-feathers (Smith 1974)
Chipmunk	*Eutamius quadravitatus*	ColoWyo Sites (Wood 1980)	Shoshone-food (Steward 1938)
Northern Pocket Gopher	*Thomomys talpoides*	ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	Shoshone-food (Steward 1938)
Vole	*Microtus montanus*	ColoWyo Sites (Wood 1980)	
Weasel	*Mustela frenata*	ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	Ute-pelts (Smith 1974) Shoshone-pelts (Trenholm and Carley 1964)
Skunk	*Mephitis mephitus*	ColoWyo Sites (Wood 1980) Mantle's Cave (Pillmore 1948)	Ute-pelts (Smith 1974)

TABLE 5 (continued)
FAUNAL REMAINS FROM EXCAVATED SITES IN LSRA AND BORDERING AREAS

Common Name	Scientific Name	Location of Recovery	Ethnographic Use
Mink	*Mustela vison*	ColoWyo Site (Wood 1980)	
Eagle	*Aquila* or *Haliaeethus*	ColoWyo Sites (Wood 1980)	Ute-feathers (Smith 1974)
Crow	*Corvus brachyrhynchos*	ColoWyo Sites (Wood 1980)	
Turkey	*Meleagris gallopavo*	ColoWyo Sites (Wood 1980)	
Turtles	*Emydinae*	ColoWyo Sites (Wood 1980)	
Rattlesnake	*Crotalus* sp.	ColoWyo Sites (Wood 1980)	
Flannelmouth Sucker Bluehead sucker	*Catostomus latipinnis* *C. discobolus*	ColoWyo Sites (Miller and Behnke 1979)	Shoshone-food (Steward 1938)

occurrence of bison in Northwestern Colorado was one killed by the Utes at Cedar Springs west of Craig in 1884 (Armstrong 1972). Bison skulls and remains have been found by local inhabitants in the Axial Basin, along Fortification Creek, at Juniper Mountain, and in Douglas Mountain. Stucky (1974) recovered evidence of butchered bison remains at 5MF625 in the Sand Wash Basin. A rock art panel south of the town of Hayden depicts a "lifesize" bison/mammoth pictograph rendered in blue pigment.

Bison were never numerous west of the Rocky Mountains, perhaps because of the lack of vast grasslands. They were evidently not hunted on a large scale until after introduction of the horse, when native bands traveled eastward. Utes from all parts of Utah hunted bison in the Uintah Basin until the bison became extinct in the 1830s (Smith 1974:53). Trips were also made into southwestern Wyoming and east of the Rockies onto the plains (Smith 1974:53).

Communal antelope drives were conducted by Shoshone groups taking advantage of herding tendencies, excessive curiosity, and poor jumping abilities of these animals. Large groups of Indians, on foot, spread out over miles of country would slowly drive the antelope into a corral (Steward 1938). Ute groups built long converging wings of brush and poles, ending in a V-shape at the edge of a well disguised, but low cliff. Below the cliff was a corral. Sometimes as many as 200 antelope were driven down the wings, over the cliff, and into the corral, where they were killed (Smith 1974:55). Mounted Shoshonean groups surrounded a bunch of antelope and, taking turns, ran them in circles until the animals collapsed from fatigue and then easily killed them (Wilson and Driggs 1919). Antelope trapping was apparently so successful in parts of the Great Basin that several years were

required to regenerate the populations (Steward 1938). Venison was the preferred meat of the Ute Indians, and where deer were plentiful it constituted a major part of their diet (Smith 1974:46). Deer hides were traded by Shoshone groups (Steward 1938:45).

According to Grady (1980), only the mule deer has the optimum size and population density to be considered as a staple food and hide resource. An additional consideration of the possible parasitic relationship between deer and hunting and gathering groups in the area would be the probablity that these prehistoric groups followed a seasonal migration pattern similar to the deer, with summers spent exploiting upland resources and winters spent in canyon bottoms.

The importance of fish to the Shoshone as a food resource varied with the locality and species (Steward 1938:4). Squawfish, suckers, and chubs (Table 5) were all exploited by various groups and may have even provided an important winter food resource. Fish were caught and eaten by all Northern Utes, but only groups living near Utah Lake had enough fish to dry and store (Smith 1974:49). The Dominguez-Escalante expedition purchased dried fish from the "Yutas" during their trip through northern Utah, near Utah Lake (Chavez 1976).

A great quantity of "finely divided dark brown material" was recovered from a cist pit at Castle Park that was analyzed as adult grasshoppers (Burgh and Scoggin 1948). Grasshoppers and Morman crickets were sometimes of great importance to Basin-Plateau aborginal groups (Steward 1938). Jones (1948) found J. W. Powell's account of the use of grasshoppers by the Ute Indians an excellent explanation of the insect cache:

During the autumn, grasshoppers are very abundant. When cold weather sets in, these insects are numbed, and can be gathered by the bushel. At such time, they [the Utes] dig a hole in the sand, heat stones in a fire near by, put some in the bottom of the hole, put on a layer of grasshoppers, then a layer of hot stones and continue this until they put bushels on to roast. They are left until cool, when they are taken out, thoroughly dried and ground into meal. Grasshopper gruel, or grasshopper cake is a great treat.

III.

INVESTIGATION AND RESEARCH BACKGROUND

Evaluation of the Data Base Methodology

A thorough compilation of the known historical and prehistoric site record data and the identification and evaluation of previous investigations was undertaken in an effort to summarize the existing cultural resource information for the LSRA. The site record compilation involved collecting information about both prehistoric and historical sites within the resource area from records maintained by the BLM, the Colorado Preservation Office, the Forest Service, the University of Colorado, Colorado State University, and many private cultural resource management offices.

During the initial "gathering" stage of the project, it became apparent that record compilation of this scale would be more efficiently accomplished by developing a computerized data base system. The prototype proposed by the Colorado Preservation Office (CPO) was in the design stage and had not been implemented. Without sufficent time to await the state system, the LSRA proceeded in the development of a local system, using BLM's data management system REX. An important consideration of the system was that it remain highly flexible so that variables could be altered or added without requiring major program changes. A second consideration in the system design involved structuring the data to ensure compatibility with commercially available statistical program packages such as Statistical Package for Social Sciences. A final consideration was the desire to include variables that coincided with the CPO system for efficient data base

comparison. The resultant data base can be periodically checked and compared to the CPO system for update and corrective purposes.

Numerous problems were encountered. Early site record forms and maps were often found to be inaccurate, poorly recorded (and even lacking altogether), making complete compilation of the data nearly impossible. Inadequate control in assigning site numbers in the past led to many double or even triple site numbers. For several years the CPO assigned numbers according to the Smithsonian Trinominal designations, while the BLM assigned a second set of "in-house" numbers. Reports and publications dealing with these sites make no mention of the parallel systems and hence it is often difficult to determine what site is actually being discussed. The importance of maintaining one site numbering system cannot be over-emphasized--site numbers are often the only way to reference a particular site, unless a name has been given to it.

A primary goal in examining the site records was to obtain, in manageable form, as much comparable site attribute data for use as a resource data base for future work as possible, and as a way to identify obvious gaps in the data that would allow an estimation of the reliability of present data. The compilation, in this context, would specifically identify areas of the region requiring work, and also previous investigations that may be unreliable and should be redone. Because of the reconnaissance nature of much of the available data, the information dealing with cultural/temporal position of sites and their distribution, density, and environmental placement is of particular importance.

The site records for Moffat, Rio Blanco, and Routt counties were examined, and a predetermined array of information on each site was

collected. Items of data collected included: site number, legal location, cultural features, artifacts, cultural affiliation, topographic position, vegetation, elevation, physiographic region, photo information and collection strategy, recorded date of record, field and official evaluation, project name, bibliographic reference, and more.

A major problem was that much of this site information had not been recorded for many of these sites, and there was no cross reference system for updating the information whenever the site(s) were destroyed, monitored, or excavated, etc. To deal with this lack of pertinent information, much effort beyond a simple inventory of records was required. Environmental information was not recorded for many sites; and in order to complete the record, the precise location and plotting of each site on USGS topographic maps was necessary. With the location firmly established, geographical and environmental information could be inferred from map and aerial photo position.

Reference to the reports and publications was also required, in an effort to glean site descriptive data and evaluation. Frequently, site cultural/temporal affiliation data was only contained in these reports and not found on the site form. Results of testing program investigations were encoded and entered into the data bank to cross reference further work at the site and provide a "case-history" for the site by including type of work conducted, investigator, bibliographic reference, results, and project name. An annotated bibliography was compiled to further cross-reference each site to all known published reports that referenced the site. This alone required considerable effort, with over 2,300 entries. Tracking down reports and site forms from various cultural resource management firms,

governmental agencies, and academic institutions was time consuming; but it identified some problems that existed with report filing and circulation at both the state and BLM levels, which had added to the lack of incomplete nature of information and to the difficulty in conducting literature searches in these offices.

Negative survey data has also been included in the data base. Project name, project size, legal location, and results have been entered into the data base in an effort to obtain a complete picture of the resource base from the standpoint of where sites have not occurred. This information, complimented with positive site project information, can also be used to track the nature of energy development and to locate the focus of this development. Future block surveys can be designed in these areas with this in mind.

Previous Archaeological Work in the Project Area

Virtually no archaeological investigations were conducted in the LSRA during the late 19th and early 20th centuries when the discovery of cliff dwellings at Mesa Verde in southwestern Colorado drew explorers, professional archaeologists, and sightseers to the four-corners area. The lack of interest is perhaps, in part, a result of the lack of impressive structures, ceramics, and burials in the LSRA, making the area appear to have little to offer. As a result, no professional archaeological investigations were conducted before 1922, and then relatively few until the late 1940s, when archaeological interest was directed toward the Fremont occupations in Utah. Following the enactment and enforcement of various

historical preservation laws in the 1960s, increased archaeological investigations have been conducted in response to the considerable development of energy resources in the LSRA.

The following discussion is divided into two parts: the first will trace early works and those projects conducted solely as scholarly research; the second part deals with cultural resource management projects conducted wholly or partially in response to pertinent historical preservation laws.

Exploration and Definition

W.C. McKern conducted the first formal investigation in the LSRA in 1922. This study of rock art was sponsored by the Smithsonian Institution and involved sites located throughout western Colorado. The manuscript was lost for 55 years, but it was recovered and published by the BLM in 1978. McKern (1978) intensively analyzed several petroglyph panels located along the Sandrocks, immediately north and just outside the town of Craig, Colorado. He surmised that the styles of rock art located there did not correlate with known Fremont petroglyphs in the area, but had a general similarity to the historic period Ute petroglyphs. Presently, McKern's evaluation of the Craig area petroglyphs have no counterpart in modern literature.

Summer expeditions were conducted from 1939 to 1941 on the western slope by Betty H. and Harold A. Huscher for the Colorado Museum of Natural History. The Huschers, in an effort to define Athabaskan migration routes, located, recorded, and tested sites containing stone structures in "spot surveys" rather than by thorough reconnaissance efforts. Numerous stone

structures were described by the Huschers (1939), including seven circular and oval stone rings and one large structure just above the Thornburgh Battle Ground along Milk Creek in Moffat County (5MF495). Detailed locational information for the site was destroyed in 1959 by a fire at the Denver Museum of Natural History, and the site has not been relocated. The Huschers (1943) attribute these enigmatic stone structures to the Athabaskans and labeled them as "hogans." Archaeologists today disagree with their identification and believe the remains may be representative of a Fremont variant (Gleichman, et al. 1982:442).

Archaeological interest in the Fremont, beginning in the late 1940s and early 1950s, centered on much investigation by the University of Colorado and University of Utah in Dinosaur National Monument. Research by Burgh and Scoggin (1948) and Gunnerson (1957), among others, led to initial definitions of Fremont Culture. The early 1960s and 1970s brought a flurry of surveys and excavation at the monument (Breternitz 1970a, and Leach 1970). These investigations further refined the nature of Fremont occupation in the area, as well as revealing more questions in relation to Fremont trait lists, interregional variation and origin, development, and "demise."

A 3-year archaeological project sponsored by the University of Colorado and the National Park Service was undertaken in Dinosaur National Monument in an effort to survey and compile an archaeological base map for the monument. Four hundred thirteen sites were located, most of which were affiliated with the Desert Culture; 16 were definitely classified as Fremont and a few were identified as Ute (Breternitz 1965). Excavation of 24 sites

followed, and the results were published in several reports (Breternitz 1970a; Leach 1966, 1970). Eight Fremont sites were excavated. They provided the foundation for the designation Cub Creek Phase for the Uinta Fremont. These reports provided important information for the interpretation of the area's prehistory, but unfortunately a majority of this material was undated. Deluge Shelter, located in Jones Hole, was an exception. It is a deep, stratified cave site, with Fremont and Archaic levels, with an early date of ca. 1850 B.C. (Leach 1970). This is one of the most important sites excavated near the LSRA, because it provides artifactual and chronological information pertinent to Little Snake and surrounding areas. Fifteen separate occupation levels were revealed, representing a time span from 5000 B.C. to A.D. 1850.

During a paleontological study of the Sand Wash Basin, 1974 to 1975, numerous archaeological sites were noted; and the following year an archaeological survey of a portion of the area was conducted by the University of Colorado. The results of the survey were reported in an M.A. thesis by Richard Stucky (1974). A total of 23 archaeological sites and 19 isolated finds were found within the survey area during the project. In addition, three sites were tested. The evidence suggests a discontinuous occupation of the basin from ca. 6550 B.C. to recent times, composed of eight separate occupation periods. The Early Prehistoric Period and Early Altithermal occupations are thought to be associated with the Northwestern Plains, followed by three Early Middle Prehistoric Period occupations, associated with the Great Basin Desert Culture, another with the Great Plains Duncan-McKean Technocomplex, and the last restricted to the northwestern Colorado region. One Late Middle Prehistoric and one Late

Prehistoric Period occupation are suggested, which may be associated with either the Great Basin or Great Plains cultural areas, or both. The last period of occupation, Late Prehistoric/Historic, may be associated with the historical Shoshone groups.

The adaptational structure of the prehistoric peoples during all eight occupations was quite similar and determined in part by the basic resources of the basin---locally available toolstone and abundant game animals. This adaptational structure was reflected in the recovered cultural material, where a major emphasis on tool manufacture, hunting, and processing of big game animals was evident; a lesser dependence on seed plants was found. These occupants were also nomadic and perhaps shifted their adaptational structure when not living in the basin to one dependent on riverine ecosystems.

Cultural Resource Management Reports

For the past decade, the archaeological investigation in the area has been dominated by cultural resource management in response to numerous laws that are aimed at locating and preserving significant historical and prehistoric sites threatened by energy exploration and development. Inventory efforts are confined to those energy development areas such as coal lease tracts, reservoir projects, and well pads, as opposed to research-oriented inventories. Appendix A is a brief tabulated summary of the major cultural resource management projects according to type (reservoir, coal, energy corridor) conducted in the LSRA. Tested and excavated sites are listed in Table 6.

TABLE 6

TESTED AND EXCAVATED SITES IN LSRA

Site Number	Township	Range	Tested	Excavated
5MF1977	12N	97W	X	
5MF1522	10N	100W	X	
5MF1521	10N	100W	X	
5MF958	11N	100W	X	X
5MF948	5N	90W	X	
5MF947	6N	91W	X	
5MF946	6N	91W	X	
5MF660	12N	99W	X	
5MF647	10N	99W	X	
5MF646	10N	99W	X	
5MF645	10N	99W	X	
5MF644	10N	99W	X	
5MF643	10N	99W	X	
5MF642	10N	99W	X	
5MF641	10N	99W	X	
5MF636	10N	99W	X	
5MF635	10N	99W	X	
5MF633	10N	99W	X	
5MF632	10N	99W	X	
5MF631	10N	99W	X	
5MF630	10N	99W	X	
5MF629	10N	99W	X	
5MF628	10N	99W	X	
5MF627	10N	99W	X	
5MF626	10N	99W	X	
5MF625	10N	99W	X	
5MF605	10N	103W	X	
5MF476	7N	93W	X	
5MF309	6N	97W	X	
5RT142	5N	87W	X	X
5RT139	5N	87W	X	X
5RB11	6N	84W	X	
5RB10	6N	84W	X	

Summary of Current Research Directions

Essentially, all current archaeological work in the area is in some way related to cultural resource management. Most of the data being generated consists of information on the distribution and number of sites derived from cultural resource management inventories, and few studies have attempted to characterize patterns of site distribution.

Most of these inventories have been conducted to meet legal and permitting requirements associated with energy development. These efforts, by nature, are concentrated within areas of intensive energy exploration. There is an absence of archaeological data from major portions of the resource area and unequal "sampling" of others. Until this disparity is eliminated, an accurate overview that truly reflects the cultural dynamics of the region cannot emerge.

A central theme in the interpretation of survey data is the development of a cultural chronology for the resource area. Although considerable work has been done, the chronological control is sketchy because of the lack of objectively dated sites. Since most of the temporally sensitive cultural material are recovered as surface finds, there are inherent biases in the sample available for study--contextual relationships are just not as secure in open sites as they are in sealed subsurface deposits.

Moreover, without an areal cultural synthesis based on excavated, dated, and associated material, comparisons with typologies developed for surrounding regions are often, and quite necessarily, made. Such comparisons, unfortunately, are at times used to imply that the dates of point types in other regions are quite similar to the dates of points in the resource area, and even imply that the cultural groups are the same.

Many archaeologists have recognized that northwestern Colorado constitutes a portion of a geological corridor between the Great Plains and the Great Basin (Mulloy 1954; Jennings 1957; Aikens 1966 and others). The area has been referred to as "the Great Margin," influenced by the Western Great Plains, Southwest, and Great Basin traditions (C. Jennings 1968). These diverse influences are evident in the wide range of archaeological material found in the area. No evidence has been presented that supports the existence of established trade networks or major population movements between the Great Basin and Great Plains (Zeimens 1976). Before assumptions are made regarding Great Plains or Great Basin cultural influence or occupation, one must realize that many projectile point types have broad geographical distributions, span many cultural groups, and were manufactured over long periods of time.

With so few studies addressing cultural/temporal sequences of occupations, settlement patterns, and subsistence strategies, research questions of a regional nature that can be investigated in the study area are numerous. These research problems include the development of a cultural-historical framework for the Little Snake Resource Area (given the strategic location of the study area between the Plains and Great Basin culture areas), reconstruction of the actual subsystems and processes within the subsistence-settlement systems for different groups, reconstruction of paleoclimatic conditions, and reconstruction of past lifeways that may be unique to particular areas within the LSRA.

Because so few sites have been excavated in the area, and of those excavated none were completely investigated, many prehistoric culture questions remain unanswered. Stratigraphic excavation techniques have been

employed at a few sites, but palynology flotation, sediment analysis, etc., have not been attempted. As a result, little is known regarding temporal spans of occupation; even less is known about aboriginal subsistence, and nothing is known about the paleoenvironment. Excavations of sites during the summer of 1984 by Western Wyoming College in Sand Wash and Irish Canyon and by the Colorado Highway Department, north of Craig, may provide invaluable information concerning prehistoric activities in the LSRA when they are published; at present, unfortunately, this information is not available.

IV.

QUALITY OF DATA BASE

Since the first studies began in the Dinosaur National Monument in the 1950s, over 580 reports on the cultural resources of the Little Snake Resource Area have been written. About 98 percent of the reports were written after 1970, reflecting work conducted primarily as a result of actions by various federal agencies. Most of this work, with the exception of Stucky (1977) and Cole (1983), has been project-clearance oriented. This has been done at the behest of the federal government and follows resource energy development such as coal, water, oil and gas, and locatable minerals. Table 7 summarizes the cultural resource activity in the Little Snake Resource Area since 1970.

These projects form the foundation of known cultural material and habitation patterns in the Little Snake Resource Area; but because of their regional and project-specific nature, they remain unintegrated. Over 1,360 sites have been recorded for the Little Snake Resource Area; 88 percent of them were recorded by cultural resource managers. Without energy-development in the resource area, little would be known about prehistoric occupation in this area, with the exception of the Brown's Park and Dinosaur areas where academic and research interests were pursued by the University of Colorado and the Colorado Archaeological Society.

Only a very small percentage (less than 3 percent) of the resource area has been surveyed; this is concentrated in certain areas destined for development. These areas include Powder Wash and Hiawatha Camp (oil and gas); Great Divide (locatable minerals); Williams Forks, Danforth Hills, and

TABLE 7
CULTRUAL RESOURCE ACTIVITY IN LSRA, 1970 - 1983

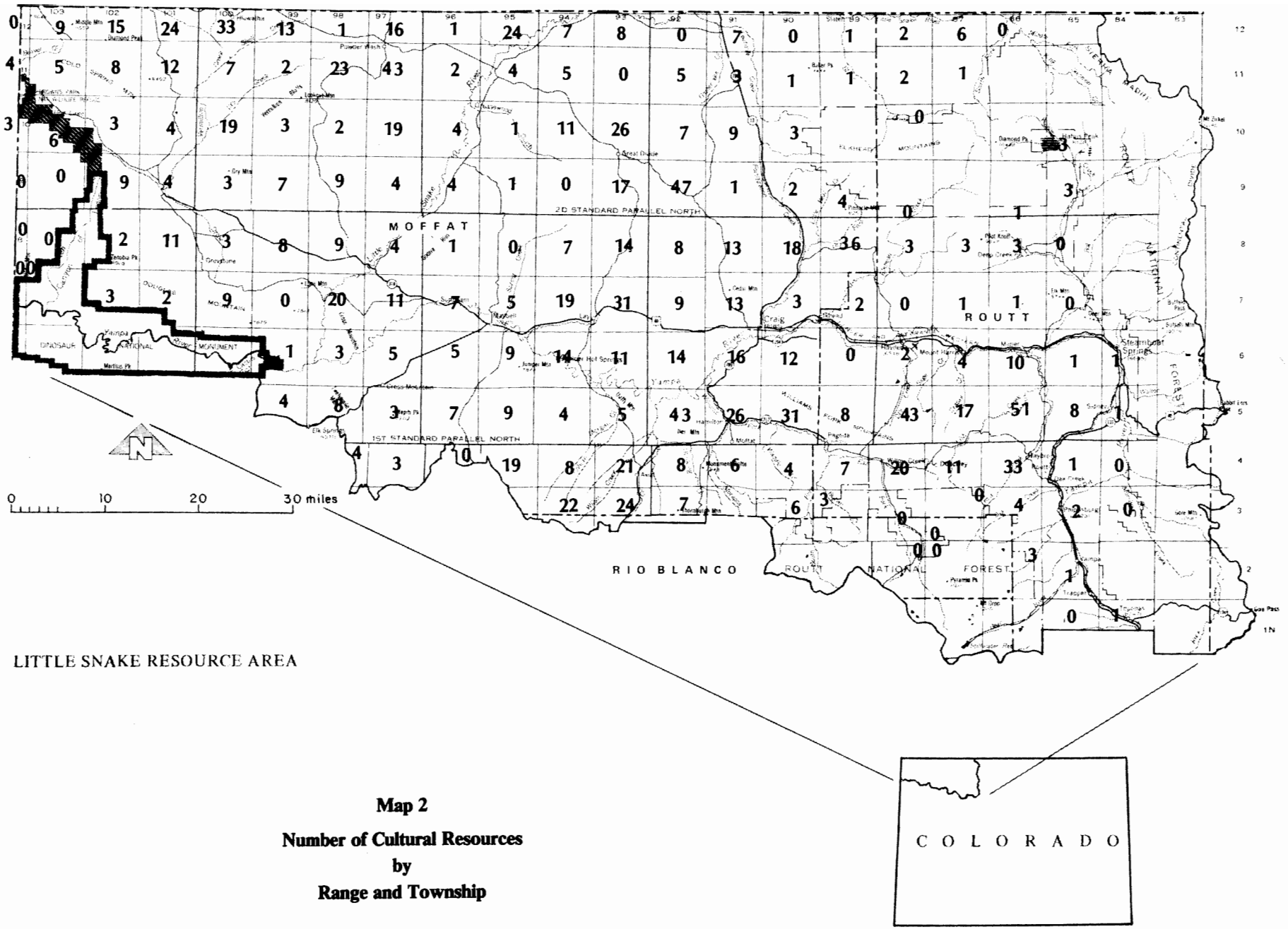
Year	Total Projects	Type of Project				Level of Investigation				Acres Surveyed	Resources Recorded	Comments
		Block	Linear	BLK/Lin	Other	Class I	Class II	Class III	Other			
1970	1	1							1		3	Spot check
1971	2										5	Unk type
1972	3	1	1		2			1	3		8	
1973	2	1	1					2		1,920	9	
1974	5		3	1	1			4	1		5	Test excavation of 5MF309
1975	7	3	1	2	1			6	1	2,887	138	
1976	24	14	1	4	1	1		20	1	4,230	109	2 unk Type, Athearn Class I
1977	69	48	11	12	1		1	65	2	23,727	188	
1978	73	34	20	16	3	1		67	3	5,427	40	
1979	73	40	17	14	1	1		62	11	8,560	101	
1980	103	56	9	33	5		2	92	4	11,311	118	
1981	85	39	23	17	6	2	5	71	6	11,042	273	
1982	68	31	15	17	5	4	1	57	6	10,612	129	
1983	65	34	13	7	11	5		44	16	4,603	76	
	580	304	115	123	37	14	9	491	55	84,308	1202	

Lay (coal); and Juniper-Cross Mountain (water). Map 2 displays by township and range.

The extant data is inherently biased toward in energy areas and neglects the total environmental range in the Little Snake Resource Area; therefore, our knowledge of prehistoric cultural adaptations in the project area is incomplete. The piece-meal quality of work requires some integration and reducing of the regional gaps through the survey and investigation of the upland regions of Douglas, Cross, and Juniper Mountains; the river canyon areas of Vermillion Creek, Brown's Park, and the Little Snake; and the Sand Wash Basin. Surveys in these areas are badly unrepresented, but through continued investigation, our knowledge of the area will be enhanced.

Knowledge of the area is of upmost importance when considering the evaluation of site significance. All sites contain information--some may contribute relatively little new data, and others may contribute significant amounts of new data that are important to the understanding of past uses. Each site must be evaluated in light of regional research goals and must be mitigated in terms of its relative value and significance--the relative value of the site can only be ascertained if the resources have been fully identified, defined, and evaluated.

Archaeological investigation has been dominated for the past 15 years by cultural resource management. Most of the work has involved inventoring cultural resources in very specific areas. Further investigation of these resources, in terms of excavation and testing, has been very limited, partly because of a general federal policy of mitigation of adverse effects by avoiding cultural resources. Occasional testing has taken place, but only to gain additional information in order to evaluate the resource in terms of



Map 2

Number of Cultural Resources
by
Range and Township

the National Register of Historical Places (NRHP) or to mitigate adverse effects from previous damage. Table 8 summarizes the tests, monitors, and mitigative efforts conducted in the Little Snake Resource Area.

Statistical manipulation of the inventory data has recently been emphasized to identify site settlement patterns and density. Class II surveys of the Juniper-Cross (Chase 1981; Arthur and Collins 1981), the Danforth Hills (Gorden et al. 1982; Piontkowski 1981) and the Kemmerer areas (Piontkowski 1980) have produced data that are, as yet, tentative and untested.

Sites or districts that are considered significant, unique, important, and representative of a time period, culture or tradition may be nominated for placement on the National Register of Historic Places. Nomination of this nature helps to assure the protection and preservation of sites from deterioration and vandalism, as well as making the site more visible to the general public. No formally recognized (i.e., NRHP) prehistoric sites or historical districts exist within the Little Snake Resource Area. Nine historical sites are listed on the National Register (see Table 9 for a description of these sites). Only 6 percent of prehistoric sites in the LSRA have been officially reviewed by BLM and the State Historical Preservation Officer for potential NRHP eligibility.

Field assessment by site recorders of historical and prehistoric cultural resources fall into four categories: no evaluation (10 percent), not eligible to the National Register (51 percent), more data required before final evaluation (27 percent), and eligible to the National Register (11 percent). Table 10 describes those sites considered eligible to the National Register.

TABLE 8
SUMMARY OF ARCHAEOLOGICAL TESTS, EXCAVATIONS
AND MONITORS FOR THE LITTLE SNAKE RESOURCE AREA

Site Number	Reference	Nature of Investigation	Result of Investigation
5MF309	Biggs 1974	Test excavation to determine site boundaries, adverse effect and stabilization requirements	Further sample excavations required to salvage material.
5MF427 - 429	Stevens 1981	Tested to evaluate significance	Eligible to the National Register.
5MF476	C. Jennings 1978	Mitigation adverse effects Mapped by protonmagnetometer and tested.	Further work necessary in order to evaluate the site in terms of NRHP.
	O'Neil 1980a	Test for site eligibility to NRHP	Site determined eligible to NRHP.
5MF605	Eddy 1982	Mitigate adverse effects	Data recovered indicates site is single component and dated to Fur Trader Era. Site stabilized and entered on the National Register.
5MF625	Stucky 1977	Tested to determine nature of material	Data recovered.
5MF627	Stucky 1977	Tested to determine nature of material	Data recovered.
5MF652	CPO site form 5MF652	Recorded and tested by Colorado Highway Department	Unknown.
5MF660	Treat 1979	Monitor of wells exposed burned components	Site determined to be multicomponent with one occupation dated to 1440+ 95 BP by C-14 method. Major activities represented include tool manufacture and maintenance with subsistence activities revolving around rabbit and juniper berry procurement.

TABLE 8 (continued)
SUMMARY OF ARCHAEOLOGICAL TESTS, EXCAVATIONS
AND MONITORS FOR THE LITTLE SNAKE RESOURCE AREA

Site Number	Reference	Nature of Investigation	Result of Investigation
5MF683	Gooding 1977	Site form states test	Will not be endangered by construction. Test results unreported.
5MF684	Gooding 1977	Site form indicates test	Will not be endangered by construction. Test results unreported.
5MF870	Gordon 1980	Monitor of construction in site vicinity	Negative results.
5MF946-947	Caraveo 1980	Shovel tested for depth of cultural deposit	Negative results.
5MF955	Knox 1982	Monitor of construction activities to evaluate site significance	No subsurface cultural deposits found. Site not eligible to the NRHP.
5MF958	Burchett and Rippeteau 1982	Monitor and test to evaluate site significance and collect data	Site considered eligible to NRHP. Ten features revealed. One C-14 date of 1055+ 230 BP indicates a Late Prehistoric occupation.
	Reust et al. 1983	Further test in another area of site to determine site significance	Site eligible to NRHP due to buried deposits. Two distinct occupation levels found; one representing the Late Late Archaic Period.
5MF959	Reust and Creasman 1981a	Monitor of adverse effect to 5MF959	No cultural material or strata revealed.
5MF1521-1522	Moore 1982	Shovel tested for subsurface cultural deposits	Not eligible to NRHP.

TABLE 8 (continued)
SUMMARY OF ARCHAEOLOGICAL TESTS, EXCAVATIONS
AND MONITORS FOR THE LITTLE SNAKE RESOURCE AREA

Site Number	Reference	Nature of Investigation	Result of Investigation
5MF1528-1529	Born 1982	Well monitor	No effect on sites.
5MF1598	Viola and Kranzush 1983	Monitor of activities in vicinity of site	No subsurface material revealed and site remains undisturbed.
5MF1741	Montgomery 1983b	Construction activities monitored in site vicinity	No adverse effect to site.
Cherokee Trail	Kosarko 1978	Surveillance of well pad	Revealed 11 features. "Area" suggested to be potential district. Two hearth types found may date to two different periods - the Early Middle Prehistoric and the Late Middle Prehistoric.
5RT11	O'Neil 1980b	Salvage excavation	Site was seasonally occupied by Shoshoean groups. One C-14 date indicates one occupation at 1730± 225 BP.
5RT139	Hand 1980	Test to determine site nature and eligibility to NRHP	Site is significant and may be the result of Cody Complex period occupation.
	Tucker 1981	Mitigative excavation	Excavation established a Early to Middle Archaic occupation. Primary activities were hunting and procession of fannal resources and heat treatment of lithic materials.

TABLE 8 (continued)
SUMMARY OF ARCHAEOLOGICAL TESTS, EXCAVATIONS
AND MONITORS FOR THE LITTLE SNAKE RESOURCE AREA

Site Number	Reference	Nature of Investigation	Result of Investigation
5RT142	Hand 1980	Test to determine site significance	Not eligible to the NRHP. Deposits determined to be result of secondary redeposition.
		Total Sites	Tested: 15 Monitored: 10 Excavated: 3 28

TABLE 9
SITES LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Site Type	Field Assessment	Site Name	Bibliography	Comment
5MF1126	Historic	Eligible	Two Bar Ranch	No Reference	
5MF1127	Historic	Eligible	Lodore School	No Reference	Community Center
5MF1128	Historic	Eligible	The Marcia	No Reference	Moffat Railroad Car
5MF605	Historic	Eligible	Fort Davy Crockett	Bauxar et al. 76	On Register 1976
5RB982	Historic	Eligible	Thornburgh Monument	Athearn 76	On Register 1975
5RT192	Historic	Eligible	Foidal Canyon School	No Reference	Built 1923
5RT344	Trails-Roads	Eligible	Ellis Trail	No Reference	On Register 1984
5RT72	Historic	Eligible	Hahns Peak School	No Reference	On Register 1974
5RT73	Historic	Eligible	Steamboat Spr. Depot	No Reference	On Register 1978

Because the Little Snake Resource Area encompasses over 3.2 million acres, the problem of protecting cultural resources from vandalism and destruction is enormous. Total or partial destruction can include defacement (rock art), agricultural activities, surface altering from pinyon-juniper clearing and prescribed burning, construction of roads, and illegal "pot hunting." Approximately 34 percent (453 sites) have been subjected to some sort of damage.

For cultural resources in the Little Snake Resource Area, the greatest threats appear to be from construction of improved trails (34 percent) and vandalism (20 percent). According to Gleichman (1982) and others, there is a direct relationship between the amount of access in an area and the amount of vandalism.

TABLE 10
SITES CONSIDERED ELIGIBLE FOR THE NATIONAL REGISTER BY INVESTIGATORS

Site Number	Site Type	Period	Site Name	Comment
5MF1007	Historic	Historic	- - - -	- - - -
5MF1017	Historic	Historic	Boston Flat Site	Occupied
5MF1027	Historic	Historic	Juniper Hot Springs	In Use
5MF1033	Open Lithic	Multi	- - - -	- - - -
5MF1036	Historic	Historic	Jesse Gulch Flume	Suspension Flume
5MF1045	Historic	Historic	- - - -	Assoc Duffy Tunnel
5MF1126	Historic	Historic	Two Bar Ranch	- - - -
5MF1127	Historic	Historic	Lodore School	Community Center
5MF1128	Historic	Historic	The Marcia	Moffat Railroad Car
5MF1236	Historic	Historic	- - - -	- - - -
5MF1414	Open Camp	Notknown	Artifact Conc, Report	Cedar Ridge Hist Dis
5MF1415	Open Lithic	Notknown	Artifact Conc, Report	Cedar Ridge Hist Dis
5MF1416	Open Camp	Notknown	Artifact Conc, Report	Cedar Ridge Hist Dis
5MF1417	Open Camp	Notknown	Artifact Conc, Report	Cedar Ridge Hist Dis
5MF1418	Open Lithic	Notknown	Artifact Conc, Report	Cedar Ridge Hist Dis
5MF1685	Open Camp	Fremont	- - - -	- - - -
5MF1696	- - - -	Late Preh	ReRecorded by GRI 83	Hoe,12 Manos,4 Metat
5MF1697	Burial	Historic	Isom Dart Grave, HS50	Wade Johnson Record
5MF1698	Trails-Roads	Historic	Matt Trail, H-012	Cattle, 1880-1910
5MF1699	Historic	Historic	CO-010-H-018	Fortification Hall
5MF1701	Historic	Historic	CO-010-H-008	Winslow Ranch 1916
5MF1703	Historic	Historic	Thornburgh Wagon Tr.	Wagon Ruts, H-017
5MF1706	Historic	Historic	- - - -	- - - -
5MF1709	Historic	Historic	Government Bridge	- - - -
5MF1710	Historic	Historic	Duffy Tunnel H-003	- - - -
5MF1712	Historic	Historic	Great Divide Townsite	1916-1940
5MF1713	Historic	Historic	Randolf, Johnson Home	1931
5MF1726	Historic	Historic	CO-010-H-014	Powder Wash Townsite
5MF1751	Sheltered Architect	Notknown	Beachman on the Green	Corn Impression
5MF1764	Open Lithic	Notknown	- - - -	- - - -
5MF1765	Open Lithic	Multi	- - - -	Dune? Buried Deposit
5MF1791	Open Camp	Notknown	- - - -	Dune, Terrace Locale
5MF1809	Open Camp	Archaic	- - - -	- - - -

TABLE 10 (continued)
SITES CONSIDERED ELIGIBLE FOR THE NATIONAL REGISTER BY INVESTIGATORS

Site Number	Site Type	Period	Site Name	Comment
5MF1821	Open Camp	Notknown	- - - -	25 Chipping Locales
5MF1828	Open Camp	Notknown	Specialized Scatter	Dune on Ridge
5MF186A	Open Camp	Late Preh	- - - -	Slab-Lined Hearth
5MF1866	Open Camp	Notknown	- - - -	10x2M Charcoal Pit
5MF1867	Open Camp	Notknown	- - - -	Two Loci
5MF1868	Open Camp	Paleoindian	- - - -	C-14 Possible
5MF1875	Open Lithic	Notknown	Specialized Scatter	- - - -
5MF1898	Open Camp	Notknown	- - - -	Stabilized Dune ?
5MF317	Open Camp	Late Preh	None	Ute Shoshone Contact
5MF324	Rock Art	Notknown	AR-05-010-839	Superimposed, Midden
5MF332	Open Camp	Notknown	AR-05-010-951	Charcoal Layer
5MF334	Open Camp	Notknown	AR-05-010-954	C-14 Possible
5MF353	Rock Art	Fremont	Irish Canyon Petrogl	Panel B at Lodore
5MF354	Rock Art	Fremont	Nativity Petroglyphs	Fremont Rock Art
5MF355	Open Camp	Late Preh	- - - -	- - - -
5MF427	Open Camp	Multi	- - - -	His-Ute Component
5MF428	Open Camp	Late Preh	- - - -	C-14 3700BP 1750BC
5MF429	Open Camp	Multi	- - - -	C-14 1085BP 3740BP
5MF476	- - - -	Multi	- - - -	C-14-6 Dates
5MF478	Open Camp	Multi	AR-05-010-1047	Paleo,Arch,Late Pre
5MF479	Quarry	Notknown	AR-05-010-1048	Cobble, Chert, Quartz
5MF492	Rock Art	Notknown	AR-05-010-96	Vermillion Can Petro
5MF509	Open Lithic	Notknown	AR-05-010-955	None
5MF510	Sheltered Camp	Notknown	AR-05-010-956	None
5MF516	Open Lithic	Multi	AR-05-010-957	None
5MF522	Open Camp	Notknown	AR-05-010-958	Quartzite Cobbles
5MF523	Open Lithic	Notknown	AR-05-010-959	- - - -
5MF529	Historic	Historic	HS-05-010-145	Pot Hook Ranch
5MF530	Open Lithic	Notknown	AR-05-010-972	- - - -
5MF531	Open Camp	Notknown	AR-05-010-973	- - - -
5MF532	Open Lithic	Notknown	AR-05-010-974	- - - -
5MF536	Open Lithic	Notknown	AR-05-101-975	- - - -

TABLE 10 (continued)
SITES CONSIDERED ELIGIBLE FOR THE NATIONAL REGISTER BY INVESTIGATORS

Site Number	Site Type	Period	Site Name	Comment
5MF537	Open Camp	Notknown	AR-05-010-976	- - - -
5MF539	Open Lithic	Notknown	AR-05-010-960	- - - -
5MF540	Open Camp	Notknown	AR-05-010-977	- - - -
5MF543	Open Camp	Notknown	AR-05-010-961	- - - -
5MF545	Open Camp	Notknown	AR-05-010-962	- - - -
5MF546	Open Camp	Notknown	AR-05-010-963	- - - -
5MF547	Open Lithic	Notknown	AR-05-010-978	Cedar Ridge Hist Dis
5MF548	Open Camp	Notknown	AR-05-010-979	Cedar Ridge Hist Dis
5MF549	Open Camp	Notknown	AR-05-010-980	Cedar Ridge Hist Dis
5MF550	Open Camp	Notknown	AR-05-010-964	- - - -
5MF552	Open Camp	Notknown	AR-05-010-965	- - - -
5MF553	Open Camp	Notknown	AR-05-010-981	Cedar Ridge Hist Dis
5MF554	Open Camp	Notknown	AR-05-010-966	- - - -
5MF555	Open Camp	Notknown	AR-05-010-967	Slab-Lined Hearths
5MF557	Open Camp	Fremont	AR-05-010-968	- - - -
5MF559	Open Camp	Notknown	AR-05-010-982	Cedar Ridge Hist Dis
5MF560	Open Camp	Notknown	- - - -	Cedar Ridge Hist Dis
5MF561	Open Camp	Notknown	- - - -	Cedar Ridge Hist Dis
5MF562	Open Camp	Multi	- - - -	- - - -
5MF566	Open Camp	Notknown	None	C-14 AD1950, Tested
5MF567	Open Camp	Notknown	- - - -	- - - -
5MF605	- - - -	- - - -	Fort Davy Crockett	NRHP 76, Frank Sarles
5MF605	- - - -	- - - -	5MF1125	Inconclusive
5MF606	Sheltered Camp	Notknown	Irish Lake Shelter	Graffiti, Near Lake
5MF623	Open Camp	Archaic	None	None
5MF683	Open Lithic	Notknown	- - - -	- - - -
5MF688	Open Camp	Fremont	Metate Rock Petrogly	Bedrock GS, Rock Art
5MF706	Open Camp	Notknown	5-010-1107	- - - -
5MF707	Open Camp	Notknown	5-010-1108	- - - -
5MF708	Open Camp	Notknown	5-010-1109	- - - -
5MF712	Open Lithic	Archaic	5-010-1113	- - - -
5MF718	Sheltered Camp	Notknown	5-010-1119	Two Shelters
5MF755	Sheltered Camp	Notknown	- - - -	- - - -

TABLE 10 (continued)
SITES CONSIDERED ELIGIBLE FOR THE NATIONAL REGISTER BY INVESTIGATORS

Site Number	Site Type	Period	Site Name	Comment
5MF756	Rock Art	Notknown	- - - -	Fremont
5MF758	Rock Art	Fremont	High Cleft Site	Cas 80 Fre Rock Art
5MF842	Open Architectural	Notknown	AR-05-010-104, 5MF497	Re-Recorded 3 times
5MF 847	Open Camp	Shoshone	- - - -	5 Activity Areas
5MF856	Open Architectural	Multi	None	Charcoal, Structures
5MF892	Open Camp	Archaic	- - - -	- - - -
5MF928	Open Camp	Multi	Tradeware Site	Paleo to Historic
5MF948	Rock Art	Notknown	- - - -	Shovel Test
5MF958	- - - -	Late Preh	- - - -	C-14 1055+230BF
5MF969	Open Lithic	PaleoIndian	Somemore Site	Bison Kill Site
5MF986	Open Lithic	Multi	- - - -	- - - -
5MF982	Historic	Historic	Thornburgh Monument	On Register 1975
5RT139	Open Lithic	PaleoIndian	- - - -	C-14 Four Dates
5RT15	Historic	Historic	HS-05-010-82	- - - -
5RT150	Open Camp	Late Preh	- - - -	Two Localities
5RT151	Multiple	Multi	- - - -	- - - -
5RT153	Open Lithic	Notknown	- - - -	- - - -
5RT154	Open Lithic	Notknown	- - - -	Heat Treatment
5RT155	Open Camp	Notknown	- - - -	Horsehair Artifact
5RT158	Open Camp	Multi	- - - -	Quarry Nodules
5RT160	Open Camp	Notknown	- - - -	- - - -
5RT161	Open Lithic	Notknown	- - - -	- - - -
5RT18	Open Camp	Archaic	AR-05-010-814	- - - -
5RT19	Open Camp	Notknown	AR-05-010-815	Blow-Out
5RT192	Historic	Historic	Foidal Canyon School	Built 1923
5RT22	Open Camp	Early Archaic	AR-05-010-818	Blow-Out
5RT235	Historic	Historic	Bank Building RT365	1911 Local Stone
5RT236	Historic	Historic	Routt Co. Courthouse	522 Lincoln Ave 1923
5RT237	Historic	Historic	Cameo 1970	Albany Hotel 1904
5RT249	Historic	Historic	Maxwell Building	Elmer Baer Arch 1908
5RT255	Historic	Historic	Soda Creek Building	Stboat Laundry 1905
5RT258	Historic	Historic	Damsel-Altamount Ski	Pioneer Hotel 1895

TABLE 10 (continued)
SITES CONSIDERED ELIGIBLE FOR THE NATIONAL REGISTER BY INVESTIGATORS

Site Number	Site Type	Period	Site Name	Comment
5RT259	Historic	Historic	First National Bank	Built by Milner 1888
5RT264	Historic	Historic	Pilot Printing 1909	The Steamboat Pilot
5RT266	Historic	Historic	Haybro Historic Dist	Eligibility Rejected
5RT269	Historic	Historic	- - - -	- - - -
5RT276	Historic	Historic	Adam Neske Homestead	Patent 1921
5RT30	Open Camp	Multi	AR-05-010-826	- - - -
5RT32A	Open Camp	Notknown	AR-05-010-828	- - - -
5RT330	Open Camp	Notknown	- - - -	- - - -
5RT344	Trails-Roads	Notknown	Ellis Trail	On Register 2-84
5RT345	Sheltered Camp	Notknown	- - - -	Plains Rock Art
5RT364	Historic	Historic	Bell Mercantile 1910	Bell Bros.
5RT366	Historic	Historic	Oak Creek Inn 1915	Sporting House-Belle
5RT367	Historic	Historic	Bernard's Station	1932 Mahoney Homestd
5RT368	Historic	Historic	Hamidy Hardware 1925	This, That Shop
5RT370	Historic	Historic	VFW	100 W Main Street
5RT384	Historic	Historic	White City, Pinnacle	1910-45, James Mine
5RT42	Open Architectural	Notknown	- - - -	- - - -
5RT50	Historic	Historic	C Howelsen Ski Jump	Woodchuck Hill 1914
5RT72	Historic	Historic	Hahns Peak School	On Register 1974
5RT73	Historic	Historic	Steamboat Spr Depot	On Register 1978

V.

PROTECTION OF SITES

The Archaeological Resources Protection Act (ARPA) of 1979 should provide more strict and meaningful penalties against vandals caught destroying sites on public lands. To most people, however, collecting artifacts is thought of as a recreational past time and not an illegal act. The development of public education programs are needed to make people aware of the damage they are doing to their American heritage by surface collecting and excavating sites.

Protection of cultural resources can be accomplished in a variety of ways, ranging from marking a site to fencing a site's perimeter. In the Little Snake Resource Area, most sites remain unmarked (76 percent) and are essentially unprotected. Because of their nature, visibility of most of these resources is low. Most sites are open-lithic scatters with a few scattered tools and flakes not likely to be noticed by the general public. One rock art site in Irish Canyon is a designated landmark and has been developed into a road stop/picnic area, with a platform for viewing the site. The site is marked with a plaque and an explanation of the prehistory of the site.

Table 11 is a list of the repositories containing archaeological collections recovered from the Little Snake Resource Area. Six hundred thirty sites have been collected and stored at 15 repositories. Cultural material from five sites are located in private collections, and the location of 12 sites collected is unaccountable.

Table 11

LOCATION OF ARCHAEOLOGICAL COLLECTIONS FROM LITTLE SNAKE RESOURCE AREA

Curation Facility	Year Collected	Collector	Project	Reference
Archaeological Services				
Location:	1980	Archaeological Services	Hiawatha Deep Unit 2	Greer and Loscheider 1980B
Total Site Collection: 1 site				
Browns Park Refuge				
Location: Lodore, Colorado	1979	Fort Lewis College	Browns Park Refuge A	Meyervand Riches 1979
Number of Collections: 2 sites	1982	Science Applications	BPNWR Excav 5MF605	Eddy et al. 1982
Colorado Highway Department				
Location: Boulder, Colorado	1974	Colorado Department Highway	Steamboat Hwy 40	Biggs et al. 1974
Total Site Collection: 4 sites	1980	Colorado Department Highway	Salvage Excav 5RT11	O'Neil 1980B
Colorado State University	1976	Colorado State University	Savory-Pot Hook	Jennings and Daniels 1976
Location: Fort Collins, Colorado	1977	Colorado State University	Coal Lease Survey A	Arthur 1977
Total Site Collection: 229 sites			Little Sn Unit No 1	Creasman and Jennings 1977
			Empire Energy Mine	Freedman 1977
			Craig-Rifle 345 KV1	Jennings and Sullivan 1977
			Flowline LOPA Rep 5	Rodriguez and Jennings 1977
			Utah Inter Empire Le	Williams and Jennings 1977
			Lay Reserves Survey A	Williams and Jennings 1977
	1978	Colorado State University	Routt CO Coal Lease A	MacNamera 1978
			Great Divide Wells A	Arthur 1978
	1979	Colorado State University	West-East Gas PL	Arthur et al. 1979
			Mtn Fuel Pipe Lat79A	Arthur and Jennings 1979
	1980	Colorado State University	Danforth Drill Utah A	Luoma and Jennings 1980
	1981	Colorado State University	Juniper-Cross 1980	Chase 1981
			Juniper-Cross 1981	Arthur and Collins 1981
	No Date	Colorado State University	Baggs-Dinosaur Pipeline	No Reference
			Colo-Wyo Sur, Ex 2	Lopa in PREP
			Quarry Trade Site	Gardner 1981
Denver Natural History Museum				
Location: Denver	1977	University of Colorado	Stucky Sand Wash	Stucky 1977
Total Site Collection: 12 sites				

TABLE 11 (continued)
LOCATION OF ARCHAEOLOGICAL COLLECTIONS FROM LITTLE SNAKE RESOURCE AREA

Curation Facility	Year Collected	Collector	Project	Reference
Denver University				
Location: Denver, Colorado	1979	Powers	Houston 42-28, 21-27A	Metcalf 1979
Total Site Collection: 14 sites			Energy Fuels Expan A	Zier 1979
	1980	Powers	LeClair Westwood #3	Tate 1980
	1981	Powers	Amoco Fed 21-1 PL A	Tate 1981
		Science Application	Davis Tenneco Fedl A	Moore 1981
	1982	Overland Archaeology	South Hiawatha Fed 1	Moore 1982
		Paleo-Environmental Consultants	Voyager Pet Sec 29	Treat 1982
Fort Lewis College	1978	Centuries	Craig-Rifle 345KV 2A	Baker and Reed 1978
Location: Durango, Colorado	1980	Centuries	Bendix Uranium	Kvamme 1980
Total Site Collection: 7 sites			Axial Rail Loadout A	Stevens 1980
Grand River Institute	1981	Grand River Institute	Mt Bell Cable RouteA	Grand River Institute 1981
Location: Grand Junction, CO			Danforth 70 Grace A	Armstrong and Wignall 1981
Total Site Collection: 2 sites				
Longmont Pioneer Museum	1978	Pioneer	Craig West Tel Cab A	Anderson 1978
Location: Longmont, Colorado	1979	Pioneer	Yampa Mine Ex Area A	Anderson and Kyle 1979
Total Site Collection: 51 sites	1980	Pioneer	Cedar Mtn Right-Way A	Anderson and Bleacher 1980
	1982	Abajo	Sugarloaf-Lay Coal	Davis and Westfall 1982
			Lay Railroad Acquis A	Davis 1982
		Pioneer	Hayden Gulch W Coal	Legard 1982
Mesa College	1980	Grand River Institute	Grace 22 Holes 80	Grand River Institute 1980
Location: Grand Junction, CO			Oak Creek Expansn A	Grand River Institute 1980
Total Site Collection: 24 sites	1981	Centuries	Kent Gilbert #199	Hubbard 1981
		Gilbert Commonwealth	Craig-Rifle 230,345	Treat and Newkirk 1981
	1983	Mariah	Mariah Danforth A	Kainer 1983
		Grand River Institute	Boone Draw 2 Mon A	Grand River Institute 1983

TABLE 11 (continued)
LOCATION OF ARCHAEOLOGICAL COLLECTIONS FROM LITTLE SNAKE RESOURCE AREA

Curation Facility	Year Collected	Collector	Project	Reference
Office of Archaeology and Historic Preservation	1979	CPO	Steamboat Lake Park	No Reference
Location: 1300 Broadway, Denver, CO				
Total Site Collection: 1 site				
University of Colorado	1970	CU	Hayden Yampa Plant	Breternitz 1970
Location: Boulder, CO	1971	CU	Stearns-Roger Coal	Breternitz 1971
Total Site Collection: 174 sites	1972	CU	Williams Fork Coal A	Breternitz 1972
			Proposed Craig Plant	Smith 1972
	1973	CU	Elkhead Cr Res 73	Hester 1973
			Railroad S Craig A	Hester and Williams 1973
	1974	CU	Gates of Lodore B AL	Breternitz 1974
	1975	CU	Colo-Wyo Survey 1	Lischka 1975
	1977	CU	Stucky Sandwash 77	Stucky 1977
		CHD	MoCo Rd 4 Realign	Gooding 1977
	1978	Gordon and Kranzush	Meter St, Two Pipel A	Kranzush and Gordon 1978
	1979	Gordon and Dranzush	Maynard Delta #1-24	Engleman and Gordon 1979
			Maynard 1-24 Alter A	Knox 1979
			E Anadarko Gather A	Gordon 1979
	1980	Archaeological Services	Utah Inter Trapper A	Caraveo 1980
		Gordon and Kranzush	Housel Gulch Fed 1-4	Keen et al. 1979
		Metcalf-Zier	Champ Pet CPC 1-28A	Metcalf 1980
			Sun Energy Coal Loc A	Zier 1980
		WCRM	Seneca II Coal Le A	Wheeler 1980A
	1981	Metcalf-Zier	O-Wi-Yu-Kuts Road A	Bradley 1981
			Blue Sky-Love 1	Zier 1981A
			Centennial Gold 81A	Zier 1981B
	1982	Gordon and Kranzush	Danforth-White RV C2	Gordon et al. 1982
			Monitor Housel Gulch	Knox 1982
		Metcalf-Zier	Canyon Cr F-22 PL A	Pastor and Metcalf 1982
	1983	Environmental Consultants	CGG Seis 83-01,02 A	Montgomery 1983
		Metcalf-Zier	Marathon Gold Placer	Black 1983
		Powers	East Boone Drw 2 ALt	O'Neil 1983
			Sheephead Pros 1-6	Burchett 1983
	No Date	Metcalf-Zier	Arco Four Well Loc A	Peebles 1983

TABLE 11 (continued)
LOCATION OF ARCHAEOLOGICAL COLLECTIONS FROM LITTLE SNAKE RESOURCE AREA

Curation Facility	Year Collected	Collector	Project	Reference
Western Wyoming College	1977	Western Wyoming	CD Hatch NCT 1, Well 1	Metcalf 1977
Location: Rock Springs, WY	1979	Western Wyoming	Monitor, Shell Cr 2,4	Treat 1979
Total Site Collection: 27 sites	1981	Western Wyoming	Amoco AA USA No 1 PLA	Copeland and Creasman 1981
			Lat Voyager, Imperial	Reust and Creasman 1981
	1983	Western Wyoming	Brinkerhoff Signal	Creasman 1983
			Emerald Ex58 Promag	Head and Creasman 1983
			Hiawatha No 3 Pipeln	Head and Creasman 1983
	1984	Western Wyoming	Aeropulse Seis 20, 9A	Head 1984
			Aeropulse 89 Seis	Hoefer and Thompson 1984

VI.

NATURE AND DISTRIBUTION OF SITES

As of June 1984, there were 1,337 recorded sites within the boundaries of the Little Snake Resource Area. Approximately 1,085 (81 percent) sites are prehistoric, 228 (17 percent) sites are historical, and 21 (less than 2 percent) contain both historical and prehistoric remains. There were also two paleontological sites recorded. The following discussion focuses on the identification of the nature and distribution of prehistoric cultural resources in this area.

For the management and analysis of large numbers of sites and site data, sites must be classified into types. There have been two basic approaches to the formulation of site typology within the Little Snake Resource Area--a descriptive classification and an interpretive classification, both based on attributes of the sites. There is no one typology for sites, artifacts or cultures; and a single site classification strategy is needed to integrate site file information into a concise and useful body of data.

For the purpose of general description of cultural resources in the Little Snake Resource Area, the site taxonomy developed by C. Jennings (Creasman et al. 1977; Creasman and C. Jennings 1977; C. Jennings and Spitzer 1976) was used. This system classifies site type, based on both topographic situation and cultural remains at the site. Site types that only cover historical and paleontological resources will not be discussed here. The prehistoric site types--open lithic, open camp, sheltered lithic, open architectural, sheltered architectural, sheltered camp, quarry, rock art, and isolated finds--are defined below.

Traditional types and more recent modeling typologies (procurement location, field camp) can easily fit into these descriptive categories, depending on the research design. Also, all sites can be consistently classified, whether or not site function is apparent from the surface. The broader categories such as open camp, open lithic and isolated find have been subdivided into smaller descriptive sub-types. A disadvantage is that the classification depends on accurate field observation and recording, in addition to a reasonable level of site preservation. Regardless of the chances for misclassification, the site typology is generally reliable for describing the prehistoric cultural resources in the Little Snake Resource Area.

Site Types

Open Lithic. This type of archaeological site is defined by the presence of lithic material in an unsheltered location. These sites contain flakes, cores or blanks, and occasionally finished or broken tools. Such sites represent extractive tasks where specific raw resources were gathered and processed for subsequent use elsewhere. There is no evidence of camping, nor does the cultural material represent the full gamet of domestic activities. These "tool use" sites may be lithic manufacturing sites, kill sites, seed gathering areas, hunting locations, or other resource acquisition locations.

The "extractive task" sites might contain a limited or specialized tool kit used for processing, depending on the type of resource being collected. They are usually situated on or near the location of the desired resource. For example, hunting locations might be situated overlooking a game trail.

The open-lithic sites, as defined, range in tools and debitage (flakes) from a few solitary artifacts, to spatially discrete loci of varied dimensions and material content, to lithic areas extending hundreds of meters.

The lithic site often presents unique problems of recordation, site delineation and site interpretation because of a lack of discrete, coherent concentrations within the site and because of the size of the site. The task of assigning lithic sites into specific functional or chronological classes is often difficult because of the lack of diagnostic artifacts within surface remains.

Three hundred forty-three sites (26 percent of all sites recorded in the Little Snake Resource Area) fall into this category. One hundred twenty sites (35 percent) contained only waste flakes, and one site contained only chipped stone tools. The 120 sites containing only flakes could not be subdivided because 103 of these sites lacked flake descriptions. Generally, these sites contained two or more different tool types and flakes. The finished tool types most frequently found were scrapers and bifaces. These artifacts, for the most part, are made of a variety of toolstone types, which give the appearance of being multi-purpose sites and/or reoccupation sites. This is one reason why site size may be a poor criterion for defining limited activity areas--size can be a function of group size, multiple occupation, or both. More specialized or limited activity sites exist, but the distribution or nature of these sites awaits studies on site catchment, location strategy, temporal placement, and function.

Open-lithic sites appear to occur in all the described environments, from valley bottom to mountain peak, within a 3,500-foot elevational range (5,280 feet to 8,730 feet). Most sites are found on ridges (30 percent), terraces or benches (24 percent), in draws or on slopes (3 percent). These intermediary topographic locations could reflect a portion of the seasonal round occupation pattern or proximity to the exploitable resource. Since most of the current survey data is confined to these areas, a full overview and relative sample of all features is not yet available. To date, only sample portions of the Williams Forks and Danforth Hills have been surveyed for archaeological sites. No systematic survey has been conducted on Juniper, Cross, Douglas, Diamond, or Cold Spring mountains. This leaves a substantial portion of the seasonal "upland" unexplored.

Over half of the sites occur in sagebrush communities. This is not especially surprising since roughly two-thirds of the resource area is covered by this vegetative community (Denker 1984). Twenty-three percent of the sites are within the pinyon-juniper community, and 6 percent are within the shrub/woodland community. The low number of sites located in the rest of the communities may reflect an equally low number of surveys in those areas, or the smaller number of acreage per community in the resource area. However, the occurrence of open-lithic sites in these smaller communities points to available resources, perhaps exclusively, for exploitation by prehistoric groups.

Most of the sites are located in sagebrush communities between 5,600 and 7,500 feet. As the elevation increases, these sagebrush communities become surrounded by pinyon-juniper or shrub woodland communities. In some areas there are openings within the stands. The high number of sites located in

these areas may represent a collecting station where more than one resource was exploited. The number of sites occurring declines significantly above 7,500 feet and below 5,600 feet. The average site size drops for only those sites above 7,500 feet; site area averages 6,800m^2 for sites below 7,500 feet and 2,280m^2 for sites above 7,500 feet.

All the major drainages in Moffat and Routt counties show open-lithic site types, with 67 percent occurring along intermittent drainages feeding the permanent waterways. The next highest site occurrence is along permanent water courses (28 percent) and at fresh water springs (4 percent). Elevation above and distance to intermittent or permanent water share similar relationship.

Most open-lithic sites contain few diagnostic artifacts or other datable elements. They tend to be located in eroded areas (along terraces and on ridges), and they often have been previously (and repeatedly) visited by local collectors. Only 82 (24 percent) of the open-lithic sites contained diagnostic artifacts, of which only 30 could be associated with cultural periods or traditions. These artifacts represent occupation from the Paleo-Indian period to the late Prehistoric Period; therefore, this site type may represent a similar sort of activity shared by all aboriginal groups through time. Table 12 presents a list of open-lithic sites containing diagnostic artifacts and their environmental situation.

Sheltered Lithic. The sheltered-lithic sites are classified in the same manner as open-lithic sites, except they occur in rock shelters, overhangs, caves, or talus boulders. These natural shelters were frequently used for protection from the elements and for the security they provided. Only two sites, 5MF1208 and 5MF760, which are located in pinyon-juniper

TABLE 12
OPEN LITHIC SITES

Period	Site Number	Vegetation	Landform
Paleoindian	5MF1003	Riparian	Terrace, Bench
	5MF969	Sagebrush	Arroyo
	5RT139	Shrub Woodland	Ridge
Archaic	5MF1447	Sagebrush	----
	5MF1449	Sagebrush	----
	5MF468	Sagebrush	----
	5MF512	Sagebrush	Terrace, Bench
	5MF712	Pinon-Juniper	Ridge
	5MF890	Sagebrush	Ridge
Middle Archaic	5MF1298	Pinon-Juniper	Terrace, Bench
	5MF638	Sagebrush	Dune, stabilized
Fremont	5MF1317	Mixed Conifer	Ridge
	5MF869	Pinon-Juniper	Ridge
Late Prehistoric	5MF1465	Sagebrush	----
	5MF1499	Sagebrush	Terrace, Bench
	5MF1800	Pinon-Juniper	Hill, Slope
	5MF460	Riparian	----
	5MF626	Sagebrush	Dune, stabilized
	5RT148	Sagebrush	Terrace, Bench
	5RT287	Sagebrush	Ridge
Protohistoric	5MF1293	Sagebrush	Dune, Unknown
Multi-Component	5MF1033	Sagebrush	Terrace, Bench
	5MF1461	Sagebrush	----
	5MF1765	Sagebrush	Ridge
	5MF516	Sagebrush	Ridge
	5MF628	Sagebrush	Dune, stabilized
	5MF849	Pinon-Juniper	Dune, stabilized
	5MF946	Shrub Woodland	Terrace, Bench
	5MF986	Sagebrush	Dune, Unknown

vegetative communities, fall into this category. Cultural materials associated with these sites are scrapers and flakes.

Open Camp. Sites containing evidence of domestic behavior such as groundstone tools, hearths, ceramics, or other nonportable cultural material within an open topographic situation are included in this classification. Campsites are generally associated with chipped stone tools and flakes, although there are exceptions. These sites were occupied over a longer period than the open-lithic site types, and they displayed a wider variety of activities. This site type would be comparable to sites described as habitation sites or as base camps.

Activities occurring at these sites included the preparation and consumption of foodstuffs and the manufacture of tools, and they were possibly a central gathering place from which hunting and collecting parties departed. Open camps generally possess a more diverse artifact inventory than the open-lithic sites and often contain features such as fire hearths or burnt-rock concentrations.

In contrast to open-lithic sites, the location of an open-camp site might have depended on more factors than the distribution of a single resource. Decisions regarding campsite location might have involved proximity to several diverse resources, such as distance to water and fuel and degree of slope.

Considering the "open" location attribute for this classification, the exposure of these sites during winter months would require some kind of habitation structure. Or, these sites might have been only occupied during the spring, summer or fall seasons. As Reed and Scott (1982:359) have observed, wickiup villages, considered habitation sites, often have few

surface artifacts; and deterioration of the village may result in classifying these phenomena as open-lithic sites. In this case, it is quite possible that some sort of structure may have existed at these sites; but, because of the lack of visible structural remains, they are classified as open camps.

According to the above definition, there are approximately 290 sites in the Little Snake Resource Area that fall into the open-camp classification. They occur at elevational ranges of 5,380 to 9,690 feet above sea level, with 68 percent of the sites situated between 5,900 and 6,900 feet. Above and below this range, the site numbers drop sharply. Sixteen percent of these sites occur above 6,900 feet, and 12 percent occur below 5,900 feet.

Within the 1,000 foot range, between 5,900 to 6,900 feet, 200 open-camp site types occur. Two-thirds of these sites occur in sagebrush communities and one-quarter occur in pinyon-juniper. Only 3 percent are found in the shrub woodland; and the remaining 14 sites are divided among salt desert shrubland, riparian, and riparian woodland. The presence of such a high number of sites within the sagebrush community may be the result of the large acreage of sagebrush in the Little Snake Area rather than selection for site location within that community. Overall, the open-camp sites betwwen 5,900 and 6,900 feet occur in the same vegetative communities and in similar relative proportions as the open camps with no elevational constraints. Most of the sites are located along ridges or terrace/benches and within dunes. They are found throughout the resource area in all major drainage basins. Most are located along an intermittent drainage, with 5 percent located adjacent to springs. Elevation above water and distance to the water source are similar to elevation and distances to intermittent and

permanent water sources. A greater range exists to water for open-lithic sites than for open-camp sites. This contrast may signal a resource procurement strategy difference, a site typology misrepresentation, the use of potable water artifacts, or a site locational difference in contrast to surrounding areas.

For descriptive purposes, the open-camp-site types were subdivided into smaller categories, based on artifact and feature content. Since three attributes--presence of groundstone, nonstructural features, and ceramics--are the classifying attributes for open-camp sites, permutations of the three were used to form the subcategories. Table 13 displays the number of open-camp-site types by subcategory.

As can be seen in the table, only two sites fulfilled all three requirements for group entry into the open-camp class. The general lack of ceramics recorded in the resource area is the reason for the few sites in this category. Twenty-two percent of the sites contained groundstone with hearths, 30 percent of the sites contained only groundstone, and 43 percent of the sites contained only hearths. The latter attribute, presence of fire, was by far the best classifier. Table 14 delineates the cultural material content on the sites and the range in diversity apparent in this site type.

Table 13

OPEN CAMP SUBTYPES

Subtype	Number of Sites	Percentage
Hearths, ceramics and groundstone	2	1
Hearths and groundstone	64	22
Hearths and ceramics	5	2
Groundstone and ceramics	3	1
Hearths	126	43
Ceramics	2	1
Groundstone	87	30
Non-structural features, other	3	1
	292	

Nonstructural features other than hearths or burnt stone were a depression, bedrock mortars and metates, and middens. The depression feature is a 3-meter diameter pit found in association with groundstone along a pinyon-juniper covered saddle above Milk Creek. The site (5MF415) was recorded by Dr. Joe Lischka of the University of Colorado during an archaeological survey. No further investigation of the site has occurred since the time of recording, and no other feature such as this is on record for the resource area.

The presence of groundstone in bedrock situations has been recorded at three sites in the Little Snake Resource Area. The bedrock mortars (5RT195) were found in Routt County by the BLM archaeologists during the Kemmerer PRLA Class II cultural resource survey. No artifactual material was found in association with these features. Bedrock metates have been recorded at two sites along the Green River in Brown's Park. Both sites also contained rock art panels on the same bedrock that the metates were ground into and

Table 14
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
None	None	Shoshone Ware	Unk, present
None	None	Undet Grayware	Unk, present
None	Groundstone	None	None
None	Groundstone	None	D
None	Groundstone	None	S
None	Groundstone	None	All flake types
None	Groundstone	None	P, S, F
None	Groundstone	None	Unk, present
None	Groundstone, scraper	None	Unk, present
None	Groundstone, biface	None	None
None	Groundstone, biface	None	S
None	Groundstone, biface	None	All
None	Groundstone, biface	None	D, F
None	Groundstone, biface	None	Unk, present
None	Groundstone, biface	None	P, S, F
None	Groundstone, biface	None	S, F
None	Biface, scraper	None	Unk, present
None	Biface, scraper	None	None
None	Core, groundstone	None	D, P, S, F
None	Core, groundstone	None	Unk, present
None	Core, groundstone, scraper	None	Unk, present
None	Core, groundstone, scraper	Undet	Unk, present
None	Core, groundstone, biface	None	Unk, present
None	Core, groundstone, biface	Shoshone ware	Unk, present
None	Core, groundstone, biface, scraper	None	Unk, present
None	Core, groundstone, biface, scraper	None	All
None	Groundstone, hammerstone	None	S
None	Groundstone, hammerstone	None	Unk, present
None	Groundstone, hammerstone, biface	None	Unk, present
None	Groundstone, hammerstone, graver	None	Unk, present
None	Groundstone, hammerstone, biface, graver	None	Unk, present
None	Groundstone, hammerstone, biface, scraper	None	Unk, present
None	Groundstone, hammerstone, biface, scraper	None	P, S, F

Table 14 (continued)
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
None	Chopper, groundstone, hammerstone	None	Unk, present
None	Core, groundstone, hammerstone, scraper, biface, graver	None	All
Hearth-firepit	None	None	None
Hearth-firepit	None	None	Unk, present
Hearth-firepit	Scraper	None	Unk, present
Hearth-firepit	Scraper	Shoshone ware	Unk, present
Hearth-firepit	Biface	None	Unk, present
Hearth-firepit	Biface	None	All
Hearth-firepit	Biface	Other Fremont	Unk, present
Hearth-firepit	Biface, graver	None	Unk, present
Hearth-firepit	Biface, scraper	None	Unk, present
Hearth-firepit	Biface, drill	None	Unk, present
Hearth-firepit	Core	None	D, S
Hearth-firepit	Core	None	Unk, present
Hearth-firepit	Core, scraper	None	Unk, present
Hearth-firepit	Core, biface	None	Unk, present
Hearth-firepit	Core, biface, graver	None	S, F, N
Hearth-firepit	Chopper	None	Unk, present
Hearth-firepit	Groundstone	None	Unk, present
Hearth-firepit	Groundstone, scraper	None	Unk, present
Hearth-firepit	Groundstone, scraper	None	S, F
Hearth-firepit	Groundstone, biface	None	Unk, present
Hearth-firepit	Groundstone, biface, scraper	None	Unk, present
Hearth-firepit	Groundstone, graver, scraper	None	Unk, present
Hearth-firepit	Chopper, groundstone, biface	None	P, S
Hearth-firepit	Core, groundstone, scraper	None	Unk, present
Hearth-firepit	Core, groundstone, biface	None	All
Hearth-firepit	Core, groundstone, biface	None	Unk, present
Hearth-firepit	Core, groundstone, biface, scraper	None	Unk, present
Hearth-firepit	Groundstone, hammerstone, scraper	None	Unk, present
Hearth-firepit	Core, hammerstone	None	All
Hearth-firepit	Core, hammerstone	None	All
2 Hearth-firepits	None	None	Unk, present
	Scraper	None	Unk, present

Table 14 (continued)
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
2 Hearth-firepits	Scraper	Undet corrugated	Unk, present
2 Hearth-firepits	Biface	None	F
2 Hearth-firepits	Biface	None	Unk, present
2 Hearth-firepits	Biface, scraper	None	Unk, present
2 Hearth-firepits	Core, biface	None	Unk, present
2 Hearth-firepits	Biface, scraper	Shoshoni ware	Unk, present
2 Hearth-firepits	Groundstone	None	None
2 Hearth-firepits	Groundstone	None	All
2 Hearth-firepits	Groundstone	None	Unk, present
2 Hearth-firepits	Groundstone	Mesa Verde B-W	Unk, present
2 Hearth-firepits	Groundstone, scraper	None	Unk, present
2 Hearth-firepits	Groundstone, biface	None	Unk, present
2 Hearth-firepits	Groundstone, biface scraper	None	Unk, present
2 Hearth-firepits	Groundstone, biface, scraper	None	F
2 Hearth-firepits	Chopper, groundstone, scraper, biface, graver	None	Unk, present
2 Hearth-firepits	Chopper, groundstone, biface, scraper	None	Unk, present
2 Hearth-firepits	Core, groundstone	None	Unk, present
2 Hearth-firepits	Core, groundstone, biface	None	Unk, present
2 Hearth-firepits	Core, groundstone, biface	None	All
2 Hearth-firepits	Core, groundstone, scraper, biface, graver	None	Unk, present
2 Hearth-firepits	Core, groundstone, biface, scraper	None	Unk, present
2 Hearth-firepits	Groundstone, hammerstone	None	Unk, present
2 Hearth-firepits	Chopper, core, biface, scraper	None	Unk, present
2 Hearth-firepits	Core, hammerstone, biface, scraper	----	Unk, present
Hearth-firepit, burnt rock	None	None	None
Hearth-firepit, burnt rock	None	None	All
Hearth-firepit, burnt rock	None	None	Unk, present
Hearth-firepit, burnt rock	None, biface, scraper	None	Unk, present
Hearth-firepit, burnt rock	Core, None	None	Unk, present
Hearth-firepit, burnt rock	Core, biface	None	All
Hearth-firepit, burnt rock	Core, biface	None	Unk, present

Table 14 (continued)
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
Hearth-firepit, burnt rock	Core, scraper, biface, graver	None	Unk, present
Hearth-firepit, burnt rock	Core, biface, scraper	None	Unk, present
Hearth-firepit, burnt rock	Groundstone	None	Unk, present
Hearth-firepit, burnt rock	Groundstone	Undet grayware	S, F
Hearth-firepit, burnt rock	Core, groundstone, biface	None	F
Hearth-firepit, burnt rock	Chopper, core, biface, scraper	None	Unk, present
Hearth-firepit, groundstone concentration	Core, groundstone, biface, scraper	None	P, s, N
Hearth-firepit, Bone concentration	Groundstone, biface, scraper	None	Unk, present
Hearth-firepit, chipped stone concentration	None	None	Unk, present
Hearth-firepit, chipped stone concentration	Scraper	None	Unk, present
Hearth-firepit, quarry	Scraper	None	Unk, present
Hearth-firepit, quarry	Biface	None	Unk, present
Hearth-firepit, quarry	Core	None	D, P, S
Hearth-firepit, other	Biface	None	P, S
Burnt rock concentration	None	None	Unk, present
Burnt rock concentration	Scraper	None	S, F
Burnt rock concentration	Scraper	None	Unk, present
Burnt rock concentration	Scraper	Undetermined	Unk, present
Burnt rock concentration	Biface	None	Unk, present
Burnt rock concentration	Biface, scraper	None	Unk, present
Burnt rock concentration	Graver, scraper	None	Unk, present
Burnt rock concentration	Core	None	F, N
Burnt rock concentration	Core	None	Unk, present
Burnt rock concentration	Core, scraper	None	S, F
Burnt rock concentration	Core, biface	None	All
Burnt rock concentration	Core, biface	None	Unk, present
Burnt rock concentration	Core, biface, scraper	None	Unk, present
Burnt rock concentration	Chopper	None	S, F
Burnt rock concentration	Groundstone	None	None
Burnt rock concentration	Groundstone	None	Unk, present
Burnt rock concentration	Groundstone, biface	None	P, S, F, N
Burnt rock concentration	Groundstone, biface	Nine	Unk, present

Table 14 (continued)
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
Burnt rock concentration	Groundstone, biface	None	All
Burnt rock concentration	Groundstone, drill	None	D, P, S, F
Burnt rock concentration	Groundstone, biface, scraper	None	Unk, present
Burnt rock concentration	Core, groundstone	None	Unk, present
Burnt rock concentration	Core, groundstone, scraper	None	Unk, present
Burnt rock concentration	Core, groundstone, biface	None	All
Burnt rock concentration	Core, groundstonee, biface	None	Unk, present
Burnt rock concentration	Core, groundstone, graver, scraper	None	Unk, present
Burnt rock concentration	Chopper, core, biface	None	Unk, present
Burnt rock concentration	Chopper, Core, groundstone	None	S, F
Burnt rock concentration, hearth-firepit	None	None	S
Burnt rock concentration, hearth-firepit	Scraper	None	Unk, present
Burnt rock concentration, hearth-firepit	Biface, scraper	None	Unk, present
Burnt rock concentration, Burnt rock concentration	Chopper, biface Core hammerstone, biface, drill, scraper	None None	All All
2 Burnt rock concentration	None	None	Unk, present
2 Burnt rock concentration	None	None	None
2 Burnt rock concentration	Core	None	P, S, F
2 Burnt rock concentration	Groundstone	None	D, P
2 Burnt rock concentration	Chopper, groundstone	None	S, F
2 Burnt rock concentration	Core, groundstone, biface, scraper	None	All
2 Burnt rock concentration	Core, groundstone, hammerstone, scraper, biface, graver	None	Unk, present
2 Burnt rock concentration	Core, groundstone, hammerstone, biface, scraper	None	Unk, present
Burnt rock concentration, chipped stone concentration	Hammerstone, biface	None	All
Burnt rock concentration, bedrock groundstone	Scraper	None	Unk, present
Groundstone concentration	Chopper, groundstone, hammerstone, biface, scraper	None	Unk, present

Table 14 (continued)
OPEN CAMP CULTURAL MATERIAL

Features	Tools	Ceramics	Debitage
Bone concentration	Chopper, core, groundstone, biface, drill, scraper	None	Unk, present
Bone concentration, chipped stone concentration	Chopper, core, groundstone, hammer-stone, scraper, biface, graver	None	Unk, present
Chipped stone concentration	Core, groundstone, biface	None	All
Chipped stone concentration	Core, groundstone, biface	None	Unk, present
Petroglyph	Groundstone	None	Unk, present
Petroglyph, bedrock ground-stone	Scraper	None	Unk, present
Petroglyph, bedrock ground-stone	Groundstone	None	Unk, present
Quarry, hearth-firepit	Core	Undetermined	Unk, present
Depression	Groundstone	None	Unk, present

All - All flake types present.
D - Decortification. Dorsal flake surface is entirely or partly covered by cortex. Flake was initially removed when shaping core. Often referred to primary flakes, or secondary flakes.
P - Primary thinning. Specially prepared platforms for retention of the old blade margin evident. Length greater than width.
S - Secondary thinning, shaping. Interior flakes not defined by other categories.
F - Final shaping. These flakes have no prepared striking platform, and the length is equal to, or less than, width. Retouch flakes.
NONE
N - Shatter. Irregular, non-modified fragments of toolstone.
UNK - Flakes are present, but type is unknown.

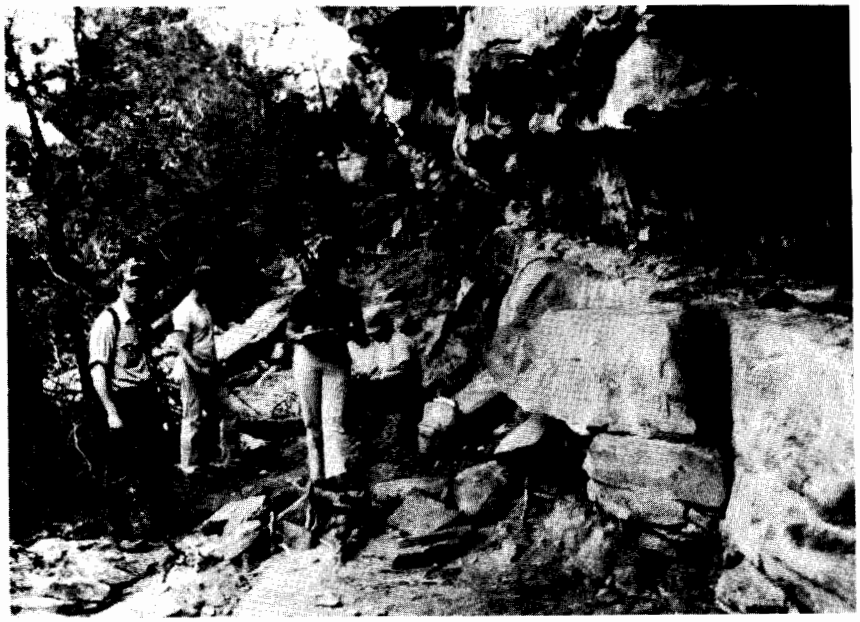
were in association with chipped stone artifacts and manos. The provenience and rock art at these sites suggest that Fremont affiliated groups utilized and processed riparian resources here, perhaps cultigens grown on the Green River floodplain.

Open-camp-site types have been affiliated with all cultural periods represented in the Little Snake Resource Area. Projectile points and ceramics have been found on 72 open camps representing the Paleo-Indian, Archaic, Fremont and Late Prehistoric periods. Seventeen sites contain components from two or more periods, possibly indicating multiple occupations by different cultural groups, or collection and use of heirloom artifacts from other sites and subsequent deposition of the artifact at the site by later groups.

Sheltered Camp. The sheltered camp classification includes the same characteristics for open-camp sites, except they are located in natural shelters. Although the resource area is not a canyon land, appropriate geological formations for rock shelters can be found in the Williams Fork, on Juniper and Cross mountains, along the Green River and the Lower Yampa, and in the far northwest in Vermillion and Irish canyons. Despite the abundance of these areas, only 22 sheltered camps have been recorded, reflecting the lack of surveys conducted outside of energy-developed areas. Numerous types of rock shelters occur in the resource area, but a cultural selectivity toward overhangs is evident--over half of the rock shelters occur in overhangs (see photographs 6 and 7).

Accessibility; stability of the shelter; and distance to water and exposure, generally south, appear to be factors in rockshelter utilization (Gleichman et al. 1982:469). In the Little Snake Resource Area, 77

Photograph 6
Irish Canyon Rock Shelter



Photograph 7
Sheltered Camp Diamond Breaks

percent of the sheltered camps were located near perennial water sources in pinyon-juniper and sagebrush communities, and over half of these were located within 150 meters of water. Sixty percent have southernly aspects.

Table 15 lists the recorded sheltered camps and the cultural attributes present at each. As can be seen on the table, of the 22 recorded sheltered camps in the study area, 10 (45 percent) show evidence of fire and 7 have associated rock art. No diagnostic artifacts such as projectile points or ceramics have been found at these sites, but the associated rock art panels at two of the sites suggest Fremont and Late Prehistoric Period occupation.

The protection from the elements provided by these natural shelters created a favorable camp spot for aboriginal peoples. It also helped protect and preserve perishable remnants of their occupation. These conditions provide a high potential for data retrievalof wood, bone, vegetable, and basketry material. Investigation of them will add to the understanding of the culture, environment, and chronology of these prehistoric peoples.

Three sheltered campsites have been excavated in the Little Snake Resource Area. During the summer of 1978, the Laboratory of Public Archaeology conducted investigations at 5MF436, located along the Williams Fork River just south of its confluence with the Yampa, and 5MF435, located above Milk Creek. Results of this investigation are being compiled. A second investigation was conducted at the Irish Canyon Rock Shelter (5MF606) by Western Wyoming College archaeological field school during the summer of 1984. Pollen and soil samples were collected for paleoenvironmental reconstruction, along with charcoal samples, for chronological control in an effort to determine the nature and length of occupation at the site. Since

TABLE 15
SHELTERED CAMP ATTRIBUTES

Site Number	Features	Tools	Bone	Debitage
5RT1	None	None	Present	None
5MF1276	Hearth-firepit	None	Present	None
5MF1316	Burnt rock concentration Chipped stone concentration	Hammerstone	Present	Present
5MF1753	Hearth-firepit Pictograph	Chopper, core Groundstone	None	Present
5MF1760	Hearth-firepit	Groundstone	None	Present
5RT2	None	None	Present	None
5MF290	Pictograph Burnt rock	None	None	None
5RT3	None	None	Present	None
5RT345	Petroglyph Pictograph	None	None	None
5MF409	None	None	Present	None
5MF436	Pictograph	Graver, core	None	Present
5RT5	None	None	None	Present
5MF510	Hearth-firepit	None	None	Present
5RT6	Pictograph Pictograph	None	None	None
5MF606	Hearth-firepit Petroglyph	None	Present	Present
5MF624	Hearth-firepit	None	None	Present
5MF657	Hearth-firepit	None	Present	None
5MF692	Petroglyph Firepit	None	None	Present
5MF693	Hearth-firepit	None	None	None
5MF694	None	Scraper Groundstone	None	Present
5MF718	Hearth-firepit	Biface	Present	Present
5MF755	Burnt rock concentration	Core	None	Present

the site is located along a major transportation canyon corridor and overlooks a Pleistocene lakebed, information retrieved will help establish the local chronology of the Little Snake Resource Area.

Open Architectural. Prehistoric architectural sites such as masonry structures, brush wickiups, pit structures, game drives, hunting blinds, cairns, and storage cists are considered open-architectural sites. Sixteen sites with structures have been recorded in the study area; all are made of stone. These sites are rather uncommon (see photographs 8 and 9).

Six types of stone structures can be distinguished--stone circles, rectangular structures, hunting blinds, pits, storage features, and cairns. Stone circles consist of a circular stone enclosure, a single coarse high, ranging in size from 3 to 6 meters in diameter. These structures are often referred to as "tipi rings." There is considerable controversy concerning their function. The prevailing hypothesis is that they are remains of stone weights used to hold down the flaps on a tipi or wickiup structure (Malouf 1961). Ethnographically, the Cheyenne were observed to use stones to hold down tipi edges in the winter when the ground was too frozen to use stakes (Grinnell 1962). If they are all that remains after the removal or disintegration of residential structures, other evidence or occupation such as hearths, ceramics, groundstone, or diverse tool kit should be present.

A second hypothesis is that stone structures represent part of a ceremonial activity such as a vision quest. Extensive lithic scatters or habitation activities would not be expected at such sites (Frison 1978).

In the Little Snake Resource Area, five stone-circle sites have been recorded. All are located on ridge tops and in sagebrush communities, and all contained chipped stone artifacts. Two are associated with hearths and

Photograph 8
Stone Circles

Photograph 9
Wickiups

two with groundstone. The occurrence of associated artifactural material indicates that some of the structures may have been residential in nature.

Clustering of open-architectural types may also provide a clue to the builders and inhabitants of these structures. Three of these sites contained over 10 structures. Historical accounts by early explorers and fur traders in the Brown's Park area mention winter encampments composed of willow pole lodges built in a circular fashion that were occupied by several thousand Indians (Dale 1918). Visitors to Fort Davy Crockett mentioned that the area was a regular wintering ground for the Snake Tribe (Farnham 1843). Multiple stone circles may be the remains of winter campgrounds or areas revisited year after year.

Large numbers of stone circles appeared throughout the Northwestern Plains during the Middle and Late Plains Archaic and Late Prehistoric periods (Frison 1978). Only one stone-circle site (5MF845) in the LSRA contained a diagnostic artifact. A small corner-notched projectile point affiliated with the Late Prehistoric Period sometime post A.D. 1150 was located in Brown's Park on a terrace overlooking the Green River.

The second type of stone structure is dry-laid, coursed, rectangular, or curvilinear structures. The structures were built several courses high, but most have collapsed. Four sites, containing 16 individual structures, are classified in this type. The Huschers (1939) reported the first group of this type on a high cuesta north of the Thornburgh Battle Ground, attributing their presence to the Athabascan migration and referring to them as "hogans." They described the structures as "walled with rounded lava boulders laid up without mortar, some walls still standing to the heights of three feet" (Huscher and Huscher 1943:16). A

series of seven circular and oval ruins were described, along with a rectangular multiple-room structure just north of the "hogan" concentration. This structure was also built of lava boulders that were piled to knee height and measured 50 feet by 20 feet, with cross partitions. No cultural material was found associated with the site (5MF495).

Two other sites of this type, 5MF612 and 5MF647, without cultural material were found. Site 5MF612 is located on a ridgetop overlooking Irish Canyon and is described as a two-room stone-walled site with walls 12 inches high that measure 30 by 60 feet. The locational situation and singular nature of this site suggests a resemblance to Fremont Promontory structures described by Grady (1984), Creasman (1981) and others. Site 5MF647, on the other hand, is located along the bottom of a canyon near the Vermillion Bluffs. It is a square to rectangular structure measuring 1.9 meters by 3.0 meters. The time period and function of these structures is unknown.

The last site in this subtype is located on a ridgetop overlooking the Yampa River and is composed of six semicircular sandstone slab structures measuring 2.5 to 3 meters in diameter. Cultural material collected at the site included two projectile points and artifacts associated with habitation sites--groundstone, tools, and debitage. The projectile points, a metal projectile point and a Pinto Basin point, represent two different chronological periods; therefore, the cultural affiliation of the site remains in question. The presence of many historical artifacts--porcelain beads, buttons, a black powder ball--is evidence of occupation during postcontact times.

Two sites located on top of Cedar Mountain comprise the third type of stone structure. They have been described by the recorder (Hansen 1977) as possible "eagle pits" or "hunting blinds." The walls of these structures are made of basalt and measure .5 meter. Benedict (1975) reported the presence of stone structures at game drive sites that are circular in configuration, with stone walls from .3 to .6 meter high that are built around pits .2 to 1.1 meters deep. These hunting blinds were found in association with other game drive features.

Smith (1974) describes a pit method of capturing eagles used by the Northern Ute:

> A pit was dug, roofed with willows, with a piece of deer meat placed on top as bait. The hunter, down in the pit, would reach through a hole in the brush covering when the eagle alighted to take the bait, pull it down by the feet and wring its neck.

The true function and affiliation of this subtype awaits further investigation.

One rock-lined depression feature is the sole representative for the fourth subtype. The structure was not measured when recorded. It is located on a pinyon-juniper covered ridgetop overlooking Elk Springs and is associated with numerous tools, flakes, and charcoal. No diagnostic artifacts were recovered and site function remains unknown. This is the only "pit" structure on record for the resource area.

The fifth type of stone structure is small rectangular sandstone structures referred to as storage cists or bins. Two sites in the resource area, 5MF841 and 5MF653, contain these features. 5MF841 consists of four upright sandstone slabs forming a cist located along the floodplain of the

Green River and adjacent to a series of bedrock metates and mortars. The feature measures approximately 30 by 14 by 35 centimeters. Associated cultural material included groundstone and chipped stone tools, but no diagnostic artifacts. The open location of the feature and associated material suggest open-camp-type activities, with a possibility of a buried habitation structure. The second site, 5MF653, contains two storage bins partially buried in a stabilized dune. One burned rock was found in association with the features. The features were made of uncoarsed sandstone slabs measuring approximately 50 by 50 by 25 centimeters.

The sixth type of stone structure is the cairn. These structures may be prehistoric or may have been built by historical ranchers, sheepherders or possibly even early surveyors. A cairn, 5MF604, which is located near a perennial spring on a mountain peak, may have served as a landmark.

The lack of recorded wickiup structures for the Little Snake Resource Area is surprising, based on the ethnographic groups known to have frequented the area. Wickiups are brush shelters, conical in shape, with an internal pole superstructure over which boughs, bark, and perhaps hides were secured. Some are free standing, and others incorporate a living tree for support. Interior fire hearths and juniper bark bedding are common. Numerous ethnographic and historical accounts of Utes and other Great Basin aborigines describe this type of structure (Huscher and Huscher 1939:28). Local informants have indicated that wickiup type structures have been found along the west side of Cross Mountain, in Sheephead Basin and above Brown's Park on Cold Spring and Diamond mountains (Levitt, 1984). All of these sites occur in dense pinyon-juniper areas, which may have provided the protection needed for their survival. Appraisal of these sites is

impossible without adequate location and recording, however, and emphasis should be made on the discovery and formal recording of this site type to fill in a rather large gap in the data base.

Sheltered Architectural. This type is the same as open-architectural sites, except they are situated in naturally sheltered locations (see photograph 10). There are five sites that fit into this classification, three of which are dry-laid walls in rock shelters. Like the other types of stone structures, the function of these walls is uncertain, but three occur in an area that may be classified as habitation sites. The other two sites contain storage cists. Only one, 5MF1751, has been adequately recorded. It consists of adobe, sandstone slab and stick construction, with a groundstone metate serving as a lid. Corn cob impressions were visible in the support adobe. An additional three or four cists in various states of disrepair are within the shelter. Local informants and this author have seen additional cists, both freestanding and incorporating bedrock, throughout the area. What was stored in these compartments and by whom awaits future investigation, but holds much promise for excellent information concerning the subsistence and settlement patterns of aboriginal groups in the Little Snake Resource Area.

Rock Art. Sites in this type contain pecked petroglyphs and painted pictograph images on rock faces. This type is not in association with a larger complex of cultural material such as campsites.

The rock art in northwestern Colorado was first studied in the 1920s by McKern for the Smithsonian Institute. McKern noted the rock art on the Sand Rocks north of Craig and associated their occurrence with Mesa Verde and Shoshonean affiliations. Since McKern's study, public and professional

Photograph 10
Sheltered Architectural Diamond Breaks

interest in rock art in Colorado and Utah has led to a number of publications (Schaafsma 1963, 1971, 1975; Turner 1963; Buckles 1971; Burton 1971; Grant 1967), despite the lack of substantive knowledge regarding the phenomena and the difficulty in applying current archaeological techniques to its investigation.

A total of 33 sites containing rock art, including some panels, have been located in the Little Snake Resource Area. Many are complex panels and others are solitary figures. Eight sites are associated with habitation-type shelters. Both pictographs and petroglyphs exist, sometimes occurring together and often superimposed.

The Denver Chapter of the Colorado Archaeological Society (CAS) has taken an active role in recording the rock art along Brown's Park, Irish Canyon, and Vermillion creeks. Through their efforts, 14 rock art sites

were recorded, studied, and interpreted. The Irish Canyon petroglyphs recorded by CAS are now protected and developed for public education and recreation. The rest of the rock art sites (19 sites) were discovered and recorded during archaeological projects supported by energy development in the resource area.

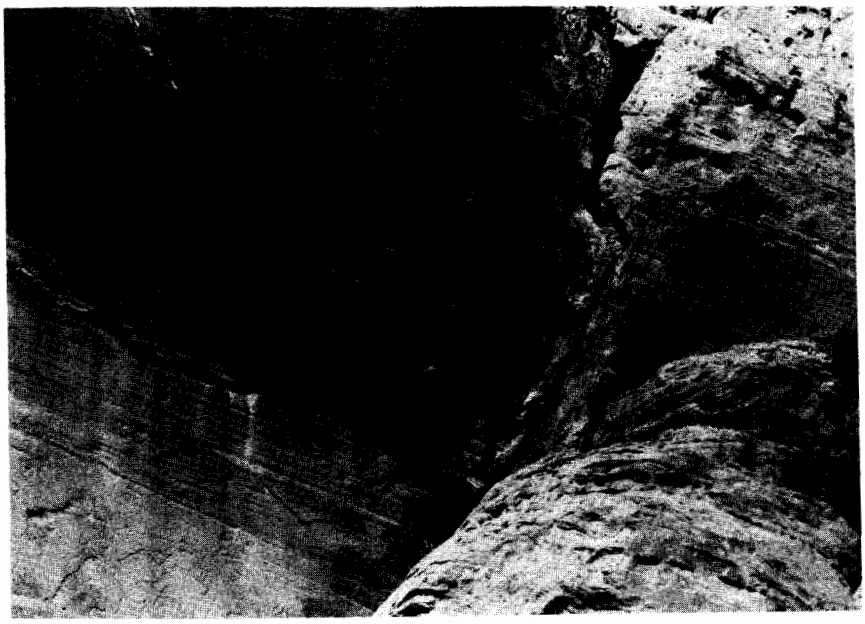
Recording techniques vary from brief notes of observations and an occasional photograph or sketch to detailed description, scale maps, and extensive photography. Unfortunately, most sites are only minimally recorded, precluding any detailed or meaningful analysis of the motifs, manufacture techniques, distribution, affiliation, etc.

Assigning a particular rock art style to a specific chronological period or cultural group can sometimes be done, but only with broad temporal categories. Relative dating through the study of patination, lichen growth, superposition of elements, erosion, or mechanical and chemical weathering can provide empirical evidence on temporal relations, but can be misleading since the processes of weathering, patination formation, and lichen growth are not well understood and often vary by location and through time. Absolute dating of the rock art may be accomplished through the presence of datable archaeological deposits in association with the rock art. This method involves numerous assumptions, however, especially if the deposit is surficial or contains multiple components, or when the panel exhibits different styles.

Cultural affiliation of the rock art has also been determined by the presence of diagnostic subject matter, such as the bow and arrow, the atlatl, the horse, or the presence of distinctive iconography. During the summer of 1983, Sally Cole conducted an intensive documentation of the rock

art of Irish and Vermillion canyons. Through relative dating of the rock art styles present, Cole (1983) associated the earliest rock art forms with Late Archaic populations in the Great Basin, as represented in the Great Basin Abstract and Representational styles. The Fremont-type rock art present was found to represent two styles--the Classic Vernal and Northern San Rafael style--suggesting a possibility of two chronological periods, as represented by the presence of bow and arrow motifs in the San Rafael style and the lack of such in the Vernal, possibly earlier, style. Cole offers an alternative theory concerning the possibility that the two styles are from the same time frame but represent two different functions. The Northern San Rafael style appears to represent pictures of everyday life such as hunting scenes, while the Vernal style is more stylistic and representative of perhaps the organized ceremonial aspect of Fremont lifeways. Cultural contacts with the Great Basin, the Southwest, Colorado Plateau, and the Northern San Rafael are evident, with a general lack of Plains-related motifs.

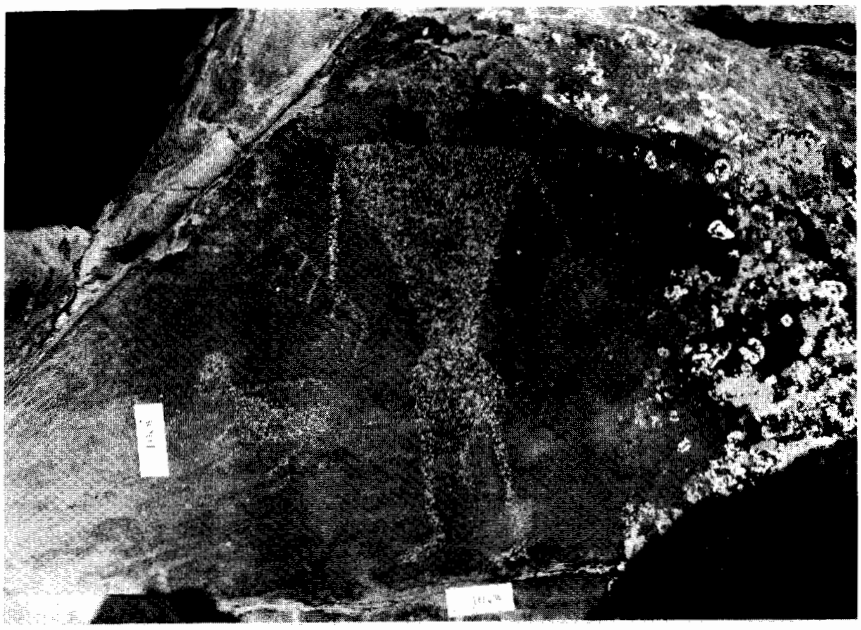
The Cole analysis was concentrated in the northwestern portion of the resource area and involved four sites, 5MF353, 492, 756, and 758. Her contributions to the chronology of the area has provided insight into the potential interrelationships between different cultural groups in the area and has offered suggestions regarding future investigations on cultural affiliations of prehistoric occupants of the resource area (see photographs 11 through 14). There remains, however, 30 recorded and unstudied sites in the resource area. Future rock art studies on the level of the Cole study are needed to support or refute the Cole hypotheses and to shed additional light on the aboriginal artists--who they were, when they were here, and why were the panels made.



Photograph 11
Rock art, Vermillion Creek

Photograph 12
Rock art, Vermillion Creek

Photograph 13
Rock Art, Irish Canyon



Photograph 14
Rock Art, Irish Canyon

Table 16 describes the rock art sites present in the resource area. The rock art styles vary considerably in size, configuration, and arrangement of the motifs. A number of sites contain a variety of anthropomorphs, painted and pecked, riding horses, carrying shields, and wearing elaborate headdresses with horns. Others are grouped (dancers?), large and small, and others are isolated. One panel, 5RT118, contains three red painted anthropomorphs 4 feet tall with round heads, square shoulders, and continuous lines forming the bodies. Anthropomorphs at 5MF465 are compared to the Barrier Canyon Style "carrot men" style but are painted in only black pigment.

Zoomorphic figures prevail throughout the rock art panels. Nearly every large indigenous mammal is represented in naturalized or stylized zoomorphs. Most commonly depicted are deer, mountain sheep, antelope, horse, and bison. A blue painted and incised mammoth/bison has been described on a panel south of the town of Hayden. Snakes and bird motifs are also common.

Abstract motifs composed of curvilinear and rectilinear elements are present at many sites. Meandering lines, straight lines, spirals, concentric circles, dots, rows of lines, and other miscellaneous patterns are the most common. "Awl" grooves are also found at several sites.

Twenty-three rock art sites are located near the confluences of side canyons, tributaries, and major drainage corridors. Three major river corridors, the Yampa, Green, and Williams Fork, as well as Vermillion Creek and Irish Canyon, form natural transportation corridors and are sprinkled with rock art sites. Whether the rock art found in these areas represent messages, trail markers, or symbolic ceremony or magic remains is not

TABLE 16
RECORDED ROCK ART IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Location/Name	Technique		# of Panels	Elements	Additional Site Information
		Peck	Painted			
5MF289	Williams Fork near Round Bottom	x	x	?	Riders with shields, headdresses, bows and arrows, deer, buffalo, mountain sheep, red paint	Small overhangs extending 1/4 mile along sandstone outcrop.
5MF290	Side of canyon of Horse Gulch		x	1	Unknown	Sheltered camp
5MF295	Castor Gulch	x		1	Human with double horned headdress, no legs, possibly Fremont	Isolated sandstone erosional remnant
5MF324	Ralston Springs	x	x	4	Zigzags, zoomorphs, Pecked figures over pictographs	SE facing sandstone outcrop
5MF337	Ralston Draw			1	Two anthropomorphs, one abstract	Sandstone outcrop
5MF353	Irish Canyon/ Irish Canyon petroglyphs	x	x	5	Classic Vernal Style anthropomorphs, zoomorphs, abstracts	Mouth of Irish Canyon
5MF354	Irish Canyon/ Nativity petro-glyphs	x		2	anthropomorphs, snakes, food prints, abstracts, animal tracks	Two large boulders
5MF435	Duffy Mountain		x	1	6 men on horseback hunting large animal with four or five toes, deer, antelope black paint	Sheltered camp

TABLE 16 (continued)
RECORDED ROCK ART IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Location/Name	Technique		# of Panels	Elements	Additional Site Information
		Peck	Painted			
5MF436	Butte at confluence of Williams fork and Yampa rivers		x	1	Horseman, red paint	Sheltered camp
5MF465	Confluence of Elkhorn and Good Spring Creeks		x	3	2 figures on horseback; Carrotman figure with lance; concentric circles; zoomorphs black paint	Sheltered Lithic
5MF492	Vermillion Creek Canyon/Vermillion Canyon petroglyphs	x		16	Fremont, San Rafael style curvilinear abstracts, zoomorphs, anthropormorphs, Flute-players	Canyon walls of Vermillion Creek
5MF496	Bull Canyon			Unknown	Unknown	No information
5MF606	Irish Canyon/ Irish Canyon Rock Shelter	x		1	Graffiti	Sheltered camp
5MF610	Brown's Park/ Raftopoulos petroglyphs	?	?	Unknown	Fremont, Comanche(?)	Open camp
5MF685	Bull Canyon/ Bull Canyon Rock Art	x	x	5	Comanche(?); 110 figures; Human figures; red, orange paint	Grotto between two boulders; Open lithic
5MF686	Brown's Park/ Matt Spring petroglyphs	x		5	Fremont Anthropomorphs zoomorphs	Open camp with bedrock metates

TABLE 16 (continued)
RECORDED ROCK ART IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Location/Name	Technique		# of Panels	Elements	Additional Site Information
		Peck	Painted			
5MF687	Brown's Park/ Basset Cemetary petroglyphs	x		1	4 Fremont Anthropomorphs; zoomorphs; spirals; sunburst; bighorn sheep	Large boulder
5MF688	Brown's Park/ Metate Rock petroglyphs	x		1	Fremont anthropomorphs; bighorn sheep; abstracts; zoomorphs	Open camp with bedrock metates
5MF692	Brown's Park/ Hole in the Rock petroglyphs	x		2	Two Fremont anthropo-morphs; big horn sheep; swastika	Sheltered Camp
5MF756	Vermillion Creek	x		2	Circular (Shield?) motifs. Great Basin Abstract, zoomorphs	Canyon wall along tributary tributary to Vermillion Creek
5MF758	Vermillion Creek/ Highcleft petro-glyphs	x		1	Classic Vernal, 18 or more anthropomorphs, headdress, big horn sheep zoomorph	Cliff face of Dry tributary to Vermillion Creek
5MF759	Vermillion Creek	x		1	2 Fremont style Antro-pomorphs	Protected sandstone wall
5MF948	Williams Fork Mountains	x	x	?	Shields, spears, bison, mounted horsemen. yellow and red ochre	escarpment
5MF949	Horse Gulch		x	1	Figure; red ochre	Sheltered Lithic
5MF1277	Iles Mountain	x		1	Anthropomorph holding spear, with rounded head and headdress (?)	Sandstone outcrop

TABLE 16 (continued)
RECORDED ROCK ART IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Location/Name	Technique Peck	Technique Painted	# of Panels	Elements	Additional Site Information
5MF1753	Diamond Breaks/ Beachman on the Lodore	x		1	Anthropomorph, zoomorph; red paint	Sheltered camp
Routt County						
5RT6	Mt. Harris		x	1	Shield figure. green and red	Sheltered camp
5RT8	Dry Creek	x	x	4	6 Horned Anthropomorphs, abstracts, red ochre	Alcove
5RT47	Dry Creek	x			Ellipse abstract (shield?), horse	Ledge
5RT90	Hayden	x	x	1	Horseback riders, zoomorphs, "dancers," masks (Fremont?) abstracts. red paint	Sandstone cliff overlooking looking Yampa River
5RT118	Dry Creek		x	1	3 Anthropomorphs 4 ft. tall with round heads, square shoulders, legs consist of continuous bodylines. Red paint	Overhang
5RT120	Hubbarson Gulch/ Sweet William	x	x	2	Blue painted incised elephant, shield figures tipi-like figures. red and blue paint	Sandstone face

TABLE 16 (continued)
RECORDED ROCK ART IN THE LITTLE SNAKE RESOURCE AREA

Site Number	Location/Name	Technique		# of Panels	Elements	Additional Site Information
		Peck	Painted			
5RT345	Twenty Mile Park	x	x	?	Deer, 3 large anthropomorphs, 3 small anthropomorphs, shield figures, arrows, circles	Sheltered camp

known. Site 5MF289 is a pictograph and petroglyph panel located along a sandstone ridge adjacent to the Williams Fork River. The main themes of the panel are riders with shields, headdresses, and bows/arrows and are representative of post-Hispanic contact. Omer Stewart has hypothesized that the rock art marks the boundary between Ute and Shoshone occupation (Breternitz 1971). The four sites not located along obvious access corridors and more inaccessible areas may have been used for different functions. The isolation of these sites suggest a possible religious purpose.

The known rock-art sites occur primarily in overhangs, sandstone cliffs, and isolated boulders, and all but three have a southernly aspect. Rock art panels associated with habitation attributes, such as 5MF290, 345, and 692, offer an excellent opportunity to investigate the nature and affiliation of these phenomena through the dating of archaeological deposits and cultural materials.

Quarry Sites. Areas where lithic raw material was extracted or mined for stone tool manufacture are classified as quarries. Despite the numerous exposed geologic strata containing potential sources for excellent toolstone and the frequent references to "tiger chert found in the Sand Wash Basin" in archaeological literature, only four quarry sites have been recorded for the resource area, none of which mention "tiger chert" as the quarried raw material. White chert was noted as occurring "everywhere" by Grand River Institute (1980) during the Oak Creek Survey in Routt County. All recorded quarries produced various types of crytocrystalline quartzites; no obsidian sources are known within the LSRA.

Stucky (1974) describes three geologic formations within the Sand Wash Basin that produced the raw lithic material utilized by prehistoric populations to make chipped stone tools. The Bridger Formation contains three types of lithic material: a green sedimentary block quartzite, rounded quartzite and jasper cobbles, and light tan to dark brown surface flint that occurs in nodular form (commonly called tiger chert). The Green River Formation produces silicified oolitic limestone that can be found as a surface deposit. The third formation described was the Wasatch where pink to orange jasper was found in angular cobble form. More than 88 percent of chipped stone tools recovered during the Stucky survey were made from these lithic sources.

Three of the recorded quarry sites, 5MF675, 5MF479, and 5MF899, are located in the Wasatch and Bridger formations and are described as terraces and ridges out of which chalcedony and chert nodules were eroding. 5MF675 and 5MF899 are located along the southern portion of the Sand Wash Basin and at elevations within 5 meters of one another, 1,798 meters and 1,804 meters. 5MF479 is located north of the Basin overlooking Shell Creek and within the Wasatch Formation at an elevation of 2,085 meters. A small quarry site (150 m^2), 5MF1205, containing chert nodules, was located on the slope of Cross Mountain within the Madison Limestone. No pits or other activities associated with "mining" the resource were observed.

Three open-camp sites are located on or near quarry sources, and apparently the procurement of the raw lithic material was one of the activities conducted at the sites. The four quarry sites are located in four different topographic areas and formations. Iron Mountain is the location of an open-camp site where basalt, which was acquired from an

outcrop on the mountain, was reduced. Chert and quartzite flakes were also present at the site but not acquired on the mountain. Tiger chert in nodular form from an erosional terrace in Sand Wash was collected at a dune open camp, 5MF1628. In the area of Savory Pot Hook, quartzite cobbles from a Wasatch Formation terrace were collected and used at 5MF522.

Much of the use of native toolstone in the LSRA appears to be more fortuitous rather than intentional mining and reduction found at quarries such as the famous "Spanish Diggings" near Lusk, Wyoming. This may be a reflection of the quality of toolstone found in the surface terrace deposits, or just another example of an incomplete data base. The presence of algael, oolithic, pumpkin, and tiger chert at archaeological sites further south and west suggest some sort of trade network or even seasonal round where collection of raw material was part of the resource strategy. The procurement of raw toolstone materials was more than the mere gathering of surface materials--it required serious, planned systematic efforts and the expenditure of energy and time. The importance of this aspect of the prehistoric cultural system cannot be underestimated. The economy of these peoples often depended on the quality and availability of raw materials for chipped stone tools. Further systematic studies of prehistoric seasonal round should include this integral activity.

An exception to the fortuitous use strategy is the quarry open-camp site recorded by Gardner (1981). The site is located in the cherty limestones of the Morgan Formation. Nodular and plate cherts were "mined," collected and utilized. The site is extensive, and no site boundaries have been discerned yet. Diagnostic artifacts recovered suggest prehistoric populations, from Paleo-Indian Clovis times to Late Prehistoric times, travelled to the quarry to collect raw toolstone material.

To determine the difference between the localities in terms of favored toolstone use, collections could be made from various formations known to have been used and, through petrographic analysis, evaluation of the quality of the toolstone could be made. This information would provide significant data as to trade networks and cultural boundaries, as well as some insight into a necessary portion of the seasonal round raw-lithic-material procurement.

Isolated Finds. This category has been used as a catchall since the advent of archaeological surveys conducted for cultural resource management. Originally conceived as a description for a solitary artifact, it has grown to be interpreted in various ways from "a single object of human origin located more than 100m from any other contemporaneous artifact" (Creasman 1979: 111-3) to its use for any phenomena that does not fit the description of an archaeological site. This last description includes historical trash, isolated fire hearths, localities, and "4 or fewer artifacts."

Overall, the general use of the category implies a description of some sort of limited short-term activity area. Studies and observations of the physical remains left by contemporary hunter and gatherer groups, such as the !Kung Bushmen, have noted that at some sites only the remains of a few flakes, scrapers and an occasional fire hearth remain (Yellen 1976). Such sites would probably either be visible or become candidates for "isolated finds" after just a few years. Arrows or ataltl points lost by aboriginal hunters may also be later found and classified as isolated finds. Once described in this category, unfortunately, the artifacts are not further studied unless they are projectile points. Therefore, it is possible that a

rather large body of data is not being synthesized into the formation of theories regarding subsistence strategies or locational patterns.

Regardless of the problems in determining the function of isolated finds, the majority are probably limited activity sites, and most could be described as open lithic. Isolated finds occur throughout the resource area at all elevations, within all vegetative types, and in all sorts of topographic situations. A total of 380 sites in the resource area have been classified as isolated finds. Thirty-nine projectile points have been found in isolated circumstances. Table 17 describes the range of cultural remains recorded in this category. Since many of these sites could represent systematic behavior such as a limited activity and, therefore, consequently a neglected aspect in the subsistence and settlement pattern of the aboriginal populations in the resource area, treatment and definition of this phenomena should be standarized in the resource area. Perhaps a return to describing solitary artifacts as isolated finds and all else as sites under the described categories along with further consideration of what aspect of prehistoric life the phenomena represents would be advisable.

Multiple-Site Type. The sites in this category contain cultural material from both historical and prehistoric periods. Twenty-one sites fall into this type. One-half of the prehistoric types would be classified as open camps. Nine of these prehistoric sites also contain historical architecture in the form of homesteads, dugouts, and corrals. Apparently, historic and prehistoric peoples at times considered similar site location attributes when selecting a "campsite." Elevation above a water source was usually less than 24 meters, and distance to the source was less than 150

TABLE 17
ISOLATED FIND DESCRIPTION

Features	Projectile Points	Tools	Exotics	Debitage
Corral	None	None	None	None
Historic Foundation	None	None	None	None
Cairn	None	None	None	None
Historic Refuse	None	None	None	None
Historic Refuse	None	None	None	Present
Burnt Rock Concentration	None	Core	Bone	Present
Hearth-Firepit	None	None	None	None
None	Agate Basin	None	None	None
None	Uintah Side notched	None	None	None
None	Elko Series	Scraper	None	Present
None	Elko Series	None	None	None
None	Duncan	None	None	None
None	Pinto Basin	None	None	None
None	Undetermined	None	None	Present
None	Undetermined	None	None	None
None	Lake Prehistoric	None	None	None
None	Cottonwood	None	None	None
None	Rose Springs Series	None	None	None
None	Undetermined Archaic	None	None	None
None	Undetermined Archaic	None	None	Present
None	Undetermined Paleo-Indian	None	None	None
None	None	Drill	None	None
None	None	Graver	None	None
None	None	Biface	None	None
None	None	Biface	None	Present
None	None	Groundstone	None	None
None	None	Core	None	None
None	None	Scraper	None	None
None	None	Scraper	None	None
None	None	Groundstone	None	Present
None	None	Hammerstone	None	None
None	None	Chopper	None	None

TABLE 17 (continued)
ISOLATED FIND DESCRIPTION

Features	Projectile Points	Tools	Exotics	Debitage
None	None	Chopper	None	Present
None	None	Core	None	Present
None	None	Core	None	None
None	None	None	Shell	None
None	None	None	Bone	None
None	None	None	None	Present
None	None	None	None	Present

meters in 70 percent of the sites. Terrace and ridge locations were favored by both peoples. Table 18 further describes this site type.

A basic framework to descriptively classify sites in the Little Snake Resource Area, based on previous work conducted in Northwest Colorado by the Laboratory of Public Archaeology (LOPA) and directed by Dr. Calvin Jennings at Colorado State University, was used. Table 19 summarizes the site classifications and the percentage of sites per category. Review of the table reveals that three of the classifications (open-lithic, open-camp, isolated-find) are larger than the others. Based on previous assumptions for general site function, there should have been more open-lithic sites (limited activity) than open-camp sites (campsites). Isolated finds could be defined as limiated activity sites, however, and by combining the isolated finds and open lithic sites classifications a more representative figure is presented in relation to the number of open-camp sites.

Assigning a function for this site typology is actually a bit premature; little environmental difference can be observed between open-lithic and open-camp sites on this general level. Subdividing the resource area into smaller environmentally similar units and then evaluating environmental differences between site types would be practical.

A far greater range of subtypes also exists within these site types in the resource area than the automated data base has produced. Amateur archaeologists and collectors in the area should be consulted on the location of wickiups, storage cists and room blocks, and their existence recorded and described in an effort to fill in the data gaps.

TABLE 18
MULTIPLE SITE TYPE DESCRIPTION

Site Number	Features	Projectile Points	Tools
5MF1004	Homestead, dugout	None	Flakes
5MF1011	Homestead, Historic refuse	Desert side-notched	Biface Core
5MF1197	Historic refuse	None	Flakes
5MF1216	Hearth-firepit, Historic foundation	Undetermined	Scraper, chopper, Groundstone
5MF1431	Groundstone concentration, homestead	Archaic Archaic	Biface, core, Groundstone
5MF1454	Historic refuse	None	Biface, scraper, Groundstone
5MF1457	Historic refuse	Undetermined	Biface
5MF1594	Historic refuse	None	Flakes
5MF269	Homestead, Historic foundation	None	Biface Groundstone, hammerstone
5MF333	Homestead, corral	None	Biface, groundstone
5MF404	Historic refuse, corral	None	Scraper
5MF518	Hearth-firepit, Historic refuse	None	Scraper, core Groundstone
5MF695	Hearth-firepit, Historic refuse	None	Biface
5MF725	Dugout, Historic refuse	Archaic	Groundstone
5MF855	Dugout, hearth-firepit	None	Groundstone
5MF888	Historic refuse	None	Biface, groundstone
5MF955	Historic refuse	None	Biface, scraper
5MF959	Hearth-firepit, burnt rock	None	Groundstone
5MF991	Historic refuse	Late Prehistoric	Groundstone
5RT151	Historic refuse	Late Prehistoric	Chopper, core, groundstone

TABLE 19
SITE TYPE DISTRIBUTION

	Number of Sites	Percentage Per Type
Unknown	1	.073
Open Lithic	347	25.5
Sheltered Lithic	4	.29
Open Architectural	16	1.18
Sheltered Architectural	5	.37
Sheltered Camp	22	1.62
Open Camp	295	21.7
Quarry	4	.29
Trails-Roads	4	.29
Rock Art	19	1.396
Burial (Historic)	5	.38
Historic	227	16.68
Isolated Find	385	28.29
Multiple	24	1.763
Paleontological	3	.220
Total	1,361	

VII.

CHRONOLOGY AND AFFILIATION

The development of a chronology and regional sequence in the Little Snake Resource Area is based on several lines of evidence, including radiocarbon dating, cross-dating of projectile point types, and the presence of ceramics. Radiocarbon dating is the primary means of dating and establishing the chronology of the region. No dendrochronologic samples have been analyzed for the LSRA.

Relative chronology through cross dating of artifacts and other types of cultural evidence such as features or structures can also be correlated. The nonperishable archaeological remains, pottery and projectile points are sufficiently distinct in their construction and morphology and restricted in terms of their temporal occurrence and geographical distribution to be used for archaeological cross-dating of sites in the LSRA.

Maize has been the best diagnostic timemarker of all preserved plant remains in Northwestern Colorado. On the Colorado Plateau, corn is generally believed to date after A.D. 1 (Schroedl 1976), although Winter (1976) reports evidence for corn in late Archaic contexts in the Southwest before this date. Corn remains have been affiliated with Fremont occupation in Dinosaur National Monument and the Canyon Pintado Historic District (Breternitz 1970a; Creasmann 1981; La Point et al. 1981).

The only evidence, however, for the presence of corn within the LSRA boundaries outside of Dinosaur National Monument are corn cob impressions left in the adobe mud walls of a storage cist above Brown's Park.

Other cultural phenomena may be used in correlating the prehistoric sites in the LSRA. Some types of pit features, including hearths, fire pits, slab and rock lined fire basins, seem to have significant temporal and possibly geographical dimensions (Wormington and Lister 1956); but no studies of these site features have been successfully conducted in the LSRA. Burials and associated artifacts also provide significant temporal associations, but there are no recorded sites of this nature for the resource area. Rock art styles have been preliminarily studied by Cole (1983), but correlation with styles outside her study area are tenuous. For the most part, cultural features suitable for cross dating and correlation of sites remain limited.

Projectile Points

Placing prehistoric sites in chronological order depends on the analysis of projectile point styles. These styles, or types, are used to describe observable and quantifiable changes in cultural material over time. Frison et al. (1974) has noted a general decrease in point size from early to late prehistoric times, reflecting the change from spear to ataltl dart to arrow point.

As previously mentioned, the LSRA is marginal to two major cultural areas, the Great Basin/Plateau/Desert Archaic and the Northwestern Plains cultures. In order to classify remains within the LSRA, typological comparisons with these areas is necessary because the materials and general area within the LSRA are relatively unknown and unexplored. There has been very little excavation of deeply stratified sealed deposits within the resource area.

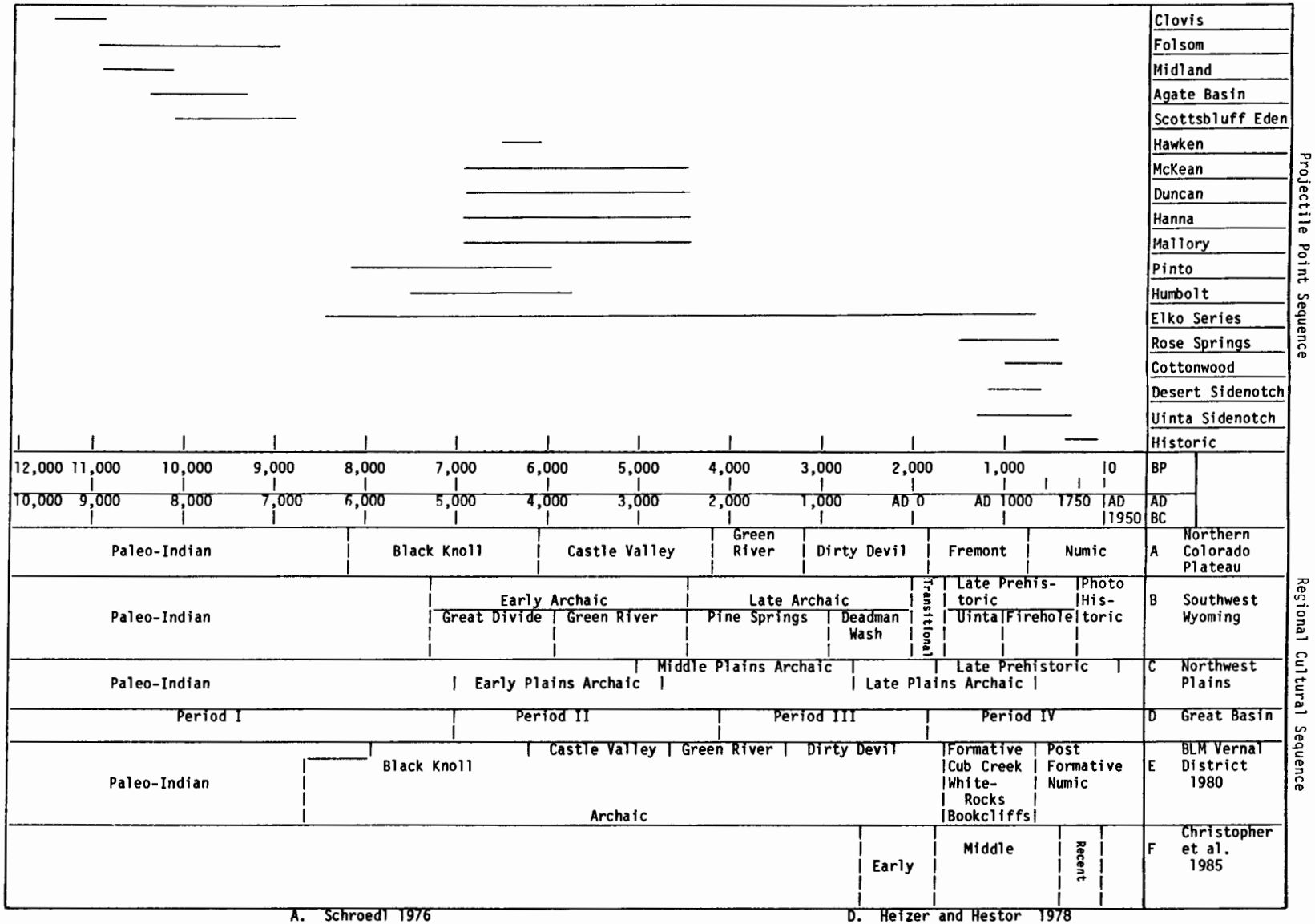
Researchers and contractors conducting archaeological investigations within the resource area have relied on cross dating recovered projectile points with those associated with excavated multiple component sites that contained sequential developments and extensive time spans. In many cases, because the area surrounding the LSRA has not been extensively explored archaeologically, archaeologists have had to reach far afield for comparisons, thus weakening the local relationships and interpretations. Until this "marginal" area has been more fully investigated, these comparisons and correlations will have to be viewed as tentative and only as general characteristics of broad cultural periods present in the resource area.

There have been 324 projectile points recovered and curated from the Little Snake Resource Area. Only 73, however, have been analyzed by the collectors and compared with surrounding cultural areas. One hundred and fourteen points have been identified to very broad cultural periods. Three points have been classified as unidentified Paleo-Indian, 37 points as unidentified Archaic, and 51 as undefined Late Prehistoric. These undetermined projectile-point types may be the result of the fragmentary nature of the point remains or the lack of comparable specimens in the surrounding areas (Table 20).

Figure 1 displays projectile-point types, approximate dates, and cultural affiliation for the various chronologies from surrounding areas that were used to compile the following type descriptions. The descriptions are organized according to chronological sequence and cultural area. Four basic time periods described by Willey and Phillips (1958) are used to subdivide the prehistoric occupation reflected in the projectile-point

TABLE 20
TYPED PROJECTILE POINTS FROM LSRA

Projectile Point Type	Approximate Date	Approximate Cultural Affiliation	Number Identified LSRA
Clovis	9250-9550 BC	Early Paleo-Indian	1
Folsom	7050-9050 BC	Paleo-Indian	2
Midland	8750-8450 BC	Paleo-Indian	2
Agate Basin	8550-8050 BC	Paleo-Indian	2
Scottsbluff-Eden	6850-8250 BC	Late Paleo-Indian	2
Hawken	4550-4350 BC	Early Plains Archaic	1
McKean	4950-2950 BC	Middle Plains Archaic	9
Duncan	4950-2950 BC	Middle Plains Archaic	4
Hanna	4950-2950 BC	Middle Plains Archaic	1
Mallory	4950-2550 BC	Middle Plains Archaic	1
Pinto	6300-4200 BC	Middle-Late Archaic	3
Humbolt	5650-4150 BC	Archaic	1
Elko Series	5650 BC-Historic?	Late Paleo-Indian to historic	16
Rose Springs	AD 450-AD 1650	Late Archaic	13
Cottonwood	AD 1000-AD 1650	Late Fremont-Proto-historic	4
Desert-side Notched	AD 900-AD 1200	Numic-Protohistoric	6
Uinta Side Notched	AD 800-AD 1720	Late Fremont-Proto-historic	3
Historic	AD 1640-AD 1870	Ute-Shoshone	2
Undetermined Paleo-Indian			3
Undetermined Archaic			37
Undetermined Late Prehistoric			51



A. Schroedl 1976
B. Zier et al. 1983
C. Frison 1978
D. Heizer and Hestor 1978
E. Bureau of Land Management Vernal District 1980
F. Christopher et al. 1985

Figure 1
CHRONOLOGIES

collection. These are the Paleo-Indian, Archaic, Formative, and Ethnohistoric periods. The Paleo-Indian will be examined as a time period that spans all cultural areas.

Paleo-Indian

Clovis. These well made lanceolate projectile points are fluted and characterize the earliest cultural tradition of the Paleo-Indian horizon the Llano tradition. This tradition is well documented at mammoth sites in New Mexico and Arizona and has been radiocarbon dated to 11,200 to 11,500 B.P. (9250 to 9550 B.C.). The closest evidence of Clovis hunters to the study area is the Union Pacific Mammoth Kill site located near the Little Snake River by Rawlins, Wyoming. Although some question remains as to whether the site is a Clovis site, because of the lack of diagnostic projectile points, a radiocarbon date of 11,280 $\pm$ 350 B.P. (9330 B.C.) on tusk material falls within the time span of the Llano tradition. The Clovis point is considered to be typically a Plains adaptation, but it has been found on a tundra ridgecrest in Rocky Mountain National Park (Benedict 1975). There are no reported sites for the Colorado Plateau (Schroedl 1976).

One Clovis type point has been recorded in the resource area at an open-camp site on Cross Mountain (Gardner 1981).

Folsom. The Folsom complex is characterized by the smaller, more finely made fluted Folsom point and, although not directly, follows the Llano tradition. Associated dates range between 9,000 to 11,000 B.P. (7050 to 9050 B.C.). Characterised as a High Plains culture like the

Llano tradition, the Folsom point has also been found as surface finds on the Uncompahgre Plateau (Huscher 1939), in the Unitah Basin (Lindsay and Lund 1976), in the Grand Junction area (Steward 1938), and along the Front Range (Benedict 1975).

Two Folsom points have been reported within the resource area. The sites, one an open-camp site and the other an open-lithic site, are multicomponent, containing diagnostic artifacts from later periods (Chase 1981). Several reports, although unconfirmed, of Folsom finds in the vicinity of Sunbeam and Maybell have been made by local residents and members of the Vermillion Creek Chapter of the Colorado Archaeological Society.

Midland. This variety of point closely resembles the Folsom point and may in fact be unfluted Folsom points (Frison 1978). At the Hell Gap site in east-central Wyoming, a separation between Midland and Folsom is perceived, but with some overlap (Irwin-Williams et al. 1973). At the Hansen site, the Midland-type projectile points occurred in the same cultural layer as the Folsom points (Frison 1978). Midland dates are thought to occur between 10,700 and 10,400 B.P. (8750 and 8450 B.C.). Two Midland type points have been reported at multicomponent open-camp sites in the resource area (Stucky 1974; O'Neil et al. 1982).

A number of point types representing a relatively more diverse archaeological culture are associated with the Plano Period, 9500 to 6500 B.P. (7550 to 4550 B.C.), the last of the Paleo-Indian horizon. These points are finely pressure flaked, producing shallow, parallel flake scars, lanceolate shapes, and lenticular cross sections. Point complexes found in the resource area representing this period are the Agate Basin and Scottsbluff-Eden point types.

Agate Basin. Two Agate Basin type points have been recorded in the resource area--one as an isolated find (Hansen 1978) and the other at an open-camp site (Stucky 1974).

The type site for the Agate Basin point is a Paleo-Indian bison trap and butchering site centered along an arroyo located in extreme eastern Wyoming (Roberts 1951; Bass 1970; Frison 1978). Recent reinvestigation of the site yielded charcoal dates of 10,330 ± 570 B.P. (8380 B.C.) (Frison 1978). The points associated with this complex represent an "excellence in stone flaking technology" with straight blade edges, lenticular in cross-section and ground on all edges (Frison 1978). Agate Basin type has been dated at the Hell Gap site at between 10,500 and 10,000 B.P. (8550 B.C. and 8050 B.C.) (Irwin-Williams et al. 1973).

Scottsbluff-Eden. This type is associated with the Cody Complex of the Plano Period. The Cody Complex was defined at the Horner site near Cody, Wyoming, (Jepsen 1953) and yielded radiocarbon dates, suggesting the complex lasted from 8800 to 8400 B.P. (6850 B.C. to 8250 B.C.). Points are often typed as Scottsbluff and Eden, but, according to Frison (1978) and others, may not be separate types but rather a continum of variation with intermediate forms. Two points identified as Cody Complex types have been recorded for the resource area. One was located in Routt County on an open-lithic site 5RT139 (Wheeler 1980; Hand 1980). The second was located in the Hiawatha area by LOPA on an open-camp site with multiple components (Jones and Jennings 1977). Scottsbluff points have also been reported from 5MF132 in Brown's Park (Breternitz 1970) and in Dinosaur National Monument in lower levels of Deluge Shelter (Leach 1970).

Archaic

The following point types are represented in the Northwestern Plains cultural area.

Hawken. This point type, defined by Frison et al. (1976) is associated with the Early Plains Archaic, radiocarbon dated at the Hawken site at about 6500 to 6300 B.P. (4550 B.C. to 4350 B.C.). These points are considered to be the earlist side-notched type known from the Northwestern Plains associated with a bison kill and might have possibly been "a local innovation derived from the terminal Paleo Indian" (Frison 1978:199). Frison also qualifies this statement by noting a possible derivation or relationship with points further east. The Hawken type is found, in rare instances, in the northern Colorado Plateau, but as yet unrecorded in the Great Basin (Schroedl 1976). At Sudden Shelter the point dates approximately 6500 to 4600 B.P. (4550 B.C. to 2650 B.C.), falling into Schroedl's Castle Valley Phase. Holmer (1978) suggests that the presence of the Plains-associated type in the plateau area and not in the Great Basin may indicate a shift from close association to diversification between the two areas. One Hawken-type point was recorded in the resource area by Stevens (1981) during test excavations near Axial.

McKean Complex. The McKean complex is characterized in southern Wyoming by large, side notched and basically indented points occuring about 3000 to 1000 B.C. (4950 to 2950 B.P.) This complex signals the beginning of the Middle Plains Archaic Period defined by Frison (1978). Diagnostic points include Duncan, Hanna, and Mallory types. Nine points have been described as McKean for the resource area, all associated with

archaeological sites. Duncan and Hanna types are recorded on four sites and as one isolated find.

The point sequence that occurs in the western Great Basin is, from earliest to most recent, the Pinto Series, Humboldt Concave Base, Elko Series, Eastgate Series, Rose Spring Series, Cottonwood Series, and Desert-Side Notched. The following seven point types are represented in the Great Basin and Colorado Plateau cultural areas.

Pinto Basin. These points are described by Harrington (1957) as large, crude, thick and often asymmetrical. They are manufactured by percussion, with some pressure retouch. These Desert Archaic types are dated in the Colorado Plateau and Southern Plains around 6350 B.C. and persist for approximately 2,000 years (Holmer 1978). A firm date for the Pinto materials has never been established; however, Leach (1970) accepts a late Altithermal-early Medithermal time period, which fits correlated materials he found at Deluge Shelter. Discrepencies in the dating have been hypothesized by Holmer (1978) as possibly indicating an introduction of the Pinto series points into the central and western Great Basin from the east. Schroedl finds Pinto series characterising the earlier subphase of the Black Knoll Phase, 6300 B.C. to 4200 B.C. Three Pinto Basin type points have been recorded from the resource area. One point was located at an open-architectural site, which also contained beads and a metal projectile point (Baker and Reed 1978). The second point was found at an open-camp site near Vermillion Mesa (Hoefer and Thompson 1984). The last point was an isolated find (Gordon et al. 1982).

Humboldt Series. These points date from approximately 5650 B.C. to 4150 B.C. in the eastern Great Basin, which is similar to that of the

Pinto series points (Holmer 1978). On the Colorado Plateau this type appears during the later subphase of the Castle Valley phase, around 3050 B.C. (Schroedl 1976). Descriptions of the series vary. Aikens (1970) described the series as having contracting blade edges about one- third the vertical distance from the base giving the point "shoulders." According to Heizer and Hester (1978), the points are extremely convex without shoulders. Heizer and Hester (1978) dated the Humboldt series to 3920 to 1100 B.C. One Humboldt series point has been reported by James Head of Western Wyoming College at an open-camp site near Hiawatha Camp.

Elko Series. The series includes side-notched, corner-notched and "eared" varieties and was defined by Heizer and Baumhoff (1961) as large stemmed, often asymmetrical and produced by the percussion method and pressure retouch. As Holmer (1978:62) points out, "the Elko series projectile points are the most plentiful but the least temporally diagnostic of the point types commonly found in the northern Colorado Plateau and the far eastern Great Basin." They occurred after 5650 B.C. and possibly persisted into historic times. Heizer and Hester (1978) suggested a temporal span of 2000 B.C. to A.D. 1080 and remarked that certain varieties, such as the Elko corner-notched, might have continued beyond this time. Sixteen points identified as Elko series type have been recorded for the resource area from 13 open sites. Three Elko points were recovered as isolated finds.

Formative

Rose Springs Series. This series has been defined by Lanning (1963) and is described as small, stemmed points with straight convex bases and blade form, ranging from convex sided to concave sided. There are three defined types within the series: side-notched, corner-notched, and contracting stem. These small points mark a major shift in technology from spear to arrow. In his discussion of the types, Clewlow (1967) states that the corner-notched type appear to have occurred between the end of the Elko Series (ca. A.D. 600) and the appearance of the Desert side-notched. Heizer and Hester (1978) suggested that these points first appeared earlier than 300 B.C. and flourished between A.D. 600 to 1100, with some varieties continuing into historic times. The Rose Spring Series has been associated with Fremont occupation in Dinosaur National Monument, among many places, but recent investigations by Webster (1980) and others find the series dating as early as 3300 B.P. (1350 BC. The bow and arrow did not become the dominant weapon until ca. A.D. 250.

According to Webster (1980:65), considering "the full range of evidence in light of the findings from Dry Creek there can be little doubt that the bow and arrow was present in the Basin well before Fremont horticulturalists came on the scene, and consequently arrowpoints can have little value as Fremont diagnostics in archaeological deposits." Thirteen Rose Spring Series points are on record for the resource area for 12 sites and one isolated find. Five of the sites are considered multicomponent, including diagnostic artifacts from before and after the Rose Spring Series dates.

Ethnohistoric

Desert-Side Notched. This type is described by Baumhoff and Byrne (1959) as small, basically triangular with narrow notches removed from the side near the base, which is either straight, concave, "V" shaped, or notched. This type is widely distributed in the Great Basin, with similar forms found in the Western Plains and the southwest as well. Heizer and Hester (1978) estimate the beginning dates of A.D. 1100 to 1200 for these points; Leach (1970) and Baumhoff and Byrne (1959) conclude that the type was used much earlier, A.D. 900. Breternitz (1970a) and Leach (1970) have suggested that the Desert side-notched type is affiliated with Shoshonean origin or influence in the Dinosaur National Monument area. In the resource area, five Desert side-notched points have been recorded, all associated with prehistoric open-lithic or open-camp site types. The Uintah side-notched type falls within this type but lacks the basal notch or concavity. Three Unitah side-notched points have been recorded, all in the Danforth Hills area.

Cottonwood Series. Lanning (1963) describes this type as pressure flaked, small and nonstemmed. Two forms occur, triangular and leaf-shaped. Heizer and Hester (1978) found the type occurring ca. A.D. 1300 and continuing into historic times. Leach (1970) and Breternitz (1970) recorded this type in association with Fremont occupation in Dinosaur National Monument, with beginning dates ca. A.D. 1000. Leach (1970) has suggested that some forms of Cottonwood may be Desert side-notched preforms, based on the observation of the types co-occurrence and close association at many sites. Clewlow (1967) believes that the

Cottonwood series might serve as time markers, approximating Desert side-notched type point dates. Four points in the resource area are typed as Cottonwood triangular. Two points were found as isolated finds and two were associated with prehistoric campsites.

Historic. Two sites in the LSRA contained metal projectile points (Stevens 1981, Baker and Reed 1978). Stevens (1981) recovered a metal point and Desert side-notched point during the test excavation of 5MF427. The second metal point was recovered from the surface on an open-architectural site, along with a Pinto Basin type point (Baker and Reed 1978). The precise date of the occurrence of European trade goods in the resource area is not documented in the area, but it can be assumed that this point type is affiliated with ethnohistoric groups (Ute, Shoshone) just before or after their acquistion of the horse, approximately A.D. 1640.

As mentioned earlier, projectile point classifications are not particularly valid markers of archaeological time horizons when viewed in the absence of controlled stratigraphic relationships. The most diagnostic point types are those associated with Paleo-Indian sites because of their well defined styles and manufacturing techniques. Wide variations in projectile-point styles occurred following the demise of the Paleo-Indian traditions. These later point types are difficult to place in time and geographic locality, possibly because of the influences of larger populations and the development of individual styles in response to the exploitation of more diverse food resources (Schroedl 1976).

General inferences can be drawn from the typed projectile points that, with the exception of one, were collected from the surface. There appears

to be evidence for prehistoric occupation in the LSRA from Paleo-Indian periods continuing into historic times. Plains influences that can be identified for the area occur during the Paleo-Indian Period, Early and Middle Plains Archaic (Frison 1978), with the heaviest representation occurring during the Middle Plains Archaic. A continual Colorado Plateau and Great Basin contact of some as yet undiscerned nature is evident from approximately 3050 B.C. to at least post-Fremont times and may be affiliated with the Desert Archaic. A Fremont occupation of the area may be apparent if the basis of the argument comes from the presence of Rose Spring Series type projectile points. Ethnographic groups are well represented by projectile-point types.

The projectile-point types presented in this section are derived from recovered points described on site forms and project reports. All were typed by "intuitive" classification by a variety of individuals from different academic background, training and regional affiliations. This research methodology, based on nonquantified subjectively defined attributes and individual bias of the researcher, leads to the questioning of the validity and strength of the resulting typological system.

Classification procedures need to be standarized for the LSRA to remove the bias of individual interpretations, training, and regional affiliation. By quantifying the characteristic attributes of the projectile points, comparison of the system with surrounding regions can be made and duplicated by individual researchers. A better understanding of the temporal and spatial relationships represented by projectile points would be provided, as well as the evolution of particular styles and the identificaiton of true "horizon markers."

Two successful classification systems have been developed, one for Northwestern Colorado by Kim Pinkerton (1979) and the other by Richard Holmer (1978) for Archaic points from the eastern Great Basin and northern Colorado Plateau. Both employ multivariate analysis of the morphological characteristics for projectile points, and resultant mathematical definitions were subsequently used to classify point collections. The statistical classifications were then utilized to further refine intuitive classifications. By employing either or both systems in the LSRA, objective and uniform classification of recovered projectile points could be made by a variety of researchers. Measurements could be made in the field (in case of noncollection policies), and a nonsubjective chronology based on projectile points could be developed for the resource area.

Ceramics

Pottery has been used most successfully in cross dating and seriation because pottery designs, motifs, construction techniques, and vessel forms are relatively sensitive time and spatial markers. Prehistoric ceramics are quite scarce in the resource area, with less than 50 sherds recorded to date. Fifteen sites are reported with ceramics, five of which contained Anazazi ceramics. Four sites contained Shoshone ceramics, and only one site contained ceramics affiliated with Fremont groups. An additional five sites have been recorded that have unidentified ceramic types. The isolated occurrences of this pottery does not necessarily mean that Anazazi groups occupied the area, but that pottery could have come into the area as tradeware and was used by either indigenous western Archaic groups or by Fremont visitors. Table 21 presents the types identified, site number, and reference.

TABLE 21
CERAMICS DOCUMENTED IN THE LSRA

Type	Site Number	Bibliographic Reference
Fremont, Cisco Variety, (Turner-Gray)	5MF557	Jennings and Daniels 1976
Anazazi		
Mesa Verde Redware	5MF949,5MF950	Caraveo 1980
Mesa Verde Black on White	5MF408	Lischka 1975
Undetermined Corrugated	5MF550	Jennings, Daniels 1976
	5MF725	Metcalf 1977
Shoshone	5MF317	Arthur 1977
	5MF562	Jennings and Daniels 1976
	5MF708	Hansen 1977
	5MF847	Grand River Institute 1980
Unidentified	5MF1685	Head and Creasman 1983
	5MF245	No Reference
	5MF1223	No Reference
	5MF696	No Reference
	5MF928	Gardner 1981

Radiocarbon Dates

The distribution of radiocarbon dates offers information concerning cultural and paleo-ecological events since the beginning of the Holocene, as well as providing a framework needed to develop a regional chronology. Table 22 and Figure 2 present the 59 radiocardon dates from sites located in the Little Snake Resource Area. These dates range from 4550 B.C. to "modern" and include Archaic, Formative (Fremont?), Late Prehistoric, and Protohistoric sites. Considering that the region may have been occupied for at least 10,000 years, the data base is indeed small. This is largely the result of the dearth of excavation data.

TABLE 22
RADIO-CARBON DATES FOR LSRA

Site Number	C-14 Year BP	Calendar Year BC	Lab Number	Reference
5MF428	3700±550	1750 B.C.		Stevens 1981
5MF429	1085±90	A.D. 865		Stevens 1981
	3740±325	1790 B.C.		
5MF435	300±85	A.D. 1650	UGA-2730	Arthur et al. 1982
	335±65	A.D. 1615	UGA-2732	
	785±95	A.D. 1165	UGA-3155	
	895±75	A.D. 1055	UGA-2737	
	1010±60	A.D. 940	UGA-2734	
	1030±60	A.D. 920	UGA-2739	
	1045±60	A.D. 905	UGA-2733	
	1055±60	A.D. 895	UGA-2729	
	1065±60	A.D. 885	UGA-2728	
	1240±70	A.D. 710	2735	
	1425±60	A.D. 525	2727	
	1955±60	5 B.C.	2726	
	2045±65	95 B.C.	2736	
	2110±60	160 B.C.	2731	
	2175±95	225 B.C.	2725	
	2365±75	415 B.C.	2738	
5MF436	Modern	A.D. 1950	UGA-2741	Arthur et al. 1982
	375±90	A.D. 1575	UGA-2734	
	970±65	A.D. 980	UGA-2744	
	1055±70	A.D. 895	UGA-2746	
	1090±85	A.D. 860	UGA-2745	
	1330±80	A.D. 620	UGA-2740	
	1370±65	A.D. 580	UGA-2742	
	1545±65	A.D. 405	UGA-2747	
5MF460	Modern	A.D. 1950	UGA-2748	Arthur et al. 1982
5MF476	4260	2310 B.C.		O'Neil 1980
	4185	2235 B.C.		
	4165	2215 B.C.		
	4150	2200 B.C.		
	2950	A.D. 955		
	2590	A.D. 640		

TABLE 22 (continued)
RADIO-CARBON DATES FOR LSRA

Site Number	C-14 Year BP	Calendar Year BC	Lab Number	Reference
5MF510	2480	530 B.C.	UGA-1354	Jennings and Daniels 1976
	2560	610 B.C.	UGA-1356	
	2595	645 B.C.	UGA-1355	
5MF566	Modern	A.D. 1950	UGA-1353	Jennings and Daniels 1976
5MF660	1440±95	A.D. 410	UGA-2975	Treat 1979
5MF745	675±80	A.D. 1275	UGA-2749	Arthur et al. 1982
	945±115	A.D. 1005	UGA-2750	
5MF958	1055±230	A.D. 895	UGA-3998	Burchett 1982
	1280±50	A.D. 670	Beta 7013	Reust et al. 1984
	1500±90	A.D. 450	Beta 7020	
	1790±130	A.D. 160	Beta 7021	
Cherokee Trail #1 (unrecorded)	2470±140	520 B.C.		Kosarko 1978
	1390±110	A.D. 560		
	1270±100	A.D. 680		
	1250±100	A.D. 700		
5RT11	1730±225	A.D. 220	Dic 1390	O'Neil 1980
5RT130	1130±230	A.D. 820	RL1227	Tucker 1981
5RT139	Modern	A.D. 1950	RL1430	Tucker 1981
	"	A.D. 1950	RL1426	
	"	A.D. 1950	RL1432	
	"	A.D. 1950	RL1428	
	Modern	A.D. 1950	RL1431	
	"	A.D. 1950	RL1429	
	5900	3950 B.C.	RL1434	
	6430	4480 B.C.		
	1130	820 B.C.		

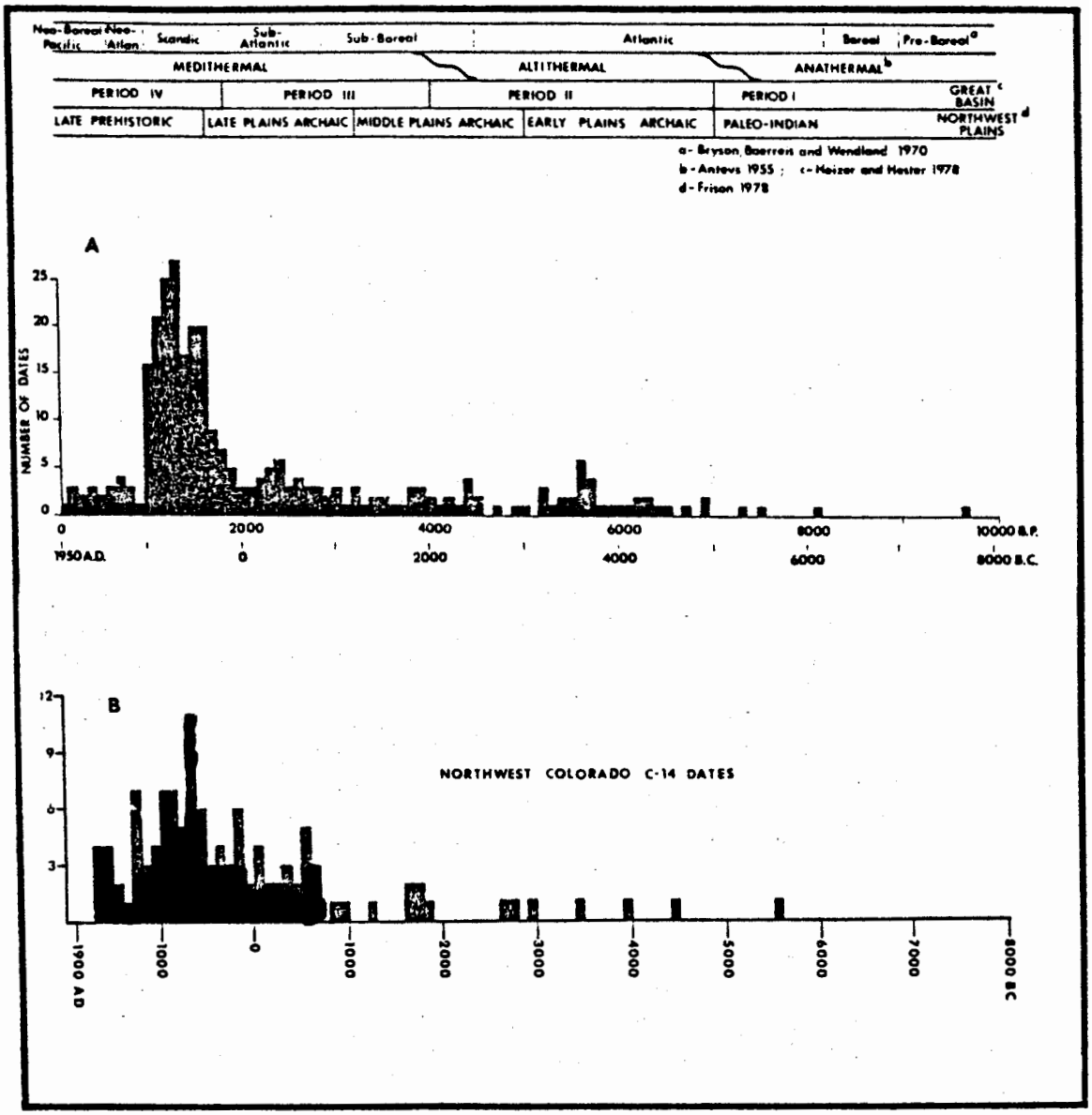


Figure 3. A. Radiocarbon dates from southwestern Wyoming (After Mackey, Sall and Creasman 1982; Mackey et al. 1982). B. Radiocarbon dates from Moffat, Routt, Garfield, and Rio Blanco Counties, Colorado.

Figure 3

Schroedl (1976) observed three major breaks in the radiocarbon date distribution for Archaic and Fremont sites in the Northern Colorado Plateau. The first break, or haitus, is a period from which no radiocarbon dates were reported and correlates with the Paleo-Indian period and pre-Boreal and Boreal climatic episodes described by Bryson and Wendland (1974). The lack of dates creating the break is not surprising, because of the lack of sealed stratified Paleo-Indian sites in the area, although a number of surface finds have been recovered (Schroedl 1976:24). This "break" is also evident in the LSRA for much the same reason.

The second break in the Northern Colorado Plateau radiocarbon dates occurs between 3500 B.C. and 4050 B.C., placing it in the middle of Antev's Altithermal Period, 2050 B.C. to 5550 B.C. (Antevs 1955). For the Little Snake Resource Area there is no apparent break, but there is an early "peak" occurring around 2250 B.C., at the close of the Altithermal. The last discontinuity falls between 1050 B.C. and 550 B.C., which is extended by Schroedl from 1050 B.C. to 150 B.C. because of nonconformity of the data. The haitus corresponds to botanic discontinuites described by Bryson and Wendland (1974) during the transition from sub-Boreal to sub-Atlantic episodes and the cultural haitus described by Madsen and Berry (1975) in the eastern Great Basin. They have shown a possible temporal gap of 2,000 years between and Archaic Fremont occupations at Hogup Cave and, based on this break, hypothesize an abandonment of the eastern Great Basin by Archaic populations. This break is not apparent in the LSRA radiocarbon dates. In fact, from 650 B.C. to historic times, no breaks over 200 years are apparent. This data may support the movement of prehistoric populations east from the Basin into the Plateau areas.

Radiocarbon date frequency distributions may reflect the size of prehistoric populations in the area, with the increase in the number of radiocarbon dates marking increases in the number of sites and thus increases in population (Schroedl 1976). Schroedl (1976) notes two peaks occurring during the Archaic (4550 B.C. and 1950 B.C.) and one during Fremont occupation (A.D. 950). This last peak corresponds well with the data for the resource area.

Radiocarbon dates for southwestern Wyoming were compiled by Mackey et al. (1983), who generated nine observations regarding prehistoric population changes. These observations indicate a low Paleo-Indian population, with a 2,000-year gap between the Paleo-Indian and the earliest dated Archaic occupation. Overall, the Altithermal is marked also by low population density, with a short-termed increase during the Middle Altithermal, coinciding with a mesic climatic fluctuation. A stable population density is observed from 2000 B.C. to A.D. 1000, with a marked increase beginning around A.D. 100, partly because of a favorable and stable climatic regime with increased precipitation toward the end of the period. A marked decrease at A.D. 1300 coincides with an erosional period resulting from a shift to an xeric climatic regime. A lack of dates after A.D. 1600 is attributed to restrictions in the applicaion of radiocarbon dating and European contact.

Comparing these observations with the LSRA dates, there appears to be a similar increase in dates between approximately A.D. 100 to A.D. 1000. A 200-year gap, A.D. 1050 and A.D. 1250, is apparent, however, which precedes the A.D. 1300 drop in radiocarbon dates in southwestern Wyoming.

The LSRA dates indicate occupation in the area during the early and late Altithermal but no corresponding increase during the Middle Altithermal, as observed in southwestern Wyoming dates. In fact, there is a lack of dates for this period. Although a bit premature, considering the small data base, it is conceivable that during periods of xeric climate regimes in southwestern Wyoming/Plains areas, the generally higher elevations in the project area and related increase in precipitation may have been an attractive "refuge" for Plains Altithermal populations (Mackey et al. 1983). Post-Altithermal occupation in the LSRA corresponds with observatons of stable populations in the Plains, except they begin later, around 1350 B.C., and last until around A.D. 200. A marked increase in dates follows 200 years later, A.D. 400 to 450, and continues into A.D. 900. This corresponds roughly with the increase in southwestern Wyoming dates for that time. The rapid decrease in dates after A.D. 1000 also occurs in both areas. The differential slopes of growth rate may represent levels of efficiency in exploitation of resources underwriting population increases. Without further cultural material evidence, it is too early to assign a Fremont appearance and demise to these later peaks. As C. Jennings (1984) points out, general correlations for dates between the two regions are expected because of the similar topographic situations. Local environmental variability probably influenced climatic trends and, in turn, prehistoric populations, causing variation in area adaptations that could be reflected in the radiocarbon dates.

Since these general comparisons are drawn from a data base of only 58 dates and 14 sites, caution must be taken in interpreting this data. As the number of chronometric data grows for the area and is associated with diagnostic cultural material, refinement of the chronological sequence will be possible.

IV.

SYNOPSIS

The cultural history in the LSRA, as well as in surrounding areas of the Plains/Plateau and Great Basin, is still not completely understood. As a result, the relationships between the various chronological cultural divisions utilized in the framework are unknown. Because these interfaces are unclear, the temporal divisions should be considered more as chronologically ordered artifactual/economic complexes rather than developmental phases or stages.

A generalized cultural sequence for the LSRA can be constructed using the data from previous archaeological research. Most of the archaeological remains are a result of activities of hunting and gathering cultures who survived by collecting plants and pursuing game animals. An important exception to this may be the Fremont tradition, which featured both cultivation and storage of domesticated plant foods.

The basic time periods used in this overview are taken from the chronologies of Willey and Phillips (1958) and divide the prehistoric occupation into four periods: Paleo-Indian, Archaic, Formative, and Ethnohistoric. These periods must be seen as frames of reference centered around basic subsistance patterns and not absolute time markers. Surrounding cultural areas (Great Basin, Plateau, Plains) chronological periods will be included under the five generic periods. The Paleo-Indian will be examined as a time period that spans both cultural areas. The Plains cultural area will be examined and subdivided from the Archaic through the Ethnohistoric using Frison's (1978) chronology for the

Northwest Plains. Chronologies from J. Jennings (1978) will be used for the Great Basin culture area and the chronology developed by Schroedl (1976) and Leach (1970) will be used for the Colorado Plateau and Dinosaur National Park areas.

The basic chronology is:

Paleo-Indian Stage
- Early
- Middle
- Late

Archaic Stage
- Colorado Plateau/Great Basin
- Northwestern Plains
  - Early Plains Archaic
  - Middle Plain Archaic
  - Late Plains Archaic

Formative State
- Fremont

Protohistoric Ute-Shoshone/Late Prehistoric

Paleo-Indian

Haynes divides the Lithic stage or Big Game Hunting tradition (Willey and Phillips 1958) into three chronolgical periods. The Early Paleo-Indian period is dated before 26,050 B.C. and, as yet, there is no confirmed evidence of human occupation in North or South America during this period. The next period, the Middle Paleo-Indian, occurs from 26,050 B.C. to 9500 B.C. and includes a number of dated sites from North and South America, but none contained diagnostic projectile points (Schroedl 1976).

Within the LSRA there are no reported sites, complexes or associations that fall into either of these early periods. To the north and west, however, the problematical Blacks Fork Culture was defined in the late 1930s by E.B. Renaud in the Bridger Basin along the Blacks Fork River in Wyoming. Cultural material collected there was thought to be typologically similar to Old World Paleolithic implements and assigned an estimate age of 30 to 40 thousand years old. This culture was later disputed by Sharrock (1966) who found, through excavation and survey, the Blacks Fork assemblage to be composed of tool blanks and preforms from quarry sites and having no great antiquity.

The Blacks Fork Culture is part of a phenomena commonly referred to as the pre-projectile point stage in North American prehistory (Kreiger 1964), and although the concept is not widely accepted, documented evidence continues to accumulate supporting the occupation of the continent before the development known as Paleo-Indian hunting traditions. Finds of large, crudely percussion-flaked core tools occur

frequently in Basin and Plateau areas (C. Jennings 1968), and artifacts similar to core tools described by Renaud have been found and referred to as "choppers" (Breteritz 1965). Perhaps components attributable to this period may someday be identified in the LSRA.

The Late Paleo-Indian period is known primarily from kill sites on the Great Plains. Lithic remains of these hunters have been noted, in sparse quantity, in the study area. The period can be subdivided into three distinct complexes or traditions--the Llano or Clovis, the Folsom, and the Plano--based on distinctions in terms of projectile-point types, types of fauna exploited, and temporal position.

All three complexes represent human adaptations to terminal Pleistocene environments, with an apparent emphasis on big-game procurement. Each of these three complexes is artifactually represented in the LSRA.

The earliest of the three complexes is the Llano culture (9050 B.C. to 8810 B.C.) characterized by the distinctive Clovis projectile points found in association with now extinct forms of mammoth, horse, tapir, and camel. A Clovis point was recovered from a multicomponent campsite/quarry near Cross Mountain (Gardner 1981). Outside of the resource area, Clovis surface finds have been recorded in the Skull Creek Basin south of Dinosaur National Monument (Weber et al. 1977) and south of Rangely, Colorado (Meacham 1980). The nearest excavated site containing dated cultural material attributed to Clovis occupation is the Union Pacific Mammoth site near Rawlins, Wyoming. Although no diagnostic points were recovered, radiocarbon dates from Mammoth tusk material fell within the time span of the Llano period, 1950 $\pm$ 350 B.C.

The subsequent Paleo-Indian culture known as the Folsom culture is better represented. The Folsom, however, is not necessarily a lineal descendent of the Clovis (Grady 1984), and there appears to be a gap of several hundred years in which there are no dated intermediate forms (Frison 1978). This culture (ca. 9050 B.C. to 7550 B.C.) is characterized by the Folsom projectile point and appears to have emphasized big-game hunting, which focused on the large, now extinct species of bison (Bison antiquis).

Two Folsom points have been discovered on multicomponent open sites in the resource area. During a survey of Brown's Park area in 1977, members of the Colorado Archaeological Society recorded the Raftopoulos Petroglyph Site and were informed by local ranchers that a Folsom point had been collected from the site a few years earlier. The second point was discovered in a dune area along the Yampa River during the Juniper-Cross Mountain survey in 1980 (Chase 1981). Folsom points have also been discovered in the vicinity of Dinosaur National Monument (Weber et al. 1977).

The presence of Folsom points suggests the penetration of the High Plains buffalo hunting patterns past the Continental Divide and onto the west slope of the Rockies (C. Jennings 1968). This suggestion has been substantiated by Husted's work (1962) in the high-altitude areas of Rocky Mountain National Park. His evidence indicated heavy use of the park areas and open passes even during periods of glacial advance (C. Jennings 1968:16).

The recent discovery of partially fossilized Bison antiquis bones by the BLM (Piontkowski 1981) in an arroyo bank cut near the Danforth Hills

south of Axial Basin indicates the presence of species thought to have been preferred and exploited by the Folsom hunters, and the presence of deposits of considerable antiquity in the area. The site, named the Somemore Site, has been nominated to the NRHP. It contained two bones with possible butcher marks, but no associated cultural material.

Following the Folsom culture is the Plano culture, which lasted until ca. 8450 B.C. This culture focused on the exploitation of modern species of bison and is characterized by a wide variety of large, unfluted lanceolate points representing a relatively more diverse group of archaeological cultures. This tradition is more widely represented in the resource area than either of the earlier Llano or Folsom complexes.

The Plano complex has been divided into two distinct point groups: the plain-form series and the parallel-flaked-form series (Bryan 1962). The plain-form series is characterized by Clovis- and Folsom-type points without the fluting and includes Plainview, Midland, Milnesand, and Meserve forms. Two Midland points have been discovered in the resource area on multicomponent open sites in the Sand Wash Basin (Stucky 1974).

Scottsbluff, Eden, Hell Gap, and Agate Basin types are considered to be slightly more recent than the Plainview series. An Agate Basin type isolated find has been recorded by Hansen (1978) on private land near Milner along Trout Creek. Scottsbluff and Eden points belonging to the Cody Complex have been recovered from two sites, 5RT139 and 5MF478 (Wheeler 1980; Jones and C. Jennings 1977). A possible Cody Knife has been recovered at 5RT156 near Trout Creek by Grand River Institute.

A Scottsbluff point was recovered from level 15 of Deluge Shelter (Leach 1970). Faunal material found in association with the point included such big game animals as bison, elk, deer, and mountain sheep, leading Leach to postulate that the level 15 material represented short-term occupation by large game hunters.

Another site in Dinosaur National Monument, the Baker Cabin Spring site, contained a Paleo-Indian point (Calabrese 1970). This point was similar to the Cascade point (ca. 9050 B.C. to 7050 B.C.), but the context in which the point was found has cast doubt on the antiquity of the level in which it was located.

Two Plano period Paleo-Indian site components have been investigated through excavation in the LSRA. In the Sand Wash Basin, Stucky (1974) test excavated the Cathedral Butte Site, 5MF625, where 13 lanceolate points (Sand Wash Type I) were recovered from the surface. The points, considered by Stucky to date ca. 6550 B.C., appear similar to types recovered from Pine Springs, the Sorenson Site, Bottleneck, and Mummy Cave. Test excavation revealed two bison butchering units, groundstone, and numerous bifaces. No stratigraphy was discernable, however, nor were any diagnostic artifacts recovered in the test excavation. Stucky suggests the site represents a trash midden or ancient sink hole that had been filled by cultural debris.

Mitigative excavations at site 5RT139 located southeast of Hayden in Routt County were conducted to investigate the occurrence of a possible local manifestation of the Cody Complex (Tucker 1981). Previous investigation had revealed a resharpened Scottsbluff II point in the fenceline backdirt, suggesting a possible subsurface origin (Wheeler

1980a). Limited testing of the site revealed 11 features, and results indicated the possibility of multiple occupations, a lengthy period of area utilization, and a possible presence of Cody Complex cultural manifestation (Hand 1980). The subsequent mitigative efforts, however, revealed the presence of two occupations, the earliest of which is radiocarbon dated at approximately 4050 B.C. This date is too late to support a temporal assignation of the site to the Paleo-Indian Cody Complex. Tucker (1981) posits a reuse of the Cody Complex material by the occupants of the site, and suggests a Middle Archaic McKean Complex affiliation for the site, based on associated culture material and radiocarbon date results.

The scant evidence of Llano and Folsom remains in the LSRA and the relatively greater amount of evidence of late Paleo-Indian Plano presence has numerous implications for future research, especially concerning the question of the origins of the Desert and Plains Archaic traditions. As Schroedl (1976) points out, the abundance of surface finds attributed to the Paleo-Indian on the Colorado Plateau may eventually indicate the Archaic was derived from a lithic stage tradition. The possibility remains, however, that the Archaic may have developed from earlier non-Paleo-Indian traditions such as those found at Danger Cave, dated at 7550 B.C. (J. Jennings 1957). The apparent contemporaneity of Late Paleo-Indian remains in the Great Plains and Early Archaic in the Great Basin has yet to be resolved.

Little is known about the subsistence patterns of the Paleo-Indian other than that the basic lifeway apparently remained rather stable despite radical environmental changes within the terminal Pleistocene. As

the cool, moist conditions of the Pleistocene Epoch and Wisconsin Age gave way to warmer, dryer conditions similar to modern conditions, shifts in vegetative zones and the extinction of certain forms of Pleistocene fauna resulted. Paleo-Indian hunting methods and types of fauna sought appear to have changed "with the times." J. Jennings (1968) hypothesizes that Clovis hunters stalked the mammoth individually or in very small groups. Bison were pursued by Folsom peoples who used a more organized method of surrounds and traps. Later Paleo-Indian groups arranged larger group hunts using topographic features such as cliffs, arroyos and sand dunes to trap bison. These methods often resulted in hundreds of animals being slain in a single event (Wheat 1979; Frison 1978).

Groups are thought to have been organized at the band level, and like ethnographic Plains groups, were relatively dispersed for much of the year in extended family units (Jones and MacKay 1980). Larger groups would then assemble for communal hunts in the summer and fall as the animals began to congregate into herds.

This mobile, big-game hunting lifestyle is reflected in the material culture of the Paleo-Indian. Tool kits are generally composed of hunting and butchering implements, and habitation structures are, as yet, unknown. The full range of subsistance items is yet undetermined because of the emphasis in excavation on kill sites (partially a result of their high visibility) and the few excavated Paleo-Indian campsites. Grinding slabs and handstones have been found at the Jurgens Site in eastern Colorado (Wheat 1979), which implies that some sort of vegetal resources were utilized.

Table 23 summarizes the nature of Paleo-Indian sites currently recorded in the LSRA. Although 13 archaeological sites possibly contain Paleo-Indian cultural material, over half are considered multiple component sites. A similar situation has been described by Buckles (1971). He asserts that later Archaic groups may have collected and utilized Paleo-Indian artifacts and discarded these "heirloom" artifacts at their own camp. This hypothesis has been partially substantiated at 5RT139 where Scottsbluff type points had been reworked and deposited over McKean complex material (Tucker 1981).

TABLE 23
PALEO-INDIAN SITES IN LSRA

Site Number	Site Type	Projectile Point	Features
5MF1003	Open Lithic	Undet Paleo-Indian	None
5MF1576	Open Lithic	Midland	None
5MF1868	Open Camp	Humboldt	2 Hearth-firepit
5MF690	Open Camp	Paleo point reported	None
5MF968	Isolated Find	Undet Paleo-Indian	None
5MF969	Open Lithic	None	Bison Antiquis
5RT139	Open Lithic	Scottsbluff-Eden	None
5RT156	Open Camp	Cody knife reported	None
5RT227	Isolated Find	Agate Basin	None

Two Paleo-Indian points are isolated finds. None of the sites contained remains of extinct fauna in association with cultural material, nor were the deposits dated.

Although some of the Paleo-Indian projectile points may have been reused by later Archaic peoples, their presence in the LSRA still suggests at least a sporadic use of the area as early as 9050 B.C. and distribution throughout much of the area. Five of the sites appear to be single component sites that

were found on ridges or terraces overlooking permanent water sources such as springs and major water courses. Leach (1970) has suggested, based on observations of the similarities between Paleo-Indian material found at Deluge Shelter and Cody Complex material from the southwestern portion of Wyoming, that movement between Dinosaur National Monument and the northwestern Plains could have occurred through the Wyoming Basin to the Plains, as well as along the Little Snake River.

The present knowledge of Paleo-Indian occupation of the LSRA is sketchy at best, but it is certain that the region was utilized by early big-game hunters. One possibility for the reason so little is known about Paleo-Indian occupation is that periods of heavy alluviation subsequent to the Big Game Hunter occupation have buried the sites, and an erosional cycle will be necessary to expose them in sufficient number to analyze (C. Jennings 1968). Deep arroyo cuts or excavation by mechanical means (construction, mining) should be investigated at all opportunities in the event Paleo-Indian cultural material might be exposed. Although there are scattered surface finds from all three late Paleo-Indian period complexes, no sealed, stratified dated deposits in the LSRA have yet produced evidence from this lithic stage. Given the number of finds and the evidence for Pleistocene fauna in the region, there is an excellent possibility that a sealed Paleo-Indian site will eventually be located. The extent and nature of Paleo-Indian use of the LSRA is still a matter to be resolved by future research.

Archaic Stage

The Pleistocene environmental conditions gave way to modern conditions by approximately 5500 B.C. The Archaic tradition, which follows the Paleo-Indian

tradition, is marked by a change in subsistance patterns in partial response to this changing environment. Big-game hunting changed to a more generalized hunting-gathering lifestyle, with an emphasis on more and smaller fauna species and a wide variety of vegetal foodstuffs.

This change is reflected in the diversity of cultural material. Projectile points include stemmed and indented base types, certain styles of lanceolate types, and large side and corner-notched types. Basketry, digging sticks, manos, and metates further reflect the increased emphasis on the collection and processing of vegetal and faunal resources. Mountain sheep, antelope, mule deer bones, and more infrequently, bison bones are found along with rabbit, waterfowl, and rodent bones. Plant remains include pickleweed, grasses, prickly pear, rabbitbrush, sagebrush, saltbush, and hackberries (J. Jennings 1978). This subsistence strategy, based on broad-focus hunting and gathering, was practiced by mobile bands and is generally thought to span the period from approximately 7050 B.C. to A.D. 450 (Jones and MacKay 1980).

The post-Pleistocene shift to a more intensive exploitation of the environment in the western United States was originally termed the Desert Culture but has been defined more generally as the Western Archaic by J. Jennings (1974). The original definition of the Desert Culture was developed in the Great Basin Province of Utah and Nevada where resource density and variability was more homogenous than western Colorado--the more general definition considers the variability of environments where western Archaic sites are found.

The Archaic stage is defined by Willey and Phillips (1958) as "the stage of migratory hunting and gathering cultures continuing into

environmental conditions approximating those of the present." Schroedl (1976) points out that boundaries and distinctions between the Archaic and earlier and later stages are not clearcut but grade into each other as they shift slowly from one subsistence base to another.

The relatively great variety of environmental zones in the LSRA may have presented an ideal area particularly suited for the seasonal, intensive exploitation pattern of the western Archaic cultures. In fact, there are more sites attributed to this tradition in the LSRA than those of previous traditions. This may, in part, be due to larger populations and a longer time span. Radiocarbon dates from Danger Cave and Hogup Cave have indicated occupations associated with the Desert Culture as early as 8320 B.C. (Aikens 1970). If these dates are correct, the Desert Culture may have had its beginnings as early as during the Folsom tradition. A terminal date of A.D. 1776 for the tradition in western Colorado is arbitrarily based on written descriptions of the aboriginal peoples by Escalante (Lishka 1975). Escalante referred to the aboriginal inhabitants as "Yutas" or Utes; these groups followed a Western Archaic lifeway until forced out of the area by white settlers. (Changes in the Western Archaic pattern had occurred among the Utes prior to A.D. 1776, however, with the introduction of the horse sometime after A.D. 1640.)

Regional variants of this Desert Culture have been described by Marie Wormington and Robert Lister (Wormington 1955; Wormington and Lister 1956). A close resemblance has been noted between the Uncompahgre complex stemmed projectile points and those found at Danger Cave in Zone V, dated from 2000 B.C. to A.D. 20 (J. Jennings 1968). C. Jennings (1968) has pointed out that, based on geological deposition, the Taylor site in the

Uncompahgre may be as recent as A.D. 850, implying an extremely long duration of the Desert Culture tradition in the area. Buckles (1971) further maintains a continuity between the Archaic Uncompahgre complex and the historic Ute, and that these phases and assemblages are united by a common cultural tradition based on a hunting and gathering lifeway.

Excavated data concerning the Archaic Stage in the LSRA region comes primarily from one rock shelter, Deluge Shelter (Leach 1970), and specifically from a few open-camp sites--5RT139, the Lay site, 5MF428, and 5MF429. The sparse nature of the deposits from these sites, with the exception of Deluge Shelter, preclude a detailed description of local Archaic prehistory, and interpretation of the evidence from these sites depends largely on comparison and integration with information from other regions.

Colorado Plateau/Great Basin

Schroedl (1976) has assembled data from Archaic sites located on the Colorado Plateau and breaks the Archaic Period into four phases based on cultural and geological evidence, radiocarbon dates, and artifact cross dating from two recently excavated Archaic sites, Cowboy Cave and Sudden Shelter. He defines the Archaic as "a stage of migratory hunting and gathering cultures following a seasonal pattern of efficient exploitation of a limited number of selected plant and animal species within a number of different ecozones" (1976:11). Schroedl maintains that the purported "broad spectrum" foundation of Archaic adaptation is in error, and demonstrates that Archaic populations on the Plateau exploited only a

handful of plant and animal resources, were at an optimal population size, and fluctuated in size in relation to the availability of resources.

As Jones and MacKay (1980) pointed out, however, Schroedl's hypotheses are based on the assumption that the density of regional Archaic population is directly related to the number of radiocarbon dates and artifact density from sites for any given time period. They find the assumptions theoretically unsound, but useful as a framework to be tested and modified (1980:49-50).

The earliest phase in Schroedl's scheme is the Black Knoll Phase, dating from 6350 B.C. to 4250 B.C. The phase is further subdivided into early and late subphases, with corresponding population and artifact change. The Early Black Knoll Phase is typified by a slowly growing population and Pinto Series projectile points and lasts until 5250 B.C. During the Late Black Knoll Phase there appears to be a dramatic increase in population, along with the appearance of Northern side-notched and Elko series points.

There is a contrast in subsistence patterns between sites located at higher elevations with those at lower elevations. Higher elevation sites appear to focus on the hunting of large artiodactyls, while at lower elevations subsistence activities were confined to gathering vegetable resources. Schroedl interprets this difference in two ways: 1) during this period, resource exploitation was highly specialized by local groups; or 2) these sites represent stops on an annual round.

This phase corresponds with level 14 at Deluge Shelter (Leach 1970) where Pinto Basin series points were recovered. Three surface finds typed as Pinto Basin have been located in the LSRA. A radiocarbon date from

site 5RT139 falls within the later phase period, along with 16 Elko series points from surface collections.

The second period of Schroedl's classificaion is the Castle Valley Phase, 4250 B.C. to 2550 B.C., which is also divided into two subphases. The early subphase is characterized by a decrease in population or intensity of population and the appearence of the Rocker Base, the Sudden, and Hawken side-notched points. About 3050 B.C., population size increased but did not reach earlier numbers; and Humboldt and lanceolate series points appear to dominate, along with the appearence of slab-lined firepits. Additional evidence indicated a change to a somewhat dryer environment than earlier or later periods.

The Castle Valley phase is not indicated in the deposits at Deluge Shelter (Leach 1970); and only two points, one a possible Hawkin point fragment and the other a Humboldt type, have been recovered from surface deposits in the LSRA. One radiocarbon date of 3950 B.C. from a fire hearth in subsurface deposits at 5RT139 falls within the early subphase of this period.

The Green River Phase follows the Castle Valley Phase and ranges from 2550 B.C. to 1350 B.C. The phase has two regional (the High Plateau and the Northeastern Plateau) and an early and late subphase. The early subphase of the northeastern Plateau variant is typified by relatively higher population and the appearence of McKean complex artifacts such as Duncan and Hanna point types. These point types are common to the Northwestern Plains and possibly indicate a Plains influence. The High Plateau variant, meanwhile, begins with the introduction of Gypsum points and San Rafael side-notched points.

By the late subphase only the Gypsum points are apparent in the High Plateau, and the nature and extent of Plains influence in the Northeastern Plateau variant is unknown.

The Northeastern Plateau varient in the early Green River Phase is well represented at Deluge Shelter in level 12 where Duncan-Hanna points were recovered. Further east along Lay Creek, test excavations conducted by Powers Elevation (O'Neil 1980) at an open camp, 5MF476, revealed a McKean Lanceolate point in Zone 4 radiocarbon dated at 2310 B.C. and 2215 B.C. Test excavations in Axial Basin of two open camps also revealed radiocarbon dates coinciding with the early phase of the Green River period. Site 5MF428 was dated to 1750 B.C., and 5MF429 was dated to 1790 B.C. No diagnostic artifacts were directly associated with the dated features, but two Mallory points were found during surface collection of 5MF428.

Surface collections from LSRA contain 14 points possibly associated with this early Green River phase that represent the McKean Complex--nine McKean points, four Duncan points, and one Hanna point have been described.

The last phase of Schroedl's scheme is the Dirty Devil, lasting from 1350 B.C. to A.D. 450. It is considered the most tenuous of all the phases because of the lack of radiocarbon dates from 150 B.C. to 1050 B.C. There is a continuity of the Gypsum point from the preceeding Green River phase through this phase and on into the Formative Period. The introduction of the bow and arrow during this phase is the only new addition and it marks the end of this phase. At Deluge Shelter, levels 5 through 3 are placed in this phase, with Elko series points present in all four levels.

The discontinuity in the chronology between 150 B.C. and 1050 B.C. corresponds with the cultural and botanical irregularities noted by Madsen and Berry (1975) and Bryson and Wendland (1967). The Madsen and Berry (1975) hypothesis concerns the Archaic Period in the Great Basin and Colorado Plateau and states that much of the northeastern Great Basin was abandoned from around 2500 BP to 1500BP because of increased effective moisture, which in turn caused the waters of the Great Salt Lake to rise and destroy the peripheral resources of the lake. Many archaeologists believe that this destruction upset human exploitation patterns in the region and forced the subsequent migration of peoples into upland areas of eastern Utah and the Colorado plateau. The Madsen Berry model further denies the possibility that the following Fremont (Formative) Culture developed in situ in the Great Salt Lake region from a native Archaic base, but suggests an Eastern Utah/Western Colorado locus of origin for the Fremont.

Within the LSRA, radiocarbon dates taken from excavated levels at five sites reveal occupation of the area during the hiatus period. The five sites are located in different parts of the resource area. The Cherokee trail is located in Powder Wash and reveals multiple occupations beginning at least as early as 520 B.C. (Kosarko 1978). Along Milk Creek, site 5MF435 contained cultural material and radiocarbon dates indicating a beginning occupation by 415 B.C. Three dates from 5MF510 located near Savory-Pothook straddle the beginning dates for the haitus. Occupation

along the confluence of the Williams Fork and the Yampa Rivers begins at 5MF436 at the end of the hypothesized haitus. A final date of A.D. 220 comes from 5RTR11 along the foothills of the Rockies.

This data suggest that the environmental events that occurred in the Great Basin probably did not cause a corresponding abandonment of the LSRA area and may, in fact, have been a possible refuge for Great Basin Archaic populations.

Northwestern Plains

As Grady (1984) points out, the Northwestern Plains sequence proposed by Frison (1978) has most often been employed by researchers and contractors when describing the regional chronology, and this has created a sense of a Northwestern Plains influence over much of the study area. The Northwestern Plains sequence was first developed by Mulloy (1958) and modified by Frison (1978) into four periods, three of which can be considered Archaic tradition. The first period is the Paleo-Indian period, which has been examined in the previous section. Projectile-point styles are heavily depended on for identifying the Early Plains Archaic, the Middle Plains Archaic, and the Late Plains Archaic in the absence of absolute dating.

As in the Great Basin, the gathering of plant materials was an important part of the Archaic subsistence base in the Northwestern Plains, but the hunting of bison remained an extremely important aspect of the economy. The Early Plains Period, ca. 5050 to 3050 B.C., corresponds roughly with the Altithermal, a time of supposedly severe climatic conditions that was thought to represent a cultural haitus or abandonment of lower elevations in the West. The lack of sites on the Plains tends to confirm this view; however, substantial evidence of Early Plains Archaic groups does exist in foothill-mountain areas (Frison 1978).

Husted (1962) hypothesized that the McKean Complex originated in the Central and Northern Rocky Mountains and that it evolved from Paleo-Indian hunting cultures forced from the Plains by arid conditions of the Altithermal. Investigations along the Colorado Front Range by Benedict

and Olson (1978) seem to support this hypothesis with the discovery of typologically intermediate points between the Paleo-Indian James Allen and Pryor Stemmed points and McKean lanceolate and Duncan points, radiocarbon dated at 4050 B.C. They further suggest that the regional climate became more mesic about 4050 B.C., permitting Altithermal populations to return to lower Plains elevations previously abandoned (Benedict and Olson 1978:326).

Points associated with the Early Archaic Period tend to be large and side-notched. Excavation of 5RT139 revealed radiocarbon dates of 4480 and 3950 B.C. falling within this time frame. Tucker (1981:56) maintains that the site may represent an occupation of the western slope Colorado Rockies chronologically intermediate or transitional period between the Paleo-Indian and Middle Archaic, as recognized by Benedict and Olson (1973) on the eastern slope.

A fragment of a Hawken type point has been identified in the Axial Basin on the surface of a multicomponent open camp by Stevens (1981). This type was derived from a communal bison procurement site named the Hawken Site located in northeastern Wyoming that is considered by Frison (1978) to be a link between the Late Paleo-Indian bison hunters and those of the Middle Plains Archaic (Frison 1978:201).

The Middle Plains Archaic, ca. 3050 to 1050 B.C., is marked by the sudden appearance of the McKean Complex in plains and intermountain areas previously virtually devoid of cultural evidence. The McKean Complex is represented by a wide variety of projectile-point types (McKean lanceolate, Mallory, Duncan, Hanna), with the McKean lanceolate occurring at the earlier end of the temporal range, 3050 to 1050 B.C. (Frison

1978:49). There appears to be a greater emphasis on plant foods, evidenced by the occurrence of flat grinding slabs and manos along with large numbers of roasting pits. It is also during the Middle Archaic Period that large numbers of stone circles begin to appear.

Middle Plains Archaic sites identified through McKean Complex projectile-point types seem to be comparatively plentiful in the LSRA. Fifteen points have been identified and typed to this temporal period. Radiocarbon dates from the Lay site, 5MF476, in association with McKean type material, support a Plains occupation or influence during this time. Sites 5MF428 and 5MF429 also provided radiocarbon dates falling within this time span.

The Late Archaic period is marked by the appearance of large, corner-notched points called Pelican Lake points (Frison 1978:56). The Pelican Lake points, which date between 1050 B.C. to A.D. 450, are considered the earliest of the corner-notched varieties of the Late Archaic period.

In the LSRA, no Pelican Lake type points have been identified, although there are 16 radiocarbon dates from five sites that fall into this period. Grady observed (1984:27) an increase in numbers and sizes of sites, which suggests an increase in population size.

As can be seen, reliable chronologically controlled data on the Archaic stage is scant. Few excavated sites indicate Archaic presence over a long period of time and include what has been interpreted as influence from both the Great Basin and the Plains. What must be considered before such influence or occupation is posited is that many projectile-point types have very broad geographical distribution, cover many cultural groups, and were manufactured over long periods of time.

There are presently several phase and period sequences used by researchers to subdivide the temporal expanse of the Archaic Stage into smaller units, but none are without problems. With a portion of the Great Plains physiographic province located in the LSRA boundaries, Frison's (1978) chronology is often used. Unfortunately, the period designations are based more on changes in point typology and too few radiocarbon dates. Schroedl's sequence is based on numerous radiocarbon dates, but only one site near the LSRA, Deluge Shelter, is considered in its definition. More data than presented is needed to apply Shroedl's phases to new assemblages in the LSRA.

Based on available radiocarbon dates and projectile-point types, there appears to be an Archaic occupation within the LSRA throughout the periods. Unfortunately, the dates for the most part are not associated with diagnostic artifacts. Gaps in radiocarbon records from the northern Colorado Plateau (Schroedl 1976), the Plains (Frison 1978) and the Central Rocky Mountains (Benedict 1975) all identify a hiatus spanning from roughly 4050 to 3050 B.C., coinciding with a portion of Antevs' (1955) Altithermal Period. Radiocarbon dates in the LSRA do not appear to support the hiatus.

Hoefer and Thompson (1984:12) describe a return to more mesic conditions at ca. 3050 B.C. in southwestern Wyoming and a corresponding human population increase. It is conceivable that the resource area may have functioned as a haven for peoples driven out of lower elevations by deteriorating environmental conditions. These populations may have then returned to the abandoned plains and intermontane basins as conditions

improved. The question of continuity of Archaic occupation can only be addressed through additional excavations, focusing on sites thought to contain dates from the Altithermal hiatus and areas where radiocarbon data gaps exist in the LSRA.

Grady (1984) provides a outline of the Archaic Stage lifeways for northwestern Colorado and describes a seasonal round of environmental exploitation thought to have been followed by these mobile groups. He states that drainage basins probably provided the basic annual territory of exploitation (1984:29). There is a lack of evidence for large settlements, and it is assumed that Archaic activities were centered at the band level. Small nuclear or extended family groups may have come together at certain times of the year for activities requiring larger groups such as antelope or rabbit hunting, or they may have converged in localized and seasonally productive areas such as pinyon groves.

In all, 72 points from the LSRA have been attributed to the Archaic period of occupation in the area. One half of these have been typologically assigned to sequences from the Northwestern Plains, Plateau, or Great Basin areas. Generally, influences from the Great Basin appear to dominate throughout the period from Early Archaic to Late Archaic, with an intercepting McKean/Plains influence during the Middle Archaic/Green River phases. This instance is also reflected in Deluge Shelter deposits and in the Northern Plateau western variant of the Green River phase.

These points are associated with 32 single component and 20 multicomponent sites. Eleven points are recorded as isolated finds. Sixty-eight percent of the Archaic Period sites occur in present day sagebrush communities, and 25 percent occur in pinyon juniper

communities. For single component Archaic sites, one-fourth are considered open-lithic sites and the rest are open camps; each type is in the same relative percentage by vegetative community.

Twelve of the multicomponent sites are open camp, five are open lithic, one is open architectural, and the rest contain historical trash or architecture. Like single component sites, most are located in sagebrush communities. The open-architectural site contained a Pinto Basin type point and several rectangular sandstone structures. A metal projectile point was also recorded at this site.

Currently, there is only a very general outline of the culture history and lifeway for this period. The presence of Archaic Period occupation is primarily known through site surveys. Excavations of Archaic period sites is needed for comparative data.

Formative

Willey and Phillips (1958:146) define the Formative Stage by "the presence of agriculture, or any other subsistence economy of comparable effectiveness, and by the successful integration of such an economy into well-established sedentary village life." In the LSRA this stage is presently assigned to the Fremont culture.

The Fremont culture may have developed from the Desert Archaic tradition by A.D. 500 in eastern Utah and some parts of northwestern Colorado. Abandonment of the region by the Fremont falls at A.D. 1300 or later. The Fremont culture manufactured pottery and relied to a limited extent on maize horticulture. Pithouses, masonry houses, granaries, and pottery reflect a divergence from the Desert Archaic cultural pattern.

Common point types, which include the Desert and Uinta side-notched and Rose Spring corner-notched varieties, are generally small projectile points considered to be arrow points. A distinctive long, narrow flaked stone biface has been noted on a number of sites in Dinosaur National Monument and has been named "Fremont blades" (Breternitz 1970). Other traits used to define the Fremont culture are distinctive moccasins, basketry, a widely recognized style of rock art, clay figurines, the Uinta metate, and stone balls.

The Fremont culture was originally defined by Morss (1931). This was based on a number of excavated and surveyed sites located along the Fremont River and Nine Mile Canyon in the late 1920s that were conducted in conjunction with the Claflin-Emerson expeditions into the area. To Morss these sites seemed very similar in many respects to that of the Basketmaker III. At Mantles Cave in Dinosaur National Monument, Burgh and Scoggin (1948) recovered coiled basketry, dent corn, Uinta Gray pottery, and "Fremont moccasins." They concluded that the archaeological cultures of Mantles Cave and the Castle Park area were identical to the Fremont culture identified by Morss. They estimated the date of occupation in the area between A.D. 400 and A.D. 900. (1500 to 1050 B.P.).

The fairly large amount of internal variation within the Fremont Tradition has lead to extensive discussion among archaeologists on how to define the Fremont culture and on how to differentiate the several areal variants. Marwitt (1970) developed a system of classification that divided the Fremont into five regional variants, based on artifact and architectural comparisons. The regional variants are: the Uintah Fremont, located in the Uinta Basin of northeastern Utah and northwestern

Colorado; the Great Salt Lake Fremont of northern Utah; the Sevier Fremont of west-central Utah; the Parowen Fremont of southwestern Utah; and the San Rafael Fremont of east-central Utah. Two of Marwitt's defined variants occur adjacent to the LSRA.

The Uinta Fremont variant is subdivided into two sequential phases, the Cub Creek Phase, A.D. 600 (?) to A.D. 800 (?) and the later Whiterocks Phase, A.D. (?) to A.D. 950 (?). The Cub Creek Phase is represented by a number of sites in Dinosaur National Monument: Boundary Village (Leach 1966); Whole Place Village, Fremont Playhouse, Wagon Run (Breternitz 1970); Deluge Shelter (Leach 1970); and Mantle's Cave (Burgh and Scoggin 1948). The Cub Creek Phase has been identified as having entirely calcite-tempered plain Uinta Gray pottery and shallow pit dwellings or centrally supported surface structures. The sites are limited to three to five dwellings located on buttes or ridges overlooking floodplains. No surface granaries are associated with this phase.

The Whiterocks Phase architecture also shows shallow pit dwellings and circular surface structures, with the addition of wet-laid masonry and one coursed adobe structures, some of which appear to be dwellings. Others are described as storage structures. The phase is represented at Caldwell Village (Ambler 1966) and Whiterocks Village (Sheilds 1967) where the sites contained over 20 structures located in large valleys.

Ceramics include plain and surface manipulated Uinta Gray ware, with some Anazazi pottery at Caldwell Village. Schroedl and Hogan (1975) identified a third phase subsequent to the Whiterocks Phase called the Book Cliffs Phase, dated A.D. 900-1200 at the Innocents Ridge Site. The Book Cliffs sites contain oval or circular surface structures located on high buttes or at canyon heads some distance from arable land.

The San Rafael Fremont variant has been identified south of the Uinta variant. The data is scant, with no evidence for early or late phases. Wet and dry laid stone masonry is common, along with the occurrence of slab-lined pit houses similar to Basketmaker style. Ceramics are almost exclusively Emery Gray and exhibit extensive surface manipulation. The sites are small and located on high ridges, knolls and buttes above arable land. Rock shelters were used for habitation and storage. The San Rafael variants are dated to between A.D. 700 (?) and A.D. 1200, and were first identified from investigations conducted at Snake Rock (Aikens 1967), Old Woman (Taylor 1957), and other sites in and near Nine Mile Canyon, Utah.

The validity of Marwitt's Fremont regional variants have been questioned by a number of researchers, including Madson (1979) who rejects the trait-list classification in favor of a subsistance and settlement pattern approach. Madson (1979) divides the Fremont culture into two and possibly three distinct cultures--the Sevier Culture of the Great Basin, which focused on the exploitation of marsh or riverine environments and lacked masonry; the Fremont Culture peoples of the Colorado Plateau who focused on upland environments, grew corn and lived in masonry structures located on hills and benches over looking small permanent streams; and an "unnamed Plains-derived culture" of the Uinta Basin.

These classifications are based on somewhat limited data and on how well the Formative stage manifestations located in the LSRA depend on the criteria used to define the Fremont. As Reed (1984) points out:

> Early investigators used the trait-list method extensively to illustrate artifactual and architectural differences between the Fremont and other cultural groups. After years of investigation certain items such as stone balls, moccasins, calcite pottery tempering, ornate clay figurines, one-rod-and-bundle basketry, certain vessel forms, surface manipulated ceramics and metates with secondary depressions were recognized as being unique to the culture.

Based on the presence of one or more traits listed above, Fremont cultural affiliation of Formative stage sites in the LSRA is very questionable. At only one site, 5MF557, is there reported Fremont-type ceramics. This lack of ceramics is quite surprising, considering the proximity of the project area to pottery producing areas deeper into "Fremont Country" and the Anazazi center to the south. Even if the Fremont or Formative stage culture present in the area did not produce pottery, and assuming ceramics were desirable items, acquisition of pottery through trade networks would have been possible. The other described traits are as yet unreported in the LSRA.

Madsen's (1979) modified trait-list definition of the Fremont tradition includes a corn horticultural subsistence pattern, which is supplemented by wild floral and faunal foodstuffs; small settlements located near or overlooking permanent streams; and masonry surface structures and stone-lined pit dwellings. Despite the apparent vagueness of the definition, only one site, 5MF841, may fit this class. The site contains what was described as a storage cist on a small terrace overlooking the Green River. This site may be a pit house structure. No "classic" Fremont architecture, village sites or evidence for Fremont horticulture have been recorded, however.

Twenty-one sites have been affiliated with Fremont occupation in the LSRA, nine of which base this affiliation on the recovery of Rose Spring Series and Uintah side-notched points. These sites are scattered throughout the resource area and are not associated with any of the other Fremont attributes. The presence of these points could be representative of Fremont (or Formative) exploitation or "forays" into uplands for

outlying resources away from semi-sedentary camp sites. However, affiliating Fremont sites by surface finds of projectile points with typologies that range pre- and post-Formative period is risky. This "marginal activity" theory of land use has been advanced by Gordon (1982) for areas peripheral to Fremont settlements in Douglas Creek; but without a "timemarker" diagnostic such as pottery, there is no way of knowing who was actually exploiting the areas, or when.

Fremont pottery identified as Turner-Gray, Cisco Variety was identified by Jennings and Daniels (1976) in the Savory Pothook area along the state line between Wyoming and Colorado.

Nine sites in the LSRA are attributed to the Fremont, based on rock-art styles. Sites exhibiting petrograph motifs believed to represent the Fremont culture provide the only culturally and temporally diagnostic indications reported as yet for the LSRA. Eight of the sites are concentrated in or near Brown's Park, along Irish and Vermillion canyons, and the Green River. Cole (1983) has identified several of these rock art sites as containing elements attributed to the Classic Vernal rock-art styles for the Uinta Fremont. Radiocarbon dates only confirm evidence of occupation during the Fremont period, but no clear information on the cultural background of the people inhabiting the area is presently available.

In Brown's Park, numerous unrecorded storage cists have been reported that contain corn imprints or cobs, and three of the Fremont affiliated rock art sites are adjacent to bedrock metates. With the arable floodplain of the Green River, associated storage cists, and proximity to the Uinta Fremont groups to the south and west, it is very possible that

this area was heavily used during the Formative stage. Rock art along major corridors such as Irish Canyon and Vermillion Canyon may also indicate an extention of the influence one way or the other (or both ways) between the Wyoming Basin Plains and the Uinta areas. This potential Fremont "hub" in Brown's Park may be the sedentary base from which hunting forays were launched, penetrating eastward into the LSRA.

In addition to the rock-art sites, open camps, sheltered camps, and open-lithic sites are attributable to the Formative Period. Fifteen open-architectural sites are recorded in the LSRA but are not affiliated with any cultural period. Future investigation of these sites may reveal a Fremont affiliation. Table 24 summarizes the types of sites affiliated with this period.

In the Piceance Basin, the Fremont occupation has been associated with the use of rock shelters as domestic sites throughout the entire occupational period, as well as the presence of Fremont ceramics and Fremont-style rock art. Weber et al. (1977) suggests that the Piceance Basin was utilized as a hunting and gathering area by the Fremont and that evidence for year-round occupation of the basin is slight. Grady (1980) elaborates on this hypothesis and asserts the possibility that Fremont and Archaic manifestations may only be a differing set of seasonal economic activities employed by the same people. The seasonal round, in this case, is modified slightly by adding spring planting of corn to the lowland/spring quest for food. Next was the highland/summer deer harvest, followed by fall pinyon harvest, followed by movement back to the valley to gather the corn and settle in for the winter. This sequence, of course, assumes that corn was harvested when ripe and not green, and that

TABLE 24
FREMONT PERIOD SITES IN LSRA

Site Number	Site Type	Projectile Points	Features	Ceramics
5MF1300	Open camp	Uintah Side	Burnt rock concentrations, Hearth-firepit	None
5MF1317	Open lithic	2 Rose Spring Series	Chipped stone concentrations, Chipped stone concentrations	None
5MF1343	Open camp	Uintah Side	Hearth-firepit	None
5MF1390	Isolated find	Uintah Side	None	None
5MF1685	Open camp	None	Hearth-firepit, burnt rock	Undet Grayware
5MF1762	Isolated find	Undet Late Prehistoric	None	None
5MF295	Rock art	None	Petroglyph	None
5MF353	Rock art	None	2 Petroglyphs	None
5MF354	Rock art	None	2 Petroglyphs	Fremont
5MF557	Open camp	Rose Spring Series, Undet Late Prehistoric	Hearth-firepit	Fremont
5MF686	Open camp	None	Petroglyph, bedrock groundstone	None
5MF687	Rock art	None	Petroglyph	None
5MF688	Open camp	None	Petroglyph, bedrock groundstone	None
5MF692	Sheltered camp	None	Petroglyph, hearth-firepit	None
5MF758	Rock art	None	Petroglyph	None
5MF759	Rock art	None	Petroglyph	None
5MF841	Open architectural	None	Cist, bedrock groundstone	None
5MF869	Open lithic	Rose Spring Series	None	None
5RT132	Open camp	Undet Late Prehistoric	None	None

Undet = undetermined

the area supports an attractive pinyon resource. The similarities of archaeological remains exhibited by various cultural and temporal groups following a similar nomadic or semi-nomadic Archaic tradition subsistence strategy---in this case followed perhaps by Fremont populations part of the year--adds to the ambiguity of differentiating with certainty possible Fremont sites.

A local variant of the Fremont culture has been identified by Creasman (1981) in the Douglas Creek Drainage. Subsistence was based on maize horticulture supplemented by hunting and gathering, and this reliance is thought to indicate that the variant was never fully sedentary. Garden plots were grown near the mouths of side canyons and on the margins of alluvial fans. Architecture varied from one- or two-room pit structures located on low rises overlooking arable land to wet-land masonry structures located on promotories. Bee-hive-shaped storage granaries and rock shelters were utilized along with Uinta Grey and Emery Grey ceramics.

Reed (1984), reviewing the question of the Formative Stage in west-central Colorado, offers an alternative to ascribing Formative Tradition remains to regional variants or subcultures of the Fremont or Anazazi cultures. He suggests that the sites represent in situ development from an Archaic technocomplex where Archaic Tradition peoples adopted certain Formative stage lifeways, as need for food production arose. Perhaps cultivated foods only supplemented wild food collection, and certain items such as pottery were acquired through trade with Anazazi and Fremont culture areas, which in turn exposed them to various architectural styles.

Problems with defining Formative type sites and Fremont affiliation can only be resolved through further investigation and expansion of that data base and local definition. Radiocarbon dates from this period show the most activity within the LSRA was from this time period than from any other. Grady (1984) points out that, in general, Formative stage sites tend to be concentrated in relatively few areas such as Brown's Park, Douglas Creek, Missouri Creek, Southern Blue Mountain, and Dinosaur National Monument. Colo-Wyo sites excavated along the Yampa River near Craig indicate heavy occupation during this time period but cannot be affiliated conclusively with the Fremont Culture (C. Jennings 1984).

Questions of Fremont affiliation with other prehistoric cultures remain. Breternitz (1970a) asserts a possible origin of the Fremont from the Great Basin Desert culture, but Wormington (1955) contends that the Fremont arose out of a Desert Archaic substrate with some Anazazi influence. Berry and Berry (1976) propose that Basketmaker II expansion into the area following a cultural hiatus formed the base from which Uinta and San Rafael variants derived. A Plains orientation is proposed by Aikens (1966). He maintains that the Fremont Culture is a result of a westward expansion of northwestern Plains people around A.D. 500, and that ca. A.D. 1400 to 1600 the Fremont were pushed out of Utah back into the Plains by Shoshonean expansion, thus becoming the Dismal River Plains groups.

The earliest suggestion by Steward (1933) about the origin of the "Northern Periphery" cultures in western Colorado and extreme eastern Utah is supported by Schreodl (1976). Schroedl (1976) points out that if Cowboy Caves and other sites represent the terminal Archaic phase on the

northern portion of the Colorado Plateau, the similarities between the Archaic artifact assemblages and those from Fremont culture "type sites" (Morss 1931) are too great to be coincidental. In the LSRA there are no radio carbon date gaps of more than 200 years from 610 B.C. to A.D. 1055, suggesting an Archaic/Fremont (?) continuity.

Whatever its origin, Fremont horticultural adaptation and its unique material culture have been hypothesized to have come to an end in the LSRA around A.D. 1055. Fremont occupation in Douglas Creek drainage ranged from A.D. 500 to A.D. 1400 (Creasman 1981); but just west of the creek, later dates from the Texas Creek Overlook site of A.D. 1520 $\pm$ 50 years (Creasman and Gardner 1984) and the Edge Site (La Point et al. 1981) of A.D. 1430 raise many questions concerning the longevity of Fremont occupation in the area. Theories concerning a drought around A.D. 1250, which may have prevented maize horticulture and competition with Shoshoneans, have been advanced, but to date none has been substantiated. Grady (1980) suggests that this does not necessarily mean that the Fremont abandoned northwestern Colorado, but that a shift from semi-sedentary horticulturalists to year-round hunting and gathering lifeways may have occurred. This may also help to explain the long duration of the Archaic period lifestyle in the Piceance Basin (Grady 1980) described by C. Jennings (1975), shedding new light on the possibility of the transition from Fremont to prehistoric Numic culture.

With Buckles' (1971) proposal of continuity between Archaic Uncompahgre complex and Ute historical forage patterns, the interface between the Uncompahgre and the Fremont cultures and their possible

contemporaneity pose further unsolved questions. Gunnerson (1969) suggests that the Fremont gave rise to the Plateau Shoshonean groups that were residing in the LSRA at the time of earliest European contact. Data from Dinosaur National Monument is considered by Breternitz (1970) to be supportive of a Fremont to Ute or Shoshone transition as well. Berry, however, states that although the Numic-speaking Ute may have been contemporaneous with the Fremont, the groups were generally unrelated.

More research is needed to resolve these problems of social interaction and culture change, as well as questions concerning environmental adaptation. It is probably time to reassess the situation and investigate the possibility of contemporaneous or subsequent occupation by Fremont and various aceramic groups. Pre-Numic may become a more descriptive term for these prehistoric groups who may not have participated in what might be described as the Fremont or Formative episode.

Protohistoric Ute-Shoshone/Late Prehistoric

Based on studies in glottochronology, it is thought that Numic (Shoshonean) speakers, ancestors of the Shoshone, Paiute, Gosuite, and Ute, entered the Great Basin from the Southern Sierra Nevadas around A.D. 950 (Wright 1978) and arrived in the eastern Great Basin by A.D. 1150 to A.D. 1250 (J. Jennings 1978). Unfortunately, there is slight if any support from other branches of science as yet for these linguistic hypotheses. Other archaeologists arrived at opposite conclusions, finding evidence of a long Great Basin occupation (J. Jennings 1978).

Ethnographer Anne Cooke Smith, after an exhaustive analysis of Great Basin folklore, found striking uniformities between the Numic speakers but no migration myths (Steward 1966).

Nonetheless, the "Numic spread" is widely accepted and the traditional Numic components, small triangular (Desert side-notched and Cottonwood) projectile points and crude, coil-scrape pottery, mark the time period during which the Numic peoples first appeared in the Great Basin (A.D. 1300 to A.D. 1860).

The apparent rapid spread of Numic peoples into the Great Basin at the expense and subsequent displacement of "Pre-Numic" groups has been analyzed by Bettinger and Baumhoff (1982). They hypothesize a difference in subsistence strategies between the two groups, based on the differential reliance on large game and small seeds and differential investments in travel and processing times. The Great Basin "traveller" strategy, attributed to Pre-Numic groups, maximized the procurement of large game and minimized the procurement of small seeds. The Numic "processor" strategy maximized both, but with a greater reliance on seeds. Replacement of the Pre-Numic groups was the direct result of larger populations sustained by the processor strategy. This replacement may have been helped along by the introduction of the bow and arrow, which led to the overexploitation of ungulates around A.D. 600 and perhaps the decimation of game stocks by the European introduction of epizootics as early as A.D. 1540 (Grant et al. 1968).

This explanation may have also had a contributing factor to the hypothesized dislodge of Fremont peoples. Fremont peoples, dependent on specific large game as well as limited horticulture, would be just as easily overwhelmed by the successful processor strategy as their Pre-Numic neighbors.

Bettinger and Baumhoff (1982) support their hypotheses with archaeological evidence from rock-art sites, location of projectile points, and contrasts in basketry styles. Further research and review of archaeological evidence is necessary to substantiate or refute these interpretations. Implications of these interpretations will have a far-reaching effect on the presently held framework of chronology and subsistence patterning in the resource area.

Most of what is known about these early Numic speakers is from historical sources, because few sites from this period have been investigated and as J. Jennings (1978:235) describes, "The non-perishable material culture of the Utah Shoshoni speakers--Ute, Southern Paiute, Gosuite--is so scanty and nondistinctive that almost no archaeological evidence of the tribes or their lifeway can be gathered except through ethnographic and linguistic sources."

The presence of two groups of Ute Indians on Colorado's west slope was recorded by a Spanish exploring party led by Dominguez and Escalante in 1776. The Uncompahgre Plateau was occupied by the Yutas Tabehuaches, and the Colorado River Valleys were occupied by the Yutas Sabauganus (Bolton 1951; Steward 1974). The extreme northwestern part of Colorado north of the Yampa River was occupied by the enemy Comanche Yamparica, a Shoshone group.

The identity of the Comanche Yampanicas in northwestern Colorado is still in question, however. Stewart (1942), during extensive personal interviews with living Ute Indians, identified one group, listed as "White River Utes" living on the Uintah Reservation who call themselves

Yampakan. They gave their former home as the area occupied by the Comanche Yampanicas.

The Shoshone Indian groups' homeland is traditionally north of the Uintah range. Lowie and Stewart have the general opinion that the term "Comanche" as used by the Utes simply meant "enemy." Although the Utes are of Shoshonean stock, it is unlikely that peaceful relations always existed, and it is probable that Shoshone peoples hunted in the region and thus the area was a point of contact on some occasions.

Father Escalante called the Green River the "Rio de San Buenaventura," noting that this was the accepted boundary between the Ute and Comanche nations (Chavez 1976). The boundaries separating the Ute from the Shoshone along the Yampa River and the crest of the Uinta Mountains have been confirmed by Ute and Shoshone many times since first described by Fort Bridger Indian Agent John Wilson in 1849 (Stewart 1961). Stewart interprets rock-art panel 5MF281, located along the Yampa River south of Craig near Hayden, as possibly marking a boundary between the Shoshone to the north and the Ute to the South (Breternitz 1971). The panel depicts five armed riders with shields and spears against a lone rider. This may indicate possible intercultural strife or limited warfare.

From 1700 to 1750, Ute and the Comanche Shoshone were apparently allies and were reported to be hunting and raiding together on the High Plains and trading with the Pueblo Indians and Spanish along the Rio Grande (Stewart 1974). After 1750, the Ute and Comanche were no longer aligned, and the Ute, with help from the Spaniards and Pueblo Indians, forced the Comanches farther south. The Utes by 1850 had pushed the

Comanche Shoshone northward into Wyoming (Steward 1974). While the area north of the Yampa remained a common hunting ground shared by the Ute, Shoshone, Crow, and Sioux, the Ute dominated the area south of the Yampa to Gunnison, and from the Green River in Utah east to Middle Park in the Rocky Mountains (Steward 1974:125).

Historical research conducted by Eddy et al. (1982) for the excavation of 5MF605 in Brown's Park described numerous references to ethnographic groups in the area in accounts left by American fur trappers and explorers. Brown's Park served as a point of contact between native tribes and Euro-American trappers during the height of the Rocky Mountain fur trade. Lewis and Clark were told in 1805 by the Lemhi Snakes that the Green River country was the home of the Southern Shoshone or Snake tribe. Willaim Ashley noted Shoshone winter camps just above Vermillion Creek consisting of several thousand Indians in 1825. That the Shoshone used Brown's Park as a winter camp ground was also confirmed by members of the Peoria Party in 1939 (Hafen and Hafen 1955).

Other tribes also visited the area, no doubt because of the trading center in Brown's Park. The Arapaho, Ute and Navaho have all been mentioned in various memoirs of the area (Inman 1897; Hamilton 1951; Mattes 1966). E. Willard Smith wrote of a battle between white settlers and a Sioux war party in 1839 along the Little Snake River (Hafen and Hafen 1955). The Ute continued to visit the park as late as the 1870s (Willis 1952).

Late Prehistoric sites in the area are characterized by small side-notched and corner-notched projectile points and distinctive thick

walled "Shoshone" pottery. Later sites have standing wickiups, small conical brush structures. Caves were also used as shelters. These Late Prehistoric ancestors to ethnographic Indian groups practiced a nomadic lifestyle similar to the previous Archaic period. Noting a type of micro- and macro-banding that was flexible enough to make use of the varied resources, Steward (1938) describes the ethnographic subsistence pattern as seasonal movements that exploited combinations of locally available plants and, to a lesser extent, animal resources.

The acquisition of the horse and European trade goods by Numic groups some time soon after A.D. 1640 led to a rapid change among these previously pedestrian hunting and gathering groups. Southern Utes, enslaved by the Spanards, took large numbers of horses north with them after the Pueblo Revolt of 1680. This action introduced the use of the horse into the Northern Plains (Stewart 1966). The most likely route they would have taken would have been through Colorado (Stewart 1966). An essential aspect of Stewart's hypothesis is that the Indian cultures unfamiliar with horses were more likely to eat them than to ride them. Utes who worked for the Spanish by force or choice, however, learned to break and ride horses and could rapidly assimilate them as a useful element of their cultural pattern.

With the horse, hunting ranges expanded to include bison, social organization changed, and interactions with neighboring groups were not always peaceful. Winter encampments swelled to several thousand Indians, as documented for Brown's Park, and included different groups such as the Shoshone, Ute and Navaho (Hafen and Hafen 1955). New methods of hunting,

which yielded greater wealth in foods and hides, enabled people to live in large and comparatively permanent groups. Winter settlement camps, previously determined by the location of cached foods, could now be located in central locations with foods transported there. Use of the horse as a beast of burden also promoted the use of the tipi. Before the Utes became equestrian, they killed buffalo from time to time from small herds in the Rocky Mountains, along the Green River, and in the Great Basin--but nowhere was the buffalo an important food source. With the horse, long excursions to the plains across the Rocky Mountains were made to hunt buffalo at the risk of encounters with enemies along the way (Smith 1974:54). Late Protohistoric sites often contain trade items such as glass buttons, beads, and metal projectile points and knives.

The Historic ethnographic populations remained in the area until their expulsion in the early 1870s following the Meeker Massacre. Although the later part of this period is well documented in northwest Colorado, many questions concerning the origins, migrations and intercultural relationships still exist.

Few late Prehistoric/Protohistoric sites have been recorded for the LSRA, in spite of historical accounts suggesting a rather intensive occupation. This may, in part, be due to the difficulty in recognizing these sites, their reuse of earlier artifacts, or possibly such an abrupt change in settlement patterns that occurred with the introduction of horses that base camps were located in areas less determined by proximity to exploitable resources (Reed 1984:42). Forty-two sites have been

affiliated with the Late Prehistoric Period, based on the presence of undetermined Late Prehistoric points, Cottonwood points, Rose Spring points, Desert side-notched points, and metal points. Eight sites are isolated finds, 24 are open camps, and the rest are open architectural or open lithic. Three radio-carbon dates, A.D 1615 and A.D. 1575 further support the presence of some protohistoric group in the LSRA, possibly prior to the acquistion of the horse.

Four sites have been recorded as possessing "Shoshone" pottery. Shoshonean or Intermountain tradition pottery appeared on the Northwestern Plains during the Late Prehistoric period, and is thus a valuable time marker. Thirteen sites contain late prehistoric material as well as diagnostic points from other time periods.

Only one site, 5MF840, contains structural features and is affiliated with the Late Prehistoric. The site contains 10 stone circles. One Late Prehistoric point was found on the surface. Meyer and Riches (1979) refer to the site, located in Brown's Park, as the Flynn Bottom Site. Nine other sites contain stone circles or enclosures, but no diagnostic artifacts have been found associated with them.

Stone "circles" are commonly associated with Plains tipi traditions and are thought to be all that remains after the removal or disintegration of various kinds of super structures. Kehoe (1960), based on studies on the Blackfoot reservation, suggests that the stones were used to hold down lodge covers. Horizontally laid logs secured by slabs of stone creating a dome-shaped circular structure has been tentatively affiliated to the

Shoshone by Frison (1978:51). Smith (1974:39) describes the construction of tipis by the Northern Ute but states that all her informants denied the use of stones for weights.

A stone enclosure found at 5MF856 is associated with two points from widely separated periods--a Pinto Basin and late Prehistoric points. Also recovered were historical trade items such as a metal point, beads, and glass. No wikiup structures are on record for the LSRA.

Numerous rock art panels depicting horses and mounted "warriors" have been found throughout the resource area. Of the 33 sites containing rock art recorded in the LSRA, over one-third contained some sort of equestrian art.

IX.

RESEARCH DIRECTIONS AND MANAGEMENT SUGGESTIONS

In the last 10 years, there has been an explosion in commercial mineral, petrochemical and construction programs in the area and, as a result, a considerable amount of cultural resource work. Vast quantities of sites have been recorded, and considerable information has been gathered, but excavation and problem-oriented investigations have been few. Even today, with over 1,400 sites recorded, our understanding of the culture history and traditions of the area is incomplete, and chronometric control has barely been established.

It can be seen from the previous sections that there are considerable questions that remain unanswered concerning the culture history and nature of prehistoric occupation in the LSRA. Prehistoric occupation of the area has been divided into four stages--Paleo-Indian, Archaic, Formative, and Protohistoric. Paleo-Indian points have been found in the resource area as surface finds in open-camp and open-lithic sites. Despite these finds, pre-Holecene occupation is poorly understood. Archaic occupation at different periods is typologically similar to Colorado Plateau cultures, and the Plains Archaic lifeways appear to be comparable to Desert Archaic traditions. Haituses described in the Great Basin and Altithermal Plains are not indicated in the LSRA.

The Formative Period is presently undefined for the resource area, although there is a definite occupation of the area during this period. The last period is represented by the presence of Numic-speaking groups described in historical references but poorly understood in terms of

archaeological material. What has become most apparent is the possibility that archaeological evidence in the LSRA may contribute to the understanding of surrounding cultural chronologies of the Plateau, Plains and Great Basin by providing the link to data gaps and hiatuses described in those areas. Answers or vital information applicable to these "gaps" might just be found in what is considered previously as "marginal" and "peripheral" areas, where changes or new adaptations may have had their invention.

Based on the information accumulated in this Class I overview and those defined by Grady (1984), there are a myriad of potential research questions open for investigation and direction of problem-oriented projects. A set of four research question domains may be presented for consideration. These domains include the following:

1) Improvements of local chronological framework, better understanding of early cultural traditions and their transitions. Questions of the Fremont presence. Hand in hand with this aspect is the acquisition of chronometric data and the establishment of a well dated projectile-point typology.

2) Paleodemography, especially during hiatuses described in surrounding regions.

3) Prehistoric land use as it relates to subsistence and settlement systems through time and relationships between various subsistence procurement systems, e.g., horticulture and gathering.

4) Paleoenvironmental conditions, both local and regional.

5) External influences and relationships to adjacent areas---e.g., the Great Basin, Plains; Fremont and Anazazi evidence; trade relationships, perhaps traceable through raw toolstone material.

Use of these research questions will greatly aid and facilitate the evaluation of significance of cultural resources. As pointed out by Raab and Klinger (1977) and Nickens (1980), cultural resources must be evaluated for their historical and scientific importance relative to the required determination of National Register significance. Use of these regional research questions not only complement large-scale cultural resource management projects operating under specific research designs, but provide problem domains with which to examine the numerous small cultural resource management investigations that may lack well planned research designs.

These are necessarily very broadly oriented problem domains, but they can be addressed from a regional perspective by both small and large scale projects. Every site recorded, singly on a well pad or within a block survey, may potentially contribute data to these domains at the time of recording or at a later date as additional comparable information has been compiled on a regional basis. These problem domains can be further subdivided into dozens of specific questions that could be answered as the data base grows. These problems are also meant to be dynamic as new sites are recorded or excavated, and research directions can be reassessed and channeled.

The future of archaeological research in the LSRA, an area experiencing extensive development of energy resources, depends on the proper and reasonable management of public cultural resource properties.

Every effort should be made to maximize the amount of information gathered, and the significance of that information be evaluated with respect to current explicit research designs and future needs (Jones and Mackay 1980:157). Current research questions must be considered so that effort spent gathering the information contributes to the understanding of the prehistory of the area and that the remains of these nonrenewable resources are used to their fullest extent. By determining the significance of the resources, protective channels such as NRHP nominations could be better utilized.

The first step toward this goal in the cultural resource management process includes the proper identification of the distribution of resources and evaluation regarding their age, nature, type, and significance in terms of historical preservation needs. In order to move in this direction, it is important to ensure that investigators working in the area gather comparable, relevant data. Information categories identified for sites in the automated data base in conjunction with the narrative should be utilized to standardize this data. Site size, assemblage, and environment are extremely important if the site data is to be used to test future subsistence, settlement or predictive location models. For this reason, it is suggested that all researchers are encouraged to record site environmental situation, size, and location; carefully map features and artifact concentrations; and describe in detail artifacts present. With the impending BLM noncollection policy, this last task becomes critical. Measurements, outlines, and photographs of diagnostic artifacts should be required. Photographing of rock-art sites should also be encouraged. Information on environmental situation should

also be recorded for negative surveys in an effort to compile data on where sites do not occur.

This information is currently compiled and updated through the automated REX data base. Perhaps the most important and useful contribution of this Class I effort has been the generation of an extensive, flexible and easily accessible computer file containing detailed information on the cultural resources of the area. The organization of this data provides accurate information on the density of resources and the distribution of site types of varying significance, information critical to management and planning. Managers need to know why and where resources are located to determine their scientific and legal value, as well as protect these finite cultural values.

Human systems are patterned, and these patterns can be determined if appropriate questions are asked of the data. These questions include interrelated problems such as location strategy, subsistence systems, and site catchment. Site location strategy questions also concern site patterning in terms of spatial distribution of sites. It follows that a research goal for the BLM could center around the need for additional Class II and III inventories to further our understanding and to increase the amount of primary data from which these questions could be approached and from which possible predictive models of site location may be generated.

As noted, there are many gaps in our knowledge of prehistoric peoples' utilization of the LSRA. This is in part because such a small percentage of the lands comprising the LSRA have been systematically explored for archaeological resources; and the surveys that have been completed have

been concentrated in energy-rich and development areas--the Williams Fork Mountains for coal, the Powder Wash area for oil and gas, and Savery Pothook and Juniper-Cross areas for water projects. Exact data, therefore, is inherently biased toward the prehistoric exploitation of the Williams Forks, a portion of the Yampa River corridor, and the oil fields of Powder Wash and Hiawatha camps. These areas constitute but a small portion of the total range of environmental possibilities within the resource area, and our knowledge of prehistoric cultural adaptation to the LSRA as a whole cannot be considered complete. It is, therefore, important that future archaeological investigations focus on the unexplored areas of the resource area such as the upland regions of Douglas, Cross, and Cold Spring mountains; Diamond Breaks; the Vermillion and Sand Wash lowlands; and the Great Divide area. Since the resource area exhibits such environmental diversity, the area should be subdivided into physiographic areas based on drainage systems and then each studied in terms of subsistence and settlement patterning. This would not only make the models more effective but also shed light on resource exploitation and settlement through time. The most economical and scientifically meaningful way to accomplish this goal is to implement a stratified random sample of these areas at a sampling level of at least 10 percent. A stratified random sample of these areas would provide the best overall picture of the cultural resources of the region and prehistoric adaptations to the area. This information, taken in concert with the existing inventory data, would provide the necessary data from which levels of significance of the resource can be evaluated relative to

the proposed research designs. Models accounting for significance level, resource density and site type could then be constructed.

There is another type of inventory of rather pressing concern to energy developers, federal land managers, and archaeologists. The energy-rich regions of Powder Wash and Hiawatha Camp have been subjected to numerous small well-pad surveys conducted at various levels of intensity. As a result, questions concerning resource densities, type and locations have not been approached, while, one by one, the resources are either avoided or "mitigated." A Class III block survey centered in this area would provide a valuable overview of the resources in the area and aid cultural resource managers in designing areal management strategies before the inevitable destruction of the in situ cultural resource data base through energy development. In the long run, it would be economically expedient to both energy developers and managers to know where the sites are located before development plans, and with both parties contributing, perhaps energy and funds, promote a sense of cooperation among all involved, but not at the expense of the resource.

The Brown's Park area is experiencing a similar pressure, but from another source. Recreation in the park has brought more and more visitors who are exploring the commonly known archaeological sites and, at times, damaging these resources. Many of these sites are not formally recorded. The area is of tremendous archaeological value because of the ideal environmental circumstance that attracted prehistoric populations and the probability of locating evidence for Fremont occupation. This is especially important in view of problems of the origns of "Fremont"

culture and the Madsen-Berry hypothesis of an Eastern Utah and Western Colorado locus of Fremont occupation. This is especially important in view of problems of the origins of "Fremont" culture and the Madsen-Berry hypothesis of an Eastern Utah and Western Colorado locus of Fremont occupation. A Class III survey of the mountains flanking the park would provide many answers concerning the prehistoric occupation of the region and offer greater protection to the resources. Upon the evaluation of the resources discovered during the survey, interpretation centers could be designed for the education of the public.

Managers should view cultural resources as a nonrenewable land value that can illuminate past and present exploitative land-use patterns. Cultural values that will not be directly affected by land-altering activities and, therefore, require no formal mitigative measures, should be preserved for future study. Often cultural resources are located in areas of special concern for other natural science disciplines such as botany, range, geology, and wildlife. Protective measures such as Research Natural Area (RNA), Outstanding Natural Area (ONA) and Areas of Critical Environmental Concern (ACEC) designations, which involve a multi-disciplinary justification, can be further supported by the documentation of the presence of archaeological resources. As these areas are proposed, every effort should be made to include cultural resources as a consideration.

Finally, it is suggested that problem-oriented excavation in the resource area be encouraged. Since there are a great number of sites

being recorded and the interpretation of the surface remains inevitably done by comparison to excavated, stratigraphically controlled sites, it is extremely important that comparative excavation data be generated within the resource area. Very few sites have actually been thoroughly investigated in the study area and as apparent in previous sections of the report, comparative data drawn from surrounding areas has been difficult. Only through excavation can questions such as regional chronology, transition between traditions, "intrusion," and paleoenvironment be addressed.

In summary, the LSRA contains a wealth of cultural resources and considerable room for additional cultural resource inquiry exists. Efforts should be made to coordinate the cultural resource management programs of various government agencies and contractors in an effort to enhance the productivity and comparability of research and protection of cultural resources in the area. The LSRA has great potential for contributing to our aesthetic, historic and cultural appreciation of the past; and as historians, anthropologists, and cultural resource managers, it is our responsibility to see that we utilize these cultural resources to their fullest potential.

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Appendix A
Major Cultural Resource Management Projects

Reservoir Projects

1975, 1976
Reference: J. Jennings and Daniels 1976
Sponsoring Institution: National Park Service
General Location: Savery-Pot Hook area along the Little Snake River in Colorado and Wyoming
Type and Purpose of Project: Class III, 7100 acres. Archaeological investigations of lands and canal routes included in a major irrigation project.
Project Results: 69 archaeological sites were recorded, ranging in antiquity from the Early Middle Prehistoric Period to the Late Prehistoric Period, and a single site was attributed to Fremont influence by the presence of Turner Gray, Cisco variety pottery. The historic period was also well represented. The archaeology of the Little Snake region was defined as closely related to that of the Northern Plains and Dinosaur National Monument. This is a preliminary report of the findings - the project was subsequently cancelled and no final report was submitted.

1980
Reference: Chase 1981
Sponsoring Institution: Laboratory of Public Archaeology, Colorado River Water Conservation District
General Location: Juniper-Cross Mountain
Type and Purpose of Project: Class II, 1752 acres. Sample survey of 12% of the total area conducted to determine cultural resource parameters of two potential reservoir sites.
Project Results: 49 prehistoric, 23 historic, and 4 multi-component sites were recorded. A scheme of parallel systematically selected 100-meter wide transects, oriented perpendicular to the Yampa River, and extending from the river to the proposed high water line were used to sample the project area and test: 1) the general premise that site location was constrained by water and the majority of known sites were located within 250 m of a water resource; and 2) the average site size was 1375 m^2. The survey test revealed that the site area was much larger, averaging 7.67 acres or 31,058.3 m^2, and average site distance from water was 138.62 m. Projected site densities for the Juniper Reservoir area derived from the sample survey is 317 sites, or from one site per 45 to 67.6 acres. Cross Mountain projected densities were slightly lower with a total of 271 sites and one site per 27.4 to 41.4 acres indicated.

Twenty-one diagnostic artifacts were described and classified into 17 morphological types. Human occupation from the Paleo-Indian period was indicated by a problematical unfinished Folsom projectile point and bison antiquus bone tool. The early Archaic period was unrepresented, the Middle Archaic was represented by two Duncan-type projectile points, and the Late Archaic to Protohistoric periods were represented by a series of projectile points, which were not positively identified.

1981
Reference: Arthur and Collins 1982
Sponsoring Institution: Laboratory of Public Archaeology, Colorado River Water Conservation District.
General Location: Juniper-Cross Mountain reservoir
Type and Purpose of Project: Class II, sample survey of 11.5% of pools areas, 3136 acres. Goal of 1981 work was to provide addtional data that would be directly comparable to the previous study (Chase 1981)
Project Results: Transects, 100 meters in width, and of varying length comparable to the 1980 reconnaissance effort, were used by spacing the new transects on either side and parallel to the previously examined transects. Within the two proposed reservoir sites, 35 open-lithic sites, 25 prehistoric open-camp sites, 3 historic sites, and 4 multi-component sites were recorded. Diagnostic artifacts were typed morphologically and compared to dated resources from surrounding areas. The cultural chronology derived from this study indicated prehistoric occupation of the project area commencing during the Early Plains Archaic represented by a projectile-point base reminicent of the Cody Complex from the Plains. Sites attributed to the Middle Plains Archaic were more heavily represented with projectile-point styles, very similar to the McKean Complex of the Plains, the Apex Complex of the Front Range, and the Desert Culture of the Great Basin. The Late Plains Archaic was not represented in the diagnostic artifact collection. The Late Prehistoric period was found lacking in Fremont affiliated artifacts despite known occurrences in the immediate vicinity of the project area. Site locations tended to be on terrace edges and interfluvial ridges at a distance from the floodplain rather than near the river.

Coal Lease Projects

1975
Reference: Lischka 1975
Sponsoring Institution: University of Colorado
General Location: 22 airmiles southwest of Craig and routes along the Yampa, the Williams Fork River, and along Iles Mountain.
Type and Purpose of Project: Class III survey, 2,880 acres. Cultural and paleontological resources inventory and evaluation of the proposed railroad corridors and coal mine.
Project Result: The cultural resources investigation recorded a total of 10 historic sites, 62 prehistoric sites, and 65 isolated finds. Distinctive prehistoric occupation patterns, noted by clusters of sites, were located along the major river systems in areas with extensive bottomlands. The study area was occupied at least as early as 5000 B.P., and subsequent occupation appears to have been fairly continuous with all horizons represented. The relative density of the occupation during any particular horizon was not determined due to the lack of sufficient cultural material. All the prehistoric sites recorded were assigned to the generalized Western Archaic cultural tradition--no evidence was found of Fremont occupation.

1975-1976
Reference: Arthur 1977
Sponsoring Institution: Laboratory of Public Archaeology, Bureau of Land Management
General Location: Williams Fork Mountains, Craig-Hayden region south of the Yampa River valley.
Type and Purpose of Project: Class II, 124,833 acres. Archaeological reconnaissance of proposed Federal coal lease tracts, in order to estimate the nature and extent of cultural resources in the area
Project Results: Descriptive analysis of the data was undertaken due to the little previous work done in the area. Sampling technique was based on the environmental characteristics of physiographic conditions (slope and aspect) and the nature and density of local vegetation represented in each 40-acre unit in a tract. Based on the survey data, it was surmised that the Yampa River Basin and Williams Fork Mountains have been utilized by aboriginal groups since at least 5000 B.C. The Early Middle and Late Middle Prehistoric periods are well represented, although no evidence for the Early Prehistoric Period or Paleo-Indian occupation was found. Limited evidence of Fremont occupation was noted. Late Prehistoric and Early Historic Periods are thought to be affiliated with Ute and Shoshone groups, who historically are known to have utilized the area.

1977
Reference: Williams and Jennings 1977
Sponsoring Institution: Laboratory of Public Archaeology, Bureau of Land Management
General Location: South of the town of Lay, Moffat County
Type and Purpose of Project: Class III, 1,700 acres. Archaeological survey of coal reserves.
Project Results: One historic and one prehistoric site were recorded along with 15 isolated finds. The prehistoric site was dated to the Late Prehistoric Period by diagnostic projectile point comparison with similar types found in Dinosaur National Monument.

1977
Reference: Williams and Jennings 1977
Sponsoring Institution: Laboratory of Public Archaeology, BLM
General Location: Southwest of Craig, Colorado
Type and Purpose of Project: Class III, 1,120 acres. A proposed Utah International Craig underground project was surveyed for cultural resources.
Project Results: One archaeological site and three isolated finds were recorded. No diagnostic artifacts were recovered.

1979
Reference: Grand River Institute 1979
Sponsoring Institution: Grand River Institute, Bureau of Land Management
General Location: Northwest of Craig, Colorado
Type and Purpose of Project: Class III, 1,810 acres. Cultural resource survey for proposed strip mine
Project Result: Four archaeological sites and 20 isolated finds were identified. One site contained a pottery scatter resembling Shoshone pottery from northwestern Colorado.

1979
Reference: Grand River Institute 1979
Sponsoring Institution: Grand River Institute
General Location: North of the town of Hayden, along Fish, Foidel, and Trout creeks in Routt County.
Type and Purpose of Project: Class III. Cultural resource inventory for mine expansion.
Project Results: The survey recorded 15 prehistoric sites, one historic site, historic district, and 101 isolated finds. Prehistoric occupation of the project area is associated with the Western Archaic tradition.

1979
Reference: Zier 1979
Sponsoring Institution: Powers Elevation
General Location: Southwest of Steamboat Springs and northwest of the community of Oak Creek
Type and Purpose of Project: Class III, 1,365 acres. Archaeological surface survey for proposed coal mine.
Project Results: Four prehistoric sites and two historic sites were recorded along with nine isolated finds. Locational patterning of prehistoric sites was largely confined to areas near or adjacent to sources of water. Preliminary assessment of site function suggests that plant food exploitation was a major activity with some incidental lithic manufacture. No temporarily diagnostic artifacts were found.

1980
Reference: Wheeler 1980
Sponsoring Institution: Western Cultural Resource Management, Bureau of Land Management, Little Snake Resource Area
General Location: South of Mt. Harris and the Yampa River along the western edge of Twenty Mile Park.
Type and Purpose of Project: Class III, 1,515 acres. Locate and assess the significance of all cultural resources located within the proposed mine boundary.
Project Results: Four aboriginal sites, one historic site, and four isolated finds were recorded. Site typology was developed based on the number of tasks or activities represented at the site. Evidence of two time periods, Paleo-Indian and Historic, were recorded and represented by Paleo-Indian Cody complex, Scottsbluff projectile Point (RT 139), and Historic Euro-American artifacts.

1980
Reference: Caraveo 1980
Sponsoring Institution: Archaeological Services, Bureau of Land Management
General Location: Williams Fork Mountains, south of Craig, Colorado
Type and Purpose of Project: Class III, 5,583 acres. Archaeological inventory of portions of proposed coal mine.
Project Results: A total of five prehistoric sites, one historic site, and 18 prehistoric isolates were recorded.

1982
Reference: Davis and Westfall 1982
Sponsoring Institution: Energy Fuels Coal
General Location: South of the town of Lay in east-central Moffat County.
Type and Purpose of Project: Class III, 1,490 acres. Cultural resource investigation on proposed Sugarloaf Mine property and ancillary facilities.
Project Results: The theoretical orientation guiding the investigation was the hypothesis that if the occupational sequences described for the Sugarloaf-Lay site represents extensive, prolonged use, representative of base camp activities, (O'Neil 1980), then some supporting evidence should be reflected in the number of and relationship between the spatial location and function of special use localities found during the archaeological survey of the area around the base camp. This situational land use model, when applied to the locational aspects of the cultural remains found in the area, revealed a correlation between the types of land forms selected and degree to which they were utilized, but demonstrated that the base camp sites in the project area represent instances of short-term episodic use and not long-term continuous occupation. Isolated finds comprised the special use localities and lacked the evidence of superimposed, functionally different utilization episodes that could operate as ancillary support locales necessary for the maintenance of long-term occupation at a base camp. These conclusions were based upon the analysis of six prehistoric sites and 16 isolated finds recorded during the survey. The discovery of only four Late Prehistoric projectile points precluded any conclusions regarding temporal affiliations for the sites.

1982
Reference: Gordon & Kranzush, Inc.
Sponsoring Institution: Bureau of Land Management
General Location: Lower White River and Danforth Hills.
Type and Purpose of Project: Class II, 8,480 acres. Sample survey results were to be used to construct site locational prediction model applicable to large areas of known coal reserves. Model is to be used by the BLM for planning purposes.
Project Results: Three seperate models, using discriminant analysis and based on geographic areas, were generated using 40-acre tracts. The inventory located 47 sites, 40 localities, and 73 isolated finds, which increased in frequency from Paleo-Indian to Proto-historic periods.

1982
Reference: Legard 1982, complier
Sponsoring Institution: Hayden Gulch West Coal Company
General Location: South of Hayden in the Williams Fork Mountains, Routt County.
Type and Purpose of Project: Class III Survey, 3,000 acres, spot checked 2,300. Inventory of cultural resources in the proposed Hayden Gulch Mine area.
Project Results: Altogether 29 sites and 20 isolated finds were recorded. Eight of these sites are "aspen art" sites, the first formally recorded for Moffat County. Aborginal sites consisted of open-lithic scatters and one

stone-circle site. The span of occupation indicated was from as early as the Middle Archaic Period (3000 BC - 1000 BC) through the Late Prehistoric Period (AD 500 - 1700). Based on the topography and climate of the project area as well as the archaeological record, the authors believe that the Williams Fork Mountains were primarily used seasonally by aboriginal groups for short periods of time during hunting activities.

1983
Reference: Kainer 1983
Sponsoring Institution: Utah International Inc.
General Location: Danforth Hills.
Type and Purpose of Project: Class III, 2,820 acres. Cultural resource inventory was conducted for the proposed Utah International, Inc. Danforth Hills proposed surface mine.
Project Results: Prehistoric occupation of the project area did not appear intensive with the majority of sites recorded as small lithic scatters and isolated finds sparsely distributed throughout the area. This pattern supports earlier observations made in adjacent areas by Piontkowski (1981), Gordon et al. (1982), and Kranzush (1982). The four prehistoric sites, two historic sites, and 14 isolated finds newly recorded sites, in addition to previously recorded sites, brings the resource density to one per 98 acres.

1977
Reference: J. Jennings and Sullivan 1977
Sponsoring Institution: Laboratory of Public Archaeology
General Location: South of Craig to Meeker across the White River and south to Rifle, Colorado.
Type and Purpose of Project: Class III, 1,600 acres. Archaeological survey for proposed transmission line.
Project Results: Twenty-two archaeological sites were located, 21 are prehistoric and one is of historic vintage. Sixteen isolated finds were also located during the survey. The line was divided into three geographical sections, based upon drainage systems and sites associated by basin are discussed. Generally, the sites recorded were small in size and contained limited artifactual assemblages dominated by groundstone. The apparent span of occupation in the survey area, based upon projectile point typology and comparison, covers at least 4,000 years from perhaps as early as 2000 BC to early 20th century

1982
Reference: Newkirk and Treat 1982
Sponsoring Institution: Gilbert/Commonwealth
General Location: North to south from Craig to Rifle, Colorado.
Type and Purpose of Project: Class III, 2,513 acres. Cultural resources survey of transmission line upgrade.
Project Results: Forty-two new and previously recorded cultural resources were located. Four site types were designed which represented a variation in activities and occupation length, as defined by tool type and raw material content. Analysis of the inventory data involved comparisons with a predictive model developed in the Piceance by Grady (1980).

1984
Reference: Hoefer and Thompson 1984
Sponsoring Institution: Western Wyoming College
General Location: Sand Wash Basin, portions of Brown's Park, Cold Spring Mountain, Irish Canyon, Vermillion Mesa, and Peck Mesa.
Type and Purpose of Project: Class III, 2,144 acres. Cultural resource survey for seismic exploration lines.
Project Results: A total of 61 newly recorded sites, two previously recorded sites, and 33 isolated finds were located. The prehistoric sites were classified by material assemblages into four types--open camps, procurement lithic scatters, specialized lithic scatters, and generalized lithic scatters--and locational data supports the typology in that topographic and environmental zones appear to reflect the basic function of each site type. Material assemblages are heavily influenced by the presence of local toolstone sources. Sites within the Sand Wash Basin are primarily toolstone procurement localities while sites outside the basin appear to represent a segment of sites utilized on seasonal rounds practiced by hunters-gatherers, focussing on the exploitation of resources other than toolstone procurement. Few temporal diagnostic artifacts were found, although indications are that the area was occupied from the post-Altithermal through the Late Prehistoric period.

Excavations

1974
Reference: Biggs 1974
Sponsoring Institution: Office of the State Archaeologist
General Location: Road out west of Maybell, Colorado.
Type and Purpose of Project: Test excavation of 5MF309. The investigation was conducted in an effort to determine: 1) whether the site had undergone any further destruction since recording, 2) the horizontal and vertical dimensions of the site, 3) cultural affinities, and 4) the necessary steps to protect and stabilize the site.
Project Results: The site was tested in each of three localities. It was determined that the site was a campsite occupied discontinuously over a period of time. Although no temporally sensitive artifacts were found inside, the site appears to be affiliated with Late Archaic cultures. Recommendations were to excavate material exposed in the road cut and take steps to protect the site from further erosion.

1978
Reference: J. Jennings 1978
Sponsoring Institution: Laboratory of Public Archaeology
General Location: South of the town of Lay, Colorado.
Type and Purpose of Project: Test excavation: Recovery of significant archaeological data from the Lay site. Investigation designed to retrieve information on site complexity, cultural affiliation, and time depth.
Project Results: Four cultural loci were distinguished by diffential distribution of surface fire heaths and artifact concentrations. Protonmagnetometer survey registered the presence of buried cultural features. Occupation of the site was determined to be during the Late Prehistoric Period, 600-1800 A.D. and possibly as early as 500 B.C.

1978
Reference: O'Neil 1980
Sponsoring Institution: Colorado Highway Department
General Location: Confluence of the Yampa River and Walton Creek near Steamboat Springs, Colorado.
Type and Purpose of Project: Salvage excavation of 5RTII. Site is threatened by proposed construction of Alternate 1 of U.S. Highway 40. Archaeological material was analyzed to aid in the determination of cultural affiliations and on-site activities.
Project Results: One cultural occupation zone was identified and associated with an oval basin-shaped hearth, Feature 1, C-14 dated to 1730^{+} 225 B.P. Ten classifiable projectile points were recovered from four stratigraphic levels. The artifact assemblage was described as the Mountain Tradition of the Late Prehistoric period and indicated an open, seasonally reoccupied quarry and hunting camp occupied by Shoshonean groups exploiting the Lower Montane environment during the Late Prehistoric Period.

1979
Reference: Treat 1979
Sponsoring Institution: Western Wyoming Collge
General Location: Upland area 5 miles west of Vermillion Bluffs.
Type and Purpose of Project: Archaeological testing and monitoring. Monitor reclamation and recontouring activities adjacent to site 5MF660 and test excavate Feature 9 to determine its nature and function.
Project Results: During reclamation of a reserve pit, a buried component of site 5MF660 was exposed. Nine hearth features were recorded with one feature C-14 sample yielding a date of 1440 $\pm$ 95 B.P., 510 A.D. (UGa-297s), placing the site in the late Archaic or Early Late Prehistoric cultural time frame. No diagnostic tools were recovered. The site is believed to have been reoccupied due to the large site area and dispersal of materials. Major activities evident at the site included tool maufacture and maintenance, and rabbit and juniper berry procurement. The site is largely disturbed and may be buried under approximately one meter of sand.

1978-1979
Reference: O'Neil 1980
Sponsoring Institution:Powers Elevation Co.
General Location: South of Lay, Colorado.
Type and Purpose of Project: Test excavation of 5MF476. Refine eligibility criteria for nomination of the site to the NRHP through the verification of preliminary observations on the site's age, cultural affiliation, and occupational history.
Project Results: The site was determined to be a base camp with six localities containing cultural features and material which indicate an occupational history ranging from the Middle Archaic Period (ca. 2300 B.C.) through the Late Prehistoric Period (ca. 600 - 1800 A.D.). A possible terminal Altithermal occupation (ca. 5000 B.P.) may also exist but remains tentative until the natural and cultural stratigraphic relationships are investigated. The site is considered eligible for nomination to the NRHP.

1980
Reference: Hand 1980
Sponsoring Institution: Western Cultural Resource Management
General Location: Southeast of the town of Hayden, Colorado.
Type and Purpose of Project: Test excavation of 5RT139 and 5RT142. Multimethod testing program involving test pits, stratigraphic columns, and backhoe trenches employed to evaluate site significance.
Project Results: Location of significant subsurface deposits at 5RT139 were restricted to an area of 7200 m^2 and the exposure of subsurface cultural features in approximate association with diagnostic artifactual material indicated at least two cultural components, a Middle Archaic McKean Complex association above the in-site features assigned to the Paleo-Indian period (Cody Complex). The nature of the occupation/utilization of the site was undetermined and extensive mitigation procedures were recommended. Testing procedures at 5RT142 indicated secondary deposition--the presence of articulated domestic sheep remains was located below all diagnostic prehistoric material.

1981
Reference: Tucker 1981
Sponsoring Institution: Nickens and Associates
Type and Purpose of Project: Mitigative excavation and monitoring at 5RT139. Goal of the project was to determine the form and function of the features on the site; ascertain the absolute age of the features through radiometric methods; clarify site stratigraphy; and determine the interrelationships of artifacts, features, and activities at the site.
Project Results: Activities resulted in the exposure of 21 firehearths and a small lithic assemblage dominated by debitage. Out of nine charcoal samples, three prehistoric dates were obtained: 6430B.P., 5900 B.P., and 1130 B.P. Based on these dates, the previous temporal assignation to the Paleo-Indian Cody Complex, 9000 B.P., (based on surface recovery of Scottsbluff II projectile points) was not supported but rather an occupation of the site intermediary between the Paleo-Indian Cody Complex and the McKean Complex (3000-5000 B.P.). This period is variously referred to as the Early Plains Archaic or the Altithermal Period. The presence of the Scottbluff points was hypothesized to be heirloom artifacts collected and reused by later populations. The site is believed to be a seasonally occupied campsite established for the purpose of procuring large game animals.

1982
Reference: Eddy et al. 1982
Sponsoring Institution: Science Applications, Inc., National Park Service.
General Location: Brown's Park, Colorado.
Type and Purpose of Project: Mitigation and excavation of site 5MF605. Data recovery program was centered on the river bank section to be impacted by proposed grading operation planned by the U.S. Fish and Wildlife (USFWS) to halt erosion of the site.
Project Results: The site contained a single cultural level dating to the fur trade era, and faunal analysis revealed the use of native big game animals. The site may be remains of Fort Dave Crockett, or some other fur

trade operation contemporaneous with it. No structures were found during the investigation, but the presence of a structure in a nearby location is postulated based upon the discovery of architectural material including nails, window glass, and adobe chinking. An intensive historical literature search complimented the historic site archaeology providing a model for the study of historic fur trade forts.

1983
Reference: Reust et al. 1984
Sponsoring Institution: Western Research Archaeology, Bureau of Land Management.
General Location: Shell Creek near Hiawatha Camp, Colorado.
Type and Purpose of Project: Archaeological investigation in the form of excavation conducted in order to mitigate the adverse effect to the site by dry exploration well reclamation activities.
Project Results: Two temporally distinct periods were encountered and dated to the Late Prehistoric (1280 $\pm$50, 1500 $\pm$90 B.P.) and Late Late Archaic (1790 $^{+}$130B.P.) periods. No diagnostic artifacts were found, although nine features were recorded. All nine features were either hearths or ash stains and were not distinguishable by morphology from either component except by date. Some sort of wild plant processing appears to have been the main emphasis at the site, which was briefly revisited by small-sized groups of hunters and gatherers.

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