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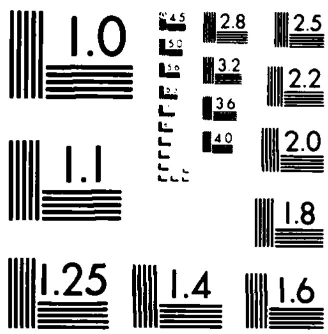

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

M-X/MPS

ENVIRONMENTAL TECHNICAL REPORT

ETR 23
ARCHAEOLOGY

DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ ACQUISITION

DEPARTMENT OF THE AIR FORCE

M-X ETR-23

ENVIRONMENTAL CHARACTERISTICS OF ALTERNATIVE DESIGNATED DEPLOYMENT AREAS: ARCHAEOLOGY

Prepared for

United States Air Force
Ballistic Missile Office
Norton Air Force Base, California

By

Henningson, Durham & Richardson, Inc.
Santa Barbara, California

REVIEW COPY OF WORK IN PROGRESS

2 October 1981

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

Federal, State and Local Agencies

On October 2, 1981, the President announced his decision to complete production of the M-X missile, but cancelled the M-X Multiple Protective Shelter (MPS) basing system. The Air Force was, at the time of these decisions, working to prepare a Final Environmental Impact Statement (FEIS) for the MPS site selection process. These efforts have been terminated and the Air Force no longer intends to file a FEIS for the MPS system. However, the attached preliminary FEIS captures the environmental data and analysis in the document that was nearing completion when the President decided to deploy the system in a different manner.

The preliminary FEIS and associated technical reports represent an intensive effort at resource planning and development that may be of significant value to state and local agencies involved in future planning efforts in the study area. Therefore, in response to requests for environmental technical data from the Congress, federal agencies and the states involved, we have published limited copies of the document for their use. Other interested parties may obtain copies by contacting:

National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
Telephone: (703) 487-4650

Sincerely,

JAMES F. BOATRIGHT
Deputy Assistant Secretary
of the Air Force (Installations)

1 Attachment
Preliminary FEIS

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1.0 GENERAL INTRODUCTION

Cultural resources, those archaeological and historical properties determined to be of local, state, and national significance, are further recognized as non-renewable resources which will be adversely impacted by deployment of the M-X system. As such, this technical report provides a working definition of cultural resources and reviews the historic preservation system and its applications for Air Force deployment of M-X in Nevada/Utah and Texas/New Mexico. National Register properties, previous research, culture history, a review of known archaeological, historical and architectural properties, and the results of a 100 sq mi regional sample survey are provided. A section on impact assessment has been included which addresses impact significance, methodology, impacts of the M-X system and its alternatives, and tables which indicate estimated numbers of sites to be impacted by each alternative. This technical report also incorporates those public comments received during draft review.

1.1 DEFINITION OF CULTURAL RESOURCES

The terms cultural resources and historic properties are generally used interchangeably. In this report cultural resources are defined to include prehistoric and historic districts, sites, structures, and other evidence of human use considered to be of some importance to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons (36 CFR Part 64). These resources may be prehistoric aboriginal sites, historic Native American and Euroamerican areas of occupation and activity, or features of the natural environment.

1.2 STATUTORY AUTHORITY

CULTURAL RESOURCE LAW AND THE COMPLIANCE PROCESS

Cultural resources are protected by a number of laws. The principal ones are briefly summarized here, and the procedures for complying with these laws are discussed. The agencies involved and the relationship between agencies are outlined. The system that has resulted from this legal base is generally referred to as the historic preservation system.

I. CULTURAL RESOURCE LAWS AND REGULATIONS:

1. National Historic Preservation Act (NHPA)

This law created the National Register of Historic Places and established the Advisory Council on Historic Preservation. Section 106 of this act requires that federal agencies take into account the effect of any undertaking on properties included in or eligible for the National Register. In addition, the Advisory Council must be afforded an opportunity to comment on such an undertaking.

2. National Environment Policy Act

This act and the guidelines of the Council on Environmental Quality (CEQ) require federal agencies to consider and evaluate the impact on the environment of all federal actions. Potential impacts to cultural resources are considered as part of this process.

3. Executive Order 11593

This order directs federal agencies to identify and nominate historic properties to the National Register (this part of the Order applies to land holding agencies). The Order also requires that all federal agencies exercise care to avoid damaging properties unnecessarily that might be eligible for the National Register.

4. Archaeological and Historic Preservation Act (sometimes referred to as the Moss-Bennett Act)

This law authorizes federal agencies impacting archaeological and historic resources, to expend funds (up to one percent of total project cost) for the proper recovery of data from these resources. Such funds are made available after project impacts have been identified and assessed in the project planning process. This Act also authorizes Interagency Archaeological Services (IAS) of the Heritage Conservation and Recreation Service to review data recovery programs to ensure that they comply with historic preservation legislation.

5. 36 CFR 800 - Advisory Council Guidelines on the Protection of Historic and Cultural Properties

These regulations implement Section 106 of the National Historic Preservation Act and Executive Order 11593, and they provide step-by-step procedures for compliance with the above legislation.

II. PARTICIPANTS IN THE HISTORIC PRESERVATION SYSTEM

The major participants in the historic preservation system and their relationships are outlined in Figure 1.2-1.

1. The Advisory Council on Historic Preservation

The Advisory Council became an independent agency of the U.S. government in 1976. The division known as the Office of Review and Compliance enforces agency compliance with the Council's procedures, comments on environmental impact statements, and alerts agencies when they appear to be in non-compliance. The Council guidelines, 36 CFR 800, define the Council's functions. Principally, the Council must be afforded an opportunity to comment on any project having an effect on cultural resources. If the effect is adverse, the Council is party to the execution of a Memorandum of Agreement, which details the actions to be taken by the Agency with the concurrence of the SHPO, to avoid or mitigate the adverse effects on the cultural resources.

2. Office of Archaeology and Historic Preservation (OAHP)

Numerous historic preservation programs fall under OAHP which is now a part of the National Park Service. Two key divisions include the National Register of Historic Places and Inter-agency Archaeological services.

National Register

This division receives nominations of properties to the Register from other agencies, verifies the accuracy of the information, accepts or rejects property nominations, and publishes an updated listing of National Register properties. As a

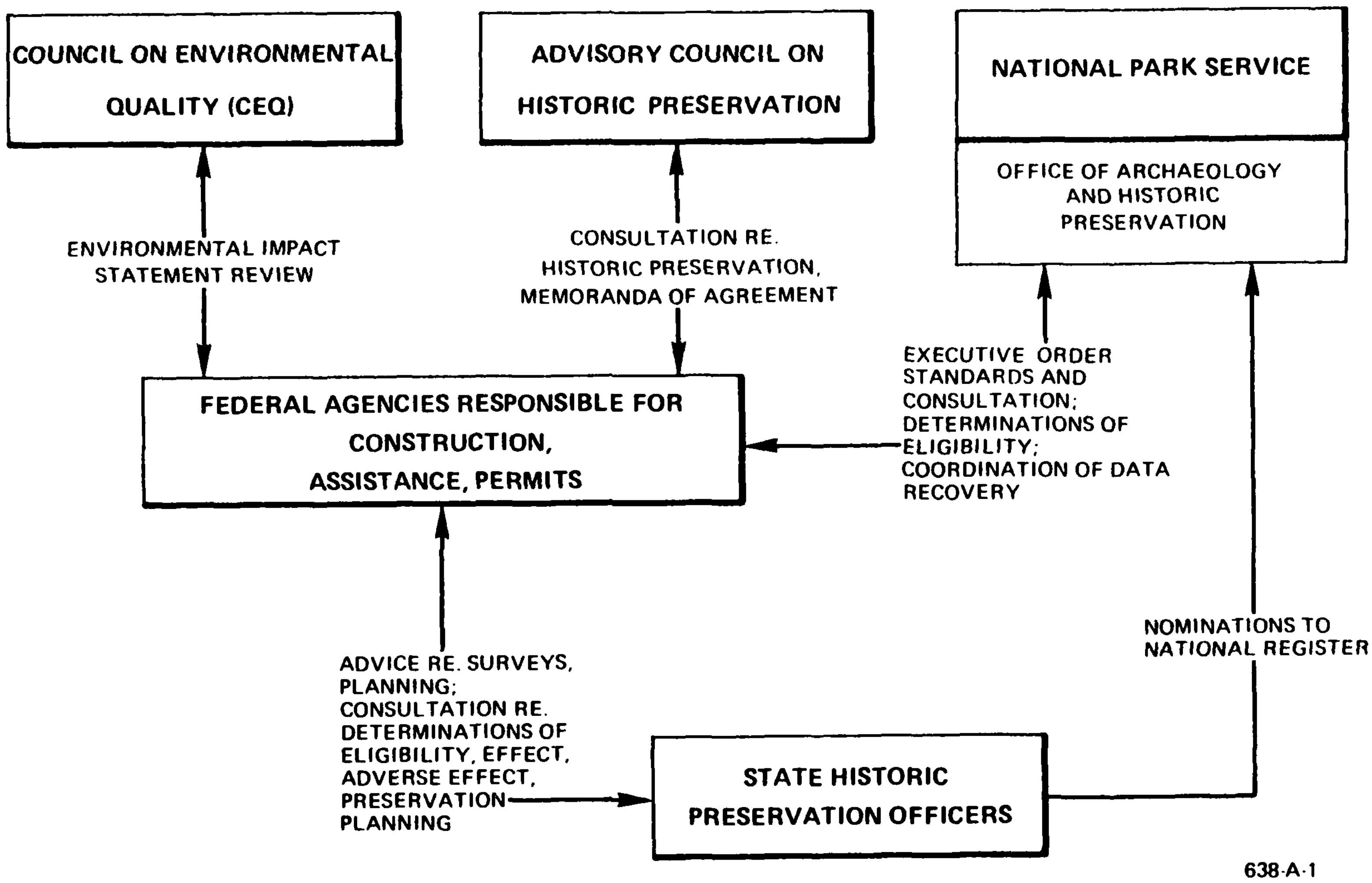

Figure 1.2-1. The historic preservaton system: major participants and relationships.

result of E.O. 11593, federal agencies are required to take care not to damage Register-eligible properties. This division processes requests for "determinations of eligibility" after these requests have been reviewed by the SHPO.

Interagency Archaeological Services: (IAS)

As its name suggests, a major function of this division is to assist other federal agencies to comply with cultural resource legislation. Frequently, this means actually assuming responsibility for the identification (inventory) and evaluation of cultural resources within the project area which may be eligible for the National Register, and taking the appropriate mitigation measures. To do this, IAS can either perform the necessary work themselves or subcontract for these services. The agency transfers funds to IAS sufficient to achieve compliance with preservation legislation, and IAS charges the agency a percentage of the total amount of contract services for facilitating the agency's compliance requirements. In addition, IAS serves in a review capacity at various project phases.

3. Council on Environmental Quality (CEQ or the "Council")

The Council was created by the National Environmental Policy Act, 1969 (NEPA), as the agency responsible for overseeing federal efforts to comply with NEPA. Under executive order 11514 (1970), the Council issued guidelines for the preparation of environmental impact statements. These were revised in 1973. Eventually, and as a result of Executive Order 11991, the final federal regulations for implementing NEPA were issued by the Council in 1979. These regulations are binding on all federal agencies, and provide a streamlined process which guides federal agencies in their compliance with NEPA.

4. State Historic Preservation Officer

The SHPO is a key participant in the historic preservation system and is consulted and involved at every step in the compliance process. The SHPO is responsible for a wide range of activities including supervision of the State Historic Preservation staff, ensuring that nominations are prepared and submitted to the National Register, supervision of an environmental review process to ensure that historic properties are considered in federal planning, participation in the compliance activities of federal agencies under the procedures of the Advisory Council, and supervision of comments on environmental impact statements. The SHPO is a political appointee of the governor, and the minimum requirements for the staff are that it include a professional archaeologist, historian, and architect or architectural historian. Professional qualifications for this staff are outlined in 36 CFR 61.5.

5. Land Management Agencies

Agencies such as the BLM are directed by E.O. 11593 to inventory all properties on their lands which qualify for the National Register. Considering the vast area to be surveyed, fulfillment of this requirement will take many years of survey work. Another requirement is to ensure that potentially qualifying properties are not impacted. Therefore, not only must the impacts of BLM projects be assessed but the impacts of other agency projects are, in part, their responsibility as well. Cooperation is required, but the agency responsible for the potential impacts is usually considered the lead agency responsible for complying with preservation legislation.

6. Construction Agencies

Agencies involved in construction have some of the clearest responsibilities. They must identify archaeological and historical properties subject to direct and indirect impacts, and determine the eligibility of such properties to the National Register in consultation with the SHPO and Advisory Council. These consultations and the studies undertaken to identify cultural resources should be documented in any environmental impact statement prepared on the project.

III. COMPLIANCE WITH CULTURAL RESOURCE LEGISLATION

While it is mandated by NEPA that the potential for impacts to cultural resources be considered as part of the environmental planning process for a project, the historic preservation system has developed specific procedures for implementing this requirement (Figure 1.2-2). Three general points regarding Figure 2 emphasize that historic preservation studies are required early in the environmental planning process:

- Preliminary consultation with the SHPO is required in order to determine the need for a survey.
- Intensive survey is implemented after consultation with the SHPO.
- Determination of eligibility to the National Register, determination of effect, and development of a preservation plan generally should occur by the time a Draft EIS is issued.

Once a complete inventory of the cultural resources within a project area has been assembled (which requires an intensive survey of areas of distrubance), then the federal agency must comply with the regulations established by the Advisory Council on Historic Preservation in 36 CFR 800 (Figure 1.2-3). This involves submitting the cultural resource inventory to the SHPO whose responsibility it is to determine which of the properties in the inventory are listed on or eligible for the National Register. The SHPO then determines whether the project will have any effect on National Register or Register-eligible properties. A "no effect" determination enables the project to proceed without further consultation. If the SHPO determines there will be an effect, then it is necessary to apply the criteria of "adverse effect" (36 CFR 800.3). A "no adverse effect" determination is usually possible in situations where the SHPO decides that the property that will be affected has only scientific value that may be preserved by implementation of a data recovery program. After making such a determination the SHPO forwards this opinion and relevant documentation to the Advisory Council for their comment. If the Advisory Council concurs, a data recovery program is implemented and the project is authorized to proceed.

If there is a determination of "adverse effect" by SHPO, or if the Advisory Council objects to a "no adverse effect" determination, there must be consultation between the Agency, the SHPO, and the Advisory Council. This consultation process results in a Memorandum of Agreement between the involved parties as to the measures that are to be taken to mitigate the adverse effect on cultural resources. Implementation of these measures--usually a data recovery program--is required before the project can proceed.

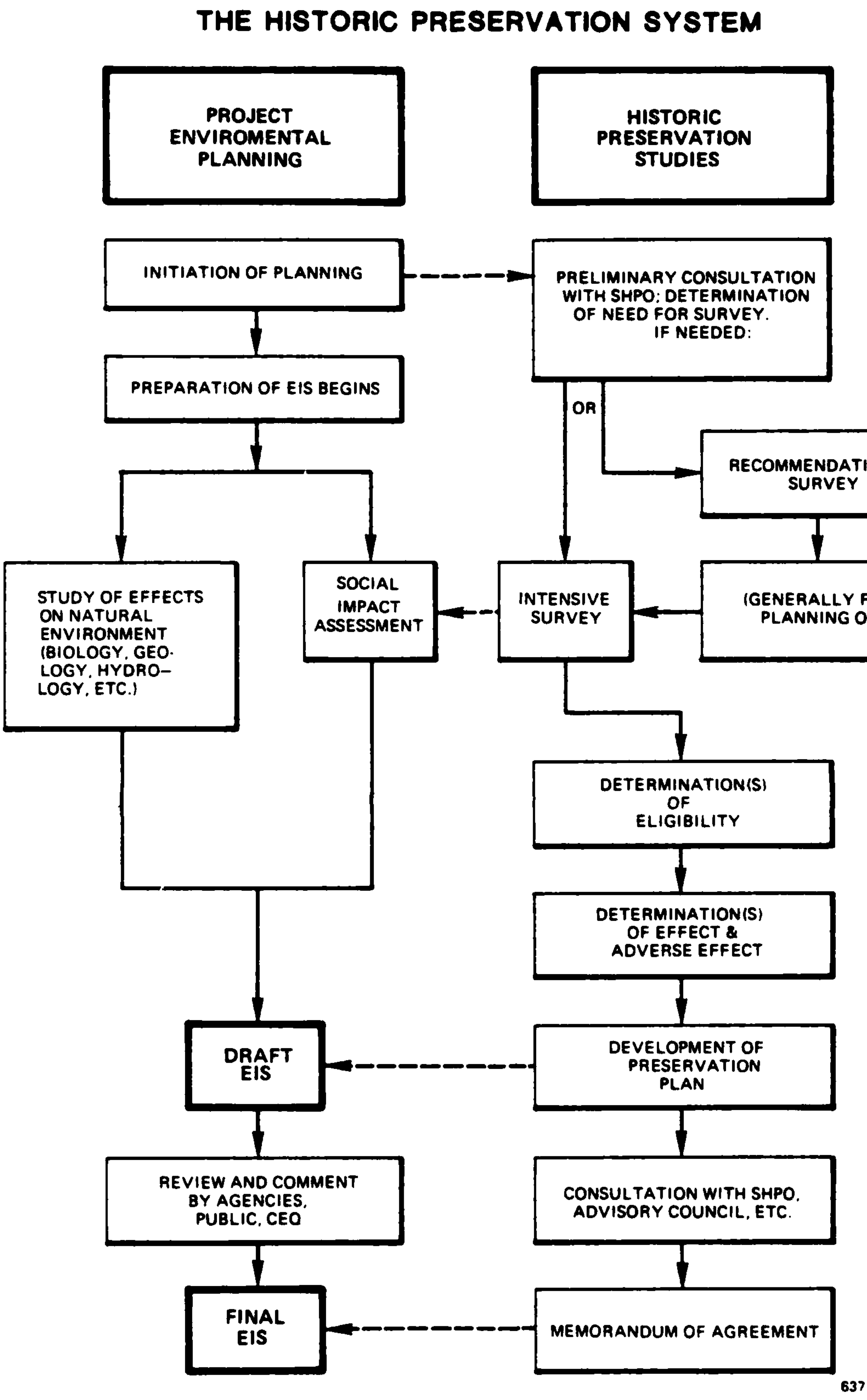

Figure 1.2-2. General relationship of historic preservation to environmental planning on a federal project.

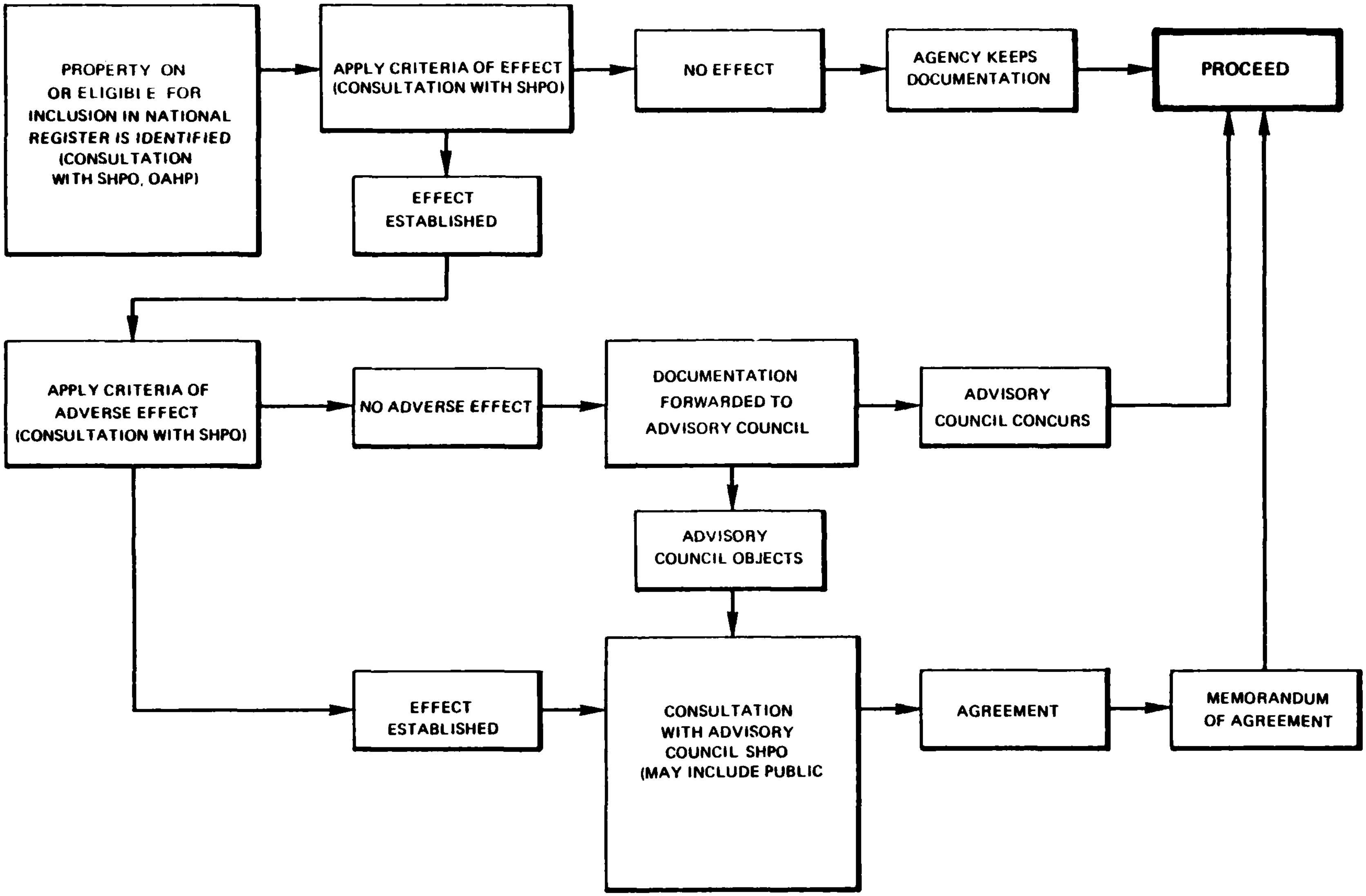

Figure 1.2-3. Procedures of the Advisory Council on Historic Preservation (36 CFR Part 800).

The consultation process required of an "adverse effect" determination is outlined in 36 CFR 800.6b. This process involves the Agency or agencies, the SHPO, and the Advisory Council as consulting parties to consider measures that could avoid, mitigate, or minimize adverse effects to cultural resources. To initiate the consultation process, the Agency is required to submit a "preliminary case report" (36 CFR 800.13b) with a request for comments to the Advisory Council. The report is also made available to the SHPO, other appropriate agencies, and the public. At the request of any of the consulting parties, an onsite inspection can be conducted. Similarly, the Advisory Council can conduct a public information meeting near the site of the undertaking where representatives of national, state, and local government, and public and private organizations, and interested citizens may receive information and express their views. After the public meetings, the consulting parties determine which are the most satisfactory alternatives, avoidance procedures, or other mitigation measures. These measures are then detailed in a proposal prepared by the Agency for inclusion in the Memorandum of Agreement, and the concurrence of the SHPO must be included. The MOA is then forwarded to the Chairman of the Advisory Council for ratification which requires a 30 day review period. At the end of the review period, notice of the ratified MOA is published in the Federal Register, and the MOA should be included in the final environmental impact statement. The MOA constitutes the comments of the Advisory Council and fulfills the Agency's requirements to comply with the legislation.

IV. THE PROGRAMMATIC MEMORANDUM OF AGREEMENT

An alternative approach to compliance is the Programmatic Memorandum of Agreement (PMOA). Because of the large scale land requirements and significant potential impacts likely to result from deployment of the M-X system during a multi-year construction period, the USAF, in consultation with the Advisory Council and the SHPO, and other concerned agencies, has sought the execution of a PMOA (Appendix A). This agreement, if implemented, will satisfactorily mitigate or avoid the adverse effects of M-X deployment on historic and cultural properties. The following procedures are followed in the development of a PMOA.

1. An official from the lead agency (in the present case the U.S. Air Force) requests of the Advisory Council the execution of a PMOA. The Executive Director of the Advisory Council determines whether a PMOA may be used and notifies the Agency Official within 30 days.

2. The PMOA is developed by the Executive Director and the Agency Official. In addition, when the Agreement will affect a particular state or states, the appropriate State Historic Preservation Officer may be a party to the consultation. When the Agreement involves issues national in scope, the President of the National Conference of State Historic Preservation Officers or designated representative may be a party to the consultation. The Executive Director may invite other parties, including other federal agencies with responsibilities which may be affected by the Agreement, to participate in the consultation and may hold a Public Information Meeting (see 800.6(b)(3) on the proposed Agreement.

3. At least 30 days prior to executing a PMOA, the Advisory Council must publish a notice of their intent in the Federal Register inviting comments. They must make copies of the proposed PMOA available to interested parties and appropriate A-95 clearinghouses.

4. Any comments received must be considered before a final version of the PMOA is ratified by the Executive Director, the Agency official, and other involved parties.

5. The signed PMOA is then forwarded to the Chairman of the Advisory Council who has 30 days to:

   a. Ratify the Agreement, at which time it will take effect.

   b. Submit the Agreement to the full Council for approval.

   c. Disapprove the Agreement.

6. Notice of an approved PMOA is published in the Federal Register. Copies should be sent to appropriate A-95 clearinghouses, should be made available to the public on request, and should be published in a Final EIS.

7. The PMOA remains in effect until revoked by any of the signatories. The Agency Official must submit an annual report on all actions taken pursuant to the PMOA.

1.3 SIGNIFICANCE OF ARCHAEOLOGICAL, HISTORICAL, AND ARCHITECTURAL RESOURCES

SCIENTIFIC SIGNIFICANCE

Cultural resources are evaluated for their potential to establish reliable generalizations about human behavior, particularly explanation of variability and change in societies and cultures. Generalizations and explanations require controlled comparison of relevant data concerning past human life. This includes such things as artifacts, settlements, food remains, and evidence of past environments. Scientific significance depends on the degree to which archaeological resources in the project or program area contain data appropriate for answering various substantive, technical, methodological, or theoretical questions. The value of these data should be determined in the regional context of the project or program and in relation to general anthropological problems.

CULTURAL SIGNIFICANCE

Cultural resources are evaluated in terms of those values consisting of the direct and indirect ways in which society at large benefits from study and preservation of cultural resources. Benefits which should be described and included are: (1) the acquisition of knowledge concerning man's past and its potential use, (2) the acquisition and preservation of objects, sites, structures, etc. for public education and enjoyment, (3) education and economic benefits from archaeological exhibits, and, (4) practical applications of scientific findings acquired through archaeological investigations.

In addition, sites of cultural significance to Native Americans are assessed for their secular or sacred value.

NATIONAL REGISTER SITES AND ELIGIBLE PROPERTIES

Cultural resources are evaluated in terms of the criteria for evaluation for inclusion on the National Register as defined in 36 CFR 60.6.

> 60.6 Criteria for evaluation
>
> The criteria applied to evaluate properties for possible inclusion in the National Register are listed below. These criteria are worded in a manner to provide for the diversity of resources. The following criteria shall be used in evaluating properties for nomination to the National Register, by the National Park Service in reviewing nominations, and for evaluating National Register eligibility of properties affected by federal agency undertakings.
>
> National Register criteria for evaluation: The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) That have yielded, or may be likely to yield, information important in prehistory or history.

Criteria considerations: Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

> (a) A religious property deriving primary significance primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.
>
> (b) A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event.

(c) A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life.

(d) A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events.

(e) A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.

(f) A property primarily commemorative in intent of design, age, tradition, or symbolic value which has become invested with its own historical significance.

(g) A property achieving significance within the past 50 years if it is of exceptional importance.

2.0 NEVADA/UTAH CULTURAL RESOURCES

2.1 NATIONAL AND STATE REGISTER PROPERTIES

The National Register of Historic Places is the nation's official list of properties worthy of preservation because of their significance in American history, architecture, archaeology, and culture.

All historic and prehistoric properties listed on or pending nomination to the National Register are shown in Figure 2.1-1. In the Nevada study area, there are currently 54 properties listed on the National Register and 4 properties pending nomination or in preparation for nomination (Tables 2.1-1 and 2.1-2). In the Utah study area, there are currently 58 properties listed in the National Register and 4 properties pending nomination (Tables 2.1-3 and 2.1-4). Utah has a State Register of Historic Places. So far, 4 sites have been listed on this register, while 1 is pending nomination (Table 2.1-5). Nevada has only recently established a State Register, and there are no entries yet.

There has been no systematic effort to make determinations of National Register eligibility for the known archaeological, historical, and architectural sites of the Nevada/Utah study region. Current and pending listings tend to include a greater proportion of historical and architectural properties than archaeological sites. Yet, these listings are neither exhaustive nor even representative of the total range of potentially eligible historical and architectural properties. Thus current National Register listings must be viewed as a small fraction of the potentially eligible properties within the study region.

The regional *sample survey*, the *initial* phase of which was implemented in Summer 1980, will provide a regional context within which to evaluate the scientific significance of cultural resources that will be directly and indirectly impacted by project implementation. Other studies, such as the Native American regional surveys, will provide essential information for assessing the cultural significance of these resources. Thus, when preconstruction studies are implemented, the cultural resources encountered will be assessed as to their National Register eligibility under the procedures outlined in the PMOA (Appendix A).

2.2 ARCHAEOLOGICAL RESOURCES

Information about the aboriginal groups that inhabited the Nevada/Utah study region for the last 11,000 years is presented in this section. As introductory material, the history of previous research is reviewed, then the regional culture history and a list of current research problems are reviewed. Finally, existing data from the Great Basin study region is examined in some detail.

REVIEW OF PREVIOUS RESEARCH (2.2.1)

Previous archaeological research in central Nevada has involved both survey and excavation, but since few areas have been intensively studied, the existing data base employed in this study contains numerous unavoidable gaps. Intensive sample surveys have been carried out in Big Smoky Valley (Thomas, 1977), the Reese River Valley (Thomas, 1973; Thomas and Bettinger, 1976), and Grass Valley (Clewlow and

Table 2.1-1. Entries in the National Register of Historic Places within the Nevada study area. (Page 1 of 2)

Key	Name	Type of Entry	County
1	Fort Ruby[1]	Site	White Pine
2	Leonard Rock Shelter[1]	Archaeological Site	Pershing
3	Austin	District	Lander
4	Berlin	District	Nye
5	Cold Springs	Site	Churchill
6	Grimes Point	Archaeological Site	Churchill
7	Las Vegas Mormon Fort	Site	Clark
8	Fort Schellbourne	Site	White Pine
9	Ward Charcoal Ovens	Site	White Pine
10	Bristol Wells Town Site	Site	Lincoln
11	Belmont	District	Nye
12	Eureka	District	Eureka
13	Caliente R.R. Depot	Building	Lincoln
14	Aurora	District	Mineral
15	Potosi	Site	Clark
16	James Wild Horse Trap	Site	Nye
17	Tybo Charcoal Kilns	Structures	Nye
18	Tim Springs Petroglyphs	Archaeological Site	Clark
19	Mormon Well Spring	Site	Clark
20	Corn Creek Campsite	Site	Clark
21	Sheep Mountain Range Archaeological District	District	Clark
22	Hidden Forest Cabin	Building	Clark
23	Ruby Valley Pony Express Station	Building	Elko
24	Rhodes Cabin (No. 19)	Building	White Pine
25	Lehman Orchard and Aqueduct (No. 22)	Site	White Pine
26	Stillwater Marsh	Site	Churchill
27	Black Canyon Petroglyphs	District	Lincoln
28	Kyle Ranch	Site	Clark
29	Humboldt Cave	Archaeological Site	Churchill

Table 2.1-1. Entries in the National Register of Historic Places within the Nevada study area. (Page 2 of 2)

Key	Name	Type of Entry	County
30	Sandstone Ranch	District	Clark
31	Sunshine Locality	Archaeological District	White Pine
32	Lincoln County Courthouse	Building	Lincoln
33	Cold Springs Pony Express	Site	Churchill
34	White River Narrows Archaeological District	Archaeological Site	Lincoln
35	Las Vegas Springs	Site	Clark
36	Sloan Petroglyphs	Archaeological Site	Clark
37	Westside School	Building	Clark
38	Tule Springs (aka Floyd Lamb State Park)	Archaeological Site	Clark
39	Gatecliff Rockshelter	Archaeological Site	Nye
40	Mizpah Hotel	Building	Nye
41	Bunkerville Historic District	District	Clark
42	Pueblo Grande de Nevada	Site	Clark (Lake Mead area)
43	Emigrant's Trail	Site	Nye
44	Blacksmith Shop	Building	Clark
45	Las Vegas Wash	Archaeological District	Clark
46	Mesquite House	Building	Clark
47	Archaeological Sites AZ-F:5:l; AZ-F:5:2	Sites	Clark
48	Tule Springs Divorce Ranch	Buildings	Clark
49	Hoover Dam	Buildings/Structure	Clark
50	Lahontan Dam and Power Plant	Structure	Churchill
51	Nevada-California Power Company Substation	Building	Nye
52	Carson River Diversion Dam	Structure	Churchill
53	Consolidated Cortez Silver Company Mine and Mill	Buildings	Eureka
54	Sand Springs Station	Building	Churchill

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[1]National Historic Landmark

Table 2.1-2. National register nominations currently in preparation in the Nevada study area.

Key	Name	Type of Entry	County
A	Pine Valley Archaeological District	Archaeologic District	Eureka
B	Goldfield Hotel	Building	Esmeralda
C	Desert Queen Mine	Structure	Nye
D	Delamar	Historic District	Lincoln

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LEGEND

NATIONAL REGISTER PROPERTIES WITHIN THE NEVADA STUDY AREA

1 FORT RUBY*
2 LEONARD ROCK SHELTER ∴
3 AUSTIN DISTRICT
4 BERLIN DISTRICT
5 COLD SPRINGS **
6 GRIME'S POINT **
7 LAS VEGAS MORMON FORT
8 FORT SCHELLBOURNE
9 WARD CHARCOAL OVENS
10 BRISTOL WELLS TOWN SITE
11 BELMONT DISTRICT
12 EUREKA DISTRICT
13 CALIENTE RAILROAD DEPOT
14 AURORA DISTRICT **
15 POTOSI **
16 JAMES WILD HORSE TRAP
17 TYBO CHARCOAL KILNS
18 TIM SPRINGS PETROGLYPHS
19 MORMON WELL SPRING
20 CORN CREEK CAMPSITE
21 SHEEP MOUNTAIN RANGE ARCHAEOLOGICAL DISTRICT
22 HIDDEN FOREST CABIN
23 RUBY VALLEY PONY EXPRESS STATION
24 RHODES CABIN (NO 19)
25 LEHMAN ORCHARD AND AQUEDUCT (NO 22)
26 STILLWATER MARSH **
27 BLACK CANYON PETROGLYPHS
28 KYLE RANCH
29 HUMBLODT CAVE **
30 SANDSTONE RANCH
31 SUNSHINE LOCALITY
32 LINCOLN COUNTY COURTHOUSE
33 COLD SPRINGS PONY EXPRESS STATION
34 WHITE RIVER NARROWS ARCHAEOLOGICAL DISTRICT
35 LAS VEGAS SPRINGS
36 SLOAN PETROGLYPHS **
37 WESTSIDE SCHOOL
38 TULE SPRINGS (aka FLOYD LAMB STATE PARK)
39 GATECLIFF ROCKSHELTER
40 MIZPAH HOTEL
41 BUNKERVILLE HISTORICAL DISTRICT
42 PUEBLO GRANDE DE NEVADA
43 EMIGRANT'S TRAIL **
44 BLACKSMITH'S SHOP
45 LAS VEGAS WASH ARCHAEOLOGIC DISTRICT **
46 MESQUITE HOUSE
47 ARCHAEOLOGIC SITES AZ F 5 1 AZ F 5 2
48 TULE SPRINGS DIVORCE RANCH
49 HOOVER DAM
50 LAHONTAN DAM AND POWER PLANT
51 NEVADA CALIFORNIA POWER COMPANY SUB STATION
52 CARSON RIVER DIVERSION DAM **
53 CONSOLIDATED CORTEZ SILVER COMPANY MINE AND MILL
54 SAND SPRINGS PONY EXPRESS STATION **
NA PINE VALLEY ARCHAEOLOGIC DISTRICT
NB GOLDFIELD HOTEL
NC DESERT QUEEN MINE
ND DELAMAR DISTRICT

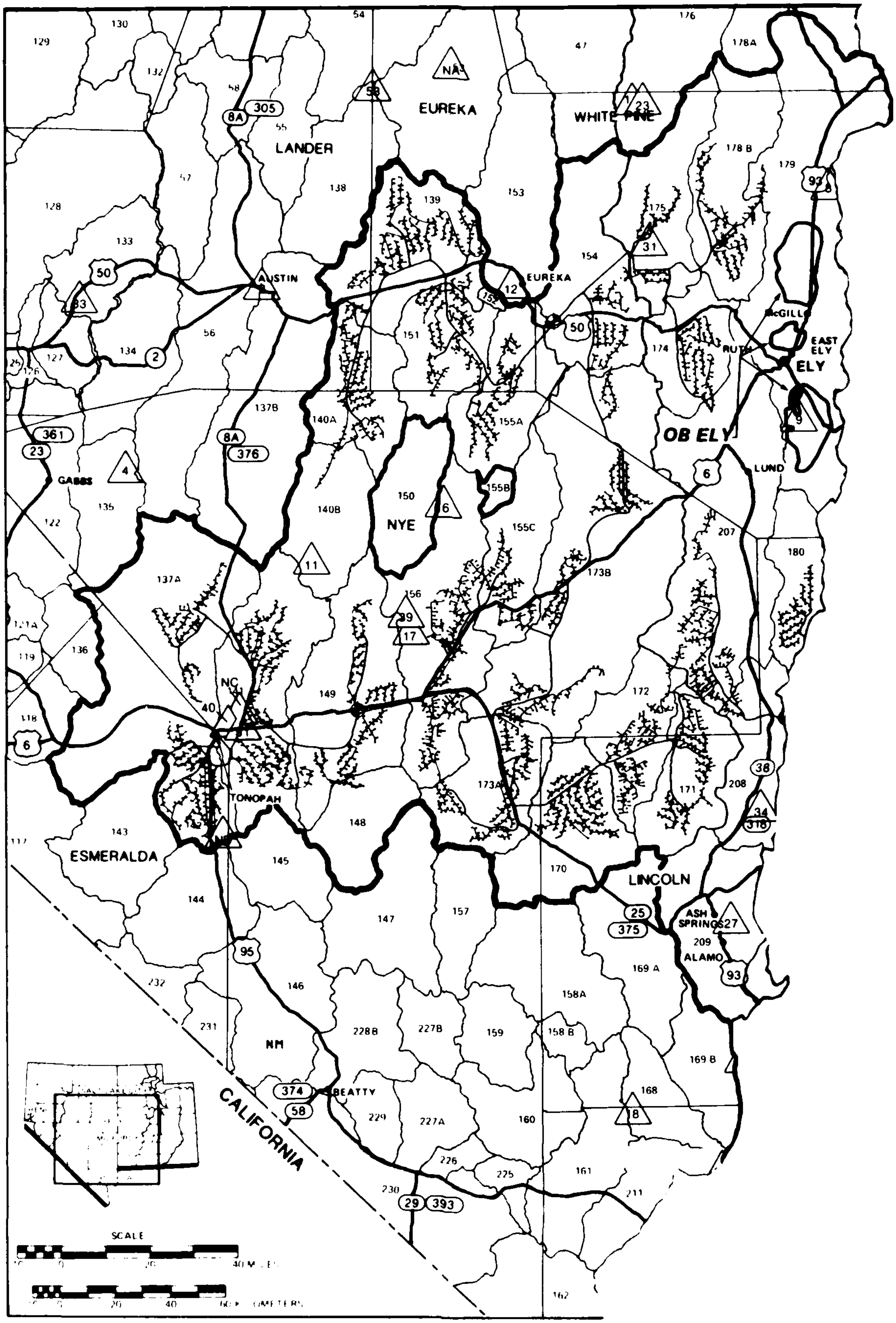
* DENOTES NATIONAL HISTORIC LANDMARK (NEVADA)
** DENOTES PROPERTY NOT ILLUSTRATED, OUTSIDE OF NEVADA STUDY AREA

NATIONAL REGISTER PROPERTIES WITHIN THE UTAH STUDY AREA

55 TINTIC MINING DISTRICT MULTIPLE RESOURCE AREA
56 ARCHAEOLOGICAL SITE 42MD300
57 LONG FLAT SITE 42IN330
58 EDWIN ROBERT BOOTH HOUSE **
59 BEAVER COUNTY COURTHOUSE
60 THOMAS FRAZER HOUSE
61 FORT CAMERON
62 WILDHORSE CANYON OBSIDIAN QUARRY
63 GEORGE H WOOD HOUSE
64 OLD IRONTOWN
65 GOLD SPRING
66 PAROWAN ROCK CHURCH
67 JESSE N SMITH HOUSE
68 PAROWAN GAP PETROGLYPHS
69 GEORGE CARTER WHITEMORE MANSION **
70 NEPHI MOUNDS **
71 COVE FORT
72 TOPAZ WAR RELOCATION CENTER SITE
73 FORT DESERET
74 UTAH TERRITORIAL CAPITOL
75 GUNNISON MASSACRE SITE
76 PHARO VILLAGE
77 LINCOLN HIGHWAY BRIDGE *
78 IOSEPA CEMETERY **
79 E T BENSON MILL **
80 BONNEVILLE SALT FLATS RACE TRACK **
81 WENDOVER AIR FORCE BASE **
82 MOUNTAIN MEADOWS HISTORIC SITE
83 HURRICANE CANAL **
84 PINE VALLEY CHAPEL AND TITHING OFFICE **
85 DESERT TELEGRAPH AND POST OFFICE**
86 JACOB HAMBLIN HOUSE **
87 WELLS FARGO AND COMPANY EXPRESS BUILDING **
88 CABLE MOUNTAIN DRAW WORKS WORKS **
89 THOMAS JUDD HOUSE **
90 OLD WASHINGTON COUNTY COURTHOUSE **
91 ST GEORGE TABERNACLE **
92 ST. GEORGE TEMPLE**
93 BRIGHAM YOUNG WINTER HOME AND OFFICE**
94 WALLACE BLAKE HOUSE **
95 ROBERT D COVINGTON HOUSE **
96 WASHINGTON COTTON FACTORY **
97 FORT PEARCE **
98 DR GEORGE FENNEMORE HOUSE
99 DUCKWORTH GRINSHAW HOUSE
100 DAVID MUIR HOUSE
101 HARRIET S SHEPERD HOUSE
102 CHARLES DENNIS WHITE HOUSE
103 PARAGONAH SITE
104 FISH SPRINGS CAVES ARCHAEOLOGIC DISTRICT
105 TINTIC STANDARD REDUCTION MILL
106 SOLDIER CREEK KILNS **
107 GAPA LAUNCH SITE AND BLOCKHOUSE
108 DIXIE COLLEGE MAIN BUILDING**
109 FORT HARMONY
110 NAEGLE WINERY **
111 WASHINGTON RELIEF SOCIETY HALL **
112 WOODWARD SCHOOL **
UA WENDOVER **
UB GERMAN VILLAGE *
UC SAND CLIFF SIGNATURE
UD PAROWAN 3rd WARD BUILDING

* EXACT LOCATION UNKNOWN SITE IS IN DUGWAY PROVING GROUNDS (UTAH)
** DENOTES PROPERTY NOT ILLUSTRATED, OUTSIDE OF UTAH STUDY AREA

4749-B



4749-B 3230-D-1

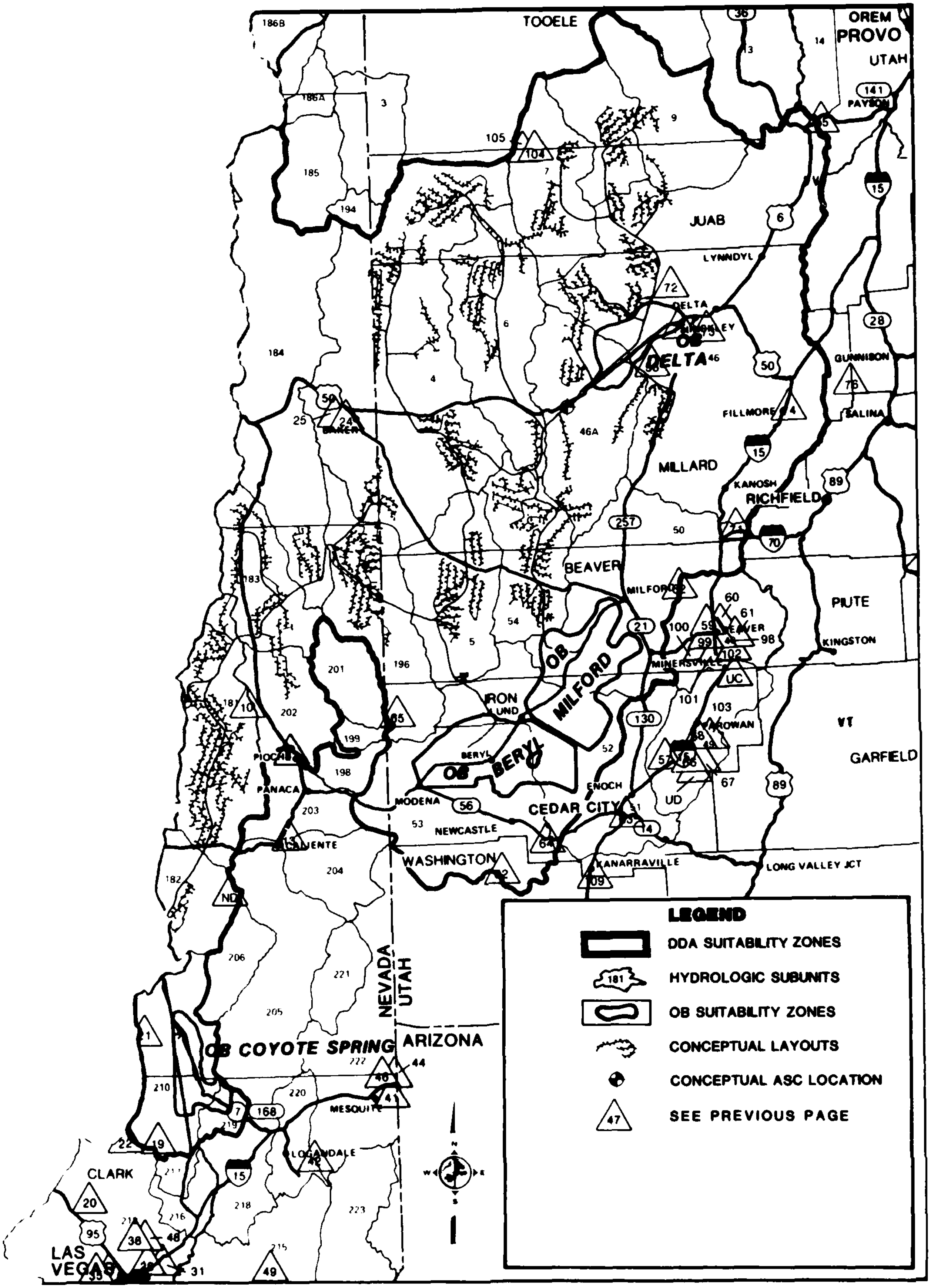


Figure 2.1-1. Archaeological and historical sites currently listed in the National Register of Historic Places and the Proposed Action conceptual project layout.

4749-B 3230-D-1

Table 2.1-3. Entries in the National Register of Historic Places within the Utah study area (Page 1 of 3).

Key	Name	Type of Entry	County
55	Tintic Mining District Multiple Resource Area	District	Juab
56	Archaeological Site (No. 42MD300)	Archaeological Site	Millard
57	Long Flat Site (42 In 330)	Site	Iron
58	Edwin Robert Booth House	Building	Juab
59	Beaver County Courthouse	Building	Beaver
60	Thomas Frazer House	Building	Beaver
61	Fort Cameron	Site (buildings)	Beaver
62	Wildhorse Canyon Obsidian Quarry	Site	Beaver
63	George H. Wood House	Building	Iron
64	Old Irontown	Site (buildings)	Iron
65	Gold Spring	Site	Iron
66	Parowan Rock Church	Building	Iron
67	Jesse N. Smith House	Building	Iron
68	Parowan Gap Petroglyphs	Archaeological Site	Iron
69	George Carter Whitemore Mansion	Building	Juab
70	Nephi Mounds	Archaeological Site	Juab
71	Cove Fort	Site (building)	Millard
72	Topaz War Relocation Center Site	Site (buildings)	Millard
73	Fort Deseret	Site	Millard
74	Utah Territorial Capitol	Building	Millard
75	Gunnison Massacre Site	Site	Millard
76	Pharo Village	Archaeological Site	Millard
77	Lincoln Highway Bridge	Object	Tooele
78	Iosepa Settlement Cemetery	Site	Tooele
79	Benson E. T. Mill	Buildings	Tooele
80	Bonneville Salt Flats Race Track	Race Track	Tooele

Table 2.1-3. Entries in the National Register of Historic Places within the Utah study area (Page 2 of 3).

Key	Name	Type of Entry	County
81	Wendover AFB	Buildings	Tooele
82	Mountain Meadows Historic Site	Site	Washington
83	Hurricane Canal	Object	Washington
84	Pine Valley Chapel and Tithing Office	Buildings	Washington
85	Deseret Telegraph and Post Office	Buildings	Washington
86	Jacob Hamblin House	Buildings	Washington
87	Wells Fargo and Co. Express Building	Building	Washington
88	Cable Mountain Draw Works	Buildings	Washington
89	Thomas Judd House	Building	Washington
90	Old Washington County Courthouse	Building	Washington
91	St. George Tabernacle	Buildings	Washington
92	St. George Temple	Building	Washington
93	Brigham Young Winter Home and Office	Buildings	Washington
94	Wallace Blake House	Building	Washington
95	Robert D. Covington House	Building	Washington
96	Washington Cotton Factory	Building	Washington
97	Fort Pearce	Site	Washington
98	Dr. George Fennemore House	Building	Beaver
99	Duckworth Grinshaw House	Building	Beaver
100	David Muir House	Building	Beaver
101	Harriet S. Sheperd House	Building	Beaver
102	Charles Dennis White House	Building	Beaver
103	Paragonah Site	Archaeological Site	Iron
104	Fish Springs Caves	Archaeological District	Juab
105	Tintic Standard Reduction Mill	Building	Juab
106	Soldier Creek Kilns	Objects	Tooele

Table 2.1-3. Entries in the National Register of Historic Places within the Utah study area (Page 3 of 3).

Key	Name	Type of Entry	County
107	Gapa Launch Site and Blockhouse	Buildings	Tooele
108	Dixie College Main Building	Building	Washington
109	Fort Harmony	Site	Washington
110	Naegle Winery	Site	Washington
111	Washington Relief Society Hall	Building	Washington
112	Woodward School	Building	Washington

T637/9-22-81/F

Table 2.1-4. National Register nominations currently in preparation in the Utah study area.

Key	Name	Type of Entry	Location
A	Wendover	Site	Toelle County
B	German Village	Site	Toelle County
C	Sand Cliff Signature	Site	Iron County
D	Parowan 3rd Ward	Building	Iron County

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Table 2.1-5. Entries on the Utah State Register within the study area. (Page 1 of 2)

KEY	NAME	TYPE OF ENTRY	LOCATION
1	Marcus L. Sheperd Home	Building	Beaver
	Williams Hotel	Building	Beaver
2	George Lamar Wood Cabin	Building	Iron
3	Joseph S. Hunter Home	Building	Iron
4	Old Main and Old Administration Building, Southern Utah State College	Building	Iron
5	UPRR Depot	Building	Iron
6	Median Village	Archaeological Site	Iron
7	Pioneer Iron Works Blast Furnace Site	Site	Iron
8	Parowan Third Ward Meetinghouse	Building	Iron
9	Deseret School	Building	Millard
10	Filmore Rock Schoolhouse	Building	Millard
11	Stevens Home, Holden	Building	Millard
12	Edward Partridge Jr. Home	Building	Millard
13	Delta Sugar Factory Warehouse	Building	Millard
14	Delta Sugar Factory Clubhouse	Building	Millard
15	Burtner Dam Ruins, Delta Vicinity	Building	Millard
16	Gunnison Bend Dam and Reservoir, Lower Sevier River	Objects	Millard
17	USRR Bridge across Sevier River	Object	Millard
18	McCullough Log House and Post Office	Buildings	Millard
19	Millard Academy	Building	Millard
20	Woodrow Hall	Building	Millard

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Table 2.1.5. Entries on the Utah State Register within the study area. (Page 2 of 2)

KEY	NAME	TYPE OF ENTRY	LOCATION
21	Deseret Petrographs	Archaeological Site	Millard
22	Black Rock Springs Petroglyphs	Archaeological Site	Millard
23	Meadow LDS Church	Building	Millard
24	Fillmore American Legion Hall	Building	Millard
25	North Sevier Lake, Paleo Indian Site,42MD300[1]	Archaeological Site	Millard
26	Ophir Town Hall and Fire Station	Building	Tooele
27	Tooele County Courthouse	Building	Tooele
28	David E. Davis Home	Building	Tooele
29	John Sharp Home	Building	Tooele
30	Naegle Winery	Buildings	Washington
31	Washington Ward Chapel	Building	Washington
32	Fort Harmony-Peter's Leap Historic District	District	Washington
33	Stirling Home	Building	Washington
34	Grafton Church	Building	Washington
35	Petet Neilson Home	Building]	Washintgon
36	Virgin River Drainage Archaeological Area	Archaeological Site	Washington
37	Alexander F. McDonald Home	Building	Washington
38	Cannan Gap Pictographs	Archaeological Site	Washington
39	Bloomington Pictorgraphs	Archaeological Site	Washington
40	Toquerville Church and Relief Society Hall	Buildings	Washington
41	Goldsborough Hotel	Building	Juab
42	Levan LDS Church	Building	Juab

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[1]Pending nomination to the Utah State Register.

Rusco, 1972), along a proposed power line in east central Nevada (Fowler et al., 1978), around all springs in the BLM Tonopah District (McGonagle and Waski, 1978), and on portions of Nellis Air Force Range (Bergin, et al. 1979). Nonintensive survey has been completed in east central (Fowler, 1968a) and southeastern Nevada (Fowler, Madsen, and Hattori, 1973). Excavations in caves and rock shelters have provided important information on chronology, material culture, and subsistence remains (e.g., Bryan, 1972; Busby, 1977; Busby and Seck, 1977; Fowler, 1968b; Gruhn, 1979; Thomas, 1976; Wheeler, 1973). Several studies of petroglyph sites have also been completed (Heizer and Baumhoff, 1962; T. Thomas, 1976). Most recent work has been in the form of small-scale clearance surveys conducted on BLM lands. These studies have substantially increased the site inventory for Nevada.

Only a limited amount of archaeological research has been conducted in western Utah. Major excavations have been completed in two caves in northwestern Utah (Aikens, 1970; Jennings, 1957) and Dalley (1976) has reported on a program of survey and excavation in that area. Intensive samply survey and testing has been conducted in the Deep Creek Mountains (Lindsay and Sargent, 1977; Sargent, 1978) and a sample survey was completed along a proposed transmission line route in west central Utah (Fowler et al., 1978). The BLM implemented a small sample survey in Dugway Valley (Cartwright, 1980) and the Utah Division of State History investigated four caves and an open site in adjacent Fish Springs Valley (Madsen, 1979a). Early nonintensive surface surveys were also carried out in western Utah (Anderson, 1962; Malouf, Dibble, and Smith, 1940; Rudy, 1953) and excavations were conducted at the Garrison site, a large open site near the Nevada/Utah border (Taylor, 1954). Small-scale clearance surveys on BLM land have been an important recent source of new archaeological data in Utah as well.

Most synthetic treatments of the prehistory of western Utah have relied principally upon the data from excavations at a limited number of sites (Madsen and Berry, 1975; Madsen, 1979a). Due to the general lack of data from large-scale archaeological surveys, reconstruction of regional settlement and subsistence patterns has been hampered.

CULTURAL HISTORY (2.2.2)

Prehistoric Resource Base

The prehistoric resource base has been well established within a culture history framework for the Great Basin (Hester, 1973; Aikens 1978a; Heizer and Hester, 1978). Four broad periods are defined: an early, pre-Archaic or Paleo-Indian period, before ca. 8000 BP; the Western Archaic period, from possibly 8000 BP to AD 500; the Formative period, from possibly AD 500-1200; the Post-Formative or Late-Archaic period from AD 500 to historic times; an Historic period, since AD 1850. Recent research, e.g., Thomas (1970), demonstrates regional differentiation of temporal systematics across the Great Basin. The implications of this differentiation need to be addressed for the M-X project area.

Pre-Archaic. There is no well supported evidence of human occupation of the Great Basin earlier than the end of the Pleistocene (Aikens, 1978a), although there are claims of extreme antiquity for occupation (Hester, 1973). Clovis points and other fluted points are widespread as surface finds, dating to ca. 9000 BC (Aikens, 1978a:147). These may indicate a big game hunting tradition (Warren and Ranere, 1968), although the evidence is not conclusive. Early finds are generally located along post-Pleistocene beachlines, and Hester (1973) and others have described a "Western Pluvial Lakes Tradition" as an early lacustrine-adapted pattern. The tradition is widespread and many names are applied throughout the Great Basin: San Dieguito, Hascomat, and others. Although similar, the assemblages are different enough that it may be inappropriate to lump them under one term (Warren and Ranere, 1968). All the early materials are surface finds, making chronological or other correlations only speculative. The dates generally given are 9000 BC to 6000 BC (11,000 BP to 8000 BP), based upon comparisons with datable materials from other areas (Hester 1973; Aikens 1978a). In short, for the pre-Archaic period, fluted points and lithic assemblages, sometimes called "Paleo-Indian," have been observed as surface finds centering on the shorelines of pluvial lake beds. These peoples may have focused on big game and foraging of lakeside resources. Temporal dimensions, cultural affiliations and relationships are poorly understood.

Western Archaic. According to the ethnographic model (Steward, 1938) and the "Desert Culture" concept (Jennings, 1964; Jennings and Norbeck, 1955), the typical Great Basin/Western Archaic pattern stresses movement from mountains to valley bottoms to mountains in a yearly cycle to take advantage of resources. The Western Archaic pattern is characterized by broad-spectrum hunting and gathering by small groups of people who moved frequently following the seasonal and geographical distributions of food resources (Aikens, 1978b:72). In some areas, such as marshes, and in some time periods, abundant, localized "key resources" allowed more sedentary occupations. This may be a function of climatic change, as postulated by Jennings (1957) and demonstrated in the Fort Rock area by Fagan (1974).

Recent studies, however, reveal a great deal of variability from region to region, and temporally, in the Great Basin, as an adaptive response to diverse microenvironments (Adovasio and Fry, 1972; Bettinger, 1978). Studies of the subsistence and settlement systems in specific valleys have revealed specializations of local subsistence patterns to the local environment. In the Reese River Valley, for example, Thomas (1973) found a pattern very similar to the Desert Culture/Western Archaic model for all time periods. Owens Valley (Bettinger, 1977) and Surprise Valley (O'Connell, 1975), however, present a very different pattern, with a series of large semi-permanent or permanent base camps located on the valley floors. Resources could be obtained in the vicinity and brought back to the base camp, rather than moving the base camp to the resources. Changes in this basic pattern were observed through time in these valleys as well. The high degree of variability makes generalizations about subsistence and settlement difficult beyond an individual valley.

Formative. Formative groups include the Fremont and Sevier of the eastern Great Basin, and the Virgin River Anasazi who occupied the Virgin and Muddy River bottomlands in southern Nevada and Utah.

Traditionally, Formative groups are those dependant upon horticulture and the gathering of wild resources. The Fremont inhabited parts of the eastern Great Basin from ca. AD 400 -AD 1200, although these occupations are not well defined. The traditional view of the Fremont (Marwitt, 1970) is of a cultural tradition dependent upon horticulture and the gathering of wild resources. The settlement pattern is for centrally-based horticultural, "Puebloid" villages with various temporary camps for seasonal collecting. The villages might be inhabited for years at a time. The

Fremont and Sevier peoples exploited areas from the valley floors to the upper reaches of the pinyon-juniper zone (Simms, 1979).

Madsen (1979b), however, argues this generalization masks a great diversity in settlement and subsistence patterns. He suggests Sevier groups primarily lived near marshes, and procured the bulk of their diet from them and utilized corn only as a dietary supplement. The environment in marshy areas may have been abundant enough to sustain the sedentary villages which are in other areas characteristic of horticultural peoples. In contrast, the Fremont of the Colorado Plateau lived near streams and relied heavily on cultivated crops. Two, or possibly three, cultural groups are defined (Madsen, 1979b): the Sevier, in the eastern Great Basin, are primarily hunters and gatherers; the Fremont are Colorado Plateau agriculturalists; and there may also be an unnamed Plains-derived culture north of the other two.

The Virgin Branch Anasazi occupied the Virgin River Drainage, including the Muddy River and Las Vegas drainages during the formative period (AD 500-1150). The Anasazi were centrally-based, sedentary or semi-sedentary horticulturalists who occupied villages in well-watered valleys. In pursuit of wild plants and game and trade, they also maintained outlying camps found throughout the plateaus of southwestern Utah and into the northeastern to central Mojave Desert.

In the early stage (AD 500-900), the Virgin Branch was thinly scattered and generally similar in architecture and artifacts to the Kayenta region to the east. During the Pueblo phases (AD 900-1150) artifacts, architecture, and village patterns took on a distinctive character, even though there remained social interaction and a common heritage between the two groups (Shutler, 1961; Lyneis, 1980; Aikens, 1966).

Post Formative or Late-Archaic. The Late-Archaic is characterized by exploitation of the full range of ecozones in some areas, with the focus upon "key resources" in others, as in the Western Archaic pattern. In the Sevier area, the Late-Archaic pattern may be coexistent with, and successive to, the Sevier culture. Madsen (1975) suggests that the Fremont and the Shoshoni occupied the same Utah-Nevada border areas for 1000-2000 years. Resource competition may have been a factor in the disappearance of the Fremont. On the periphery of the Great Basin some Numic speaking groups contined a pattern of adaption to lacustrine or riverine resources, e.g., at Walker and Pyramid lakes.

KEY RESEARCH PROBLEMS (2.2.3)

The nature of the relationship between key research problems and the environmental impact assessment process requires a brief evaluation. Two principal factors mandate the consideration of research problems. First is the legal requirement that the significance of all historic properties must be evaluated in order to determine whether such properties are eligible for nomination to the National Register of Historic Places. An important significance criterion is the potential "to yield information significant to history or prehistory (36 CFR 60.6d)." Adequate evaluation of this criterion requires a careful consideration of the current status of both scientific method and knowledge of the local and regional setting in which a historic property exists. Second, employment of the most current method and theory has the potential to increase the efficiency of the impact assessment process. This is especially apparent in the present situation where there has been a minimum of previous research within the very large potential impact area that must be evaluated. Use of a mathematically based sampling design in order to develop a data base from which predictions can be made about the nature and distribution of cultural resources in unstudied areas should lead to significant cost savings while ensuring defensible results. In summary, consideration of legal requirements and overall efficiency in the impact assessment process mandates the incorporation of the most current method, theory, and regional knowledge as an integral part of the process.

This is an early phase in the process of evaluating potential impacts of the M-X project on cultural resources, and the principal methods for obtaining new data has been the implementation of a regional sample survey of approximately 100 sq mi (260 sq km) within the Nevada/Utah study area. Therefore, the research problems considered here are those that are judged most directly relevant to this particular project area and phase. Three broad types of research problems are defined and more specific topics within these categories are discussed. The nature of previous research in these problem areas is briefly reviewed.

Methodological Questions

Two methodological questions of central importance to the present project are considered. First, the question of using a program of intensive sample survey to evaluate the archaeological resource base of a large region. Binford (1964) was an early advocate of the use of sampling theory for efficiently gathering information about the archaeological resources present within a region. Significant advances in the development of archaeological sampling theory have ensued (e.g., Mueller, 1974, 1975; Plog, 1976), and sample surveys are now commonplace. Within the Great Basin systematic sample surveys have tended to be implemented in a relatively restricted area such as a portion of a valley (Thomas, 1969, 1973) or part of a mountain range (Lindsay and Sargent, 1977), though a large area on Nellis Air Force Range was the study area during a recent project by University of Nevada, Las Vegas (Bergin et al., 1979). The M-X study area significantly exceeds previous Great Basin study areas in size, therefore a phased sampling program has been developed. The initial phase, implemented in 1980, provides a data base that allows to some extent identification, assessment, and comparison of the subregions that exist within this large study area. The principal goals of this initial phase were a preliminary assessment of the nature, density, and distribution of archaeological resources within the entire study area, and the formulation of more sophisticated sampling strata and techniques to allow implementation of a second-phase survey that is even more efficient.

A second and closely related problem involves the development of appropriate methods of field observation and data recording in order to minimize the effects of unwanted variability that can arise during the field phase of such a large-scale project. Some methods for controlling this variability are discussed by others (Plog, Plog, and Wait, 1978; Schiffer, Sullivan, and Klinger, 1978), and additional methods have been incorporated into the design of this project. The field recording forms and manual, the conduct of pre-fieldwork orientation sessions on the rationale and procedures for using standardized observational techniques, and controlling for such variability during the analysis phase of the project are a few of the methods that were developed to deal with this problem.

Research Problems Specific to the Great Basin

A number of substantive problems specific to the Great Basin study region are discussed here, and their relevance to this phase of the M-X study is established. A substantive problem that has been the focus of a great deal of recent archaeological research in the Great Basin is the nature of past settlement-subsistence systems and their change through time. Much of this research has drawn heavily on the ethnographic work of Julian Steward (1938). Jennings (1957) used Steward's work and results from his own excavations as principal sources in developing his Desert Culture concept. Thomas (1973), on the other hand, used archaeological data to test the hypothesis that the general settlement-subsistence pattern described by Steward for Reese River Valley was operative in prehistoric times as well. Thomas concluded that such a pattern was indicated archaeologically at least since about 2500 B.C. Other recent work has documented variability in settlement-subsistence patterns in local areas through time (Bettinger, 1977; Madsen and Berry, 1975; O'Connell, 1975) and between regions (Bettinger, 1978). In the southern and eastern portions of the present study area, agriculture provided at least part of the subsistence base in late prehistoric times. In the eastern Great Basin the reasons for the shifts from hunting-gathering to partial dependence on cultigens and then back to hunting-gathering is poorly understood. A number of hypotheses and proposed approaches to this problem continue to be discussed Aikens, 1979; Madsen, 1979b; Marwitt, 1979; Winter, 1976). The implementation of a large scale regional sampling program within the M-X study area will contribute significantly to the development of a data base that will facilitate the evaluation of existing hypotheses regarding settlement-subsistence systems as well as the formulation of new hypotheses. As our understanding of past settlement-subsistence systems increases, our ability to evaluate the significance of sites as well as to predict the general locations where particular types of sites can be expected to occur should also increase.

A question that has received much attention by Great Basin anthropologists and that can be expected to be of particular interest to Native American groups is the question of Shoshonean origins. In the past, this question has been addressed primarily from a linguistic perspective with most interpretations favoring an expansion from the Death Valley area out into the Great Basin around A.D. 1000 (e.g. Fowler, 1972; Goss, 1968; Miller, 1966). An alternative argument favoring *in situ* development of Great Basin linguistic groups has recently been proposed (Goss, 1968), however Madsen (1975) is one of the few researchers to address this problem with archaeological data as the principal line of evidence. The present project should provide an expanded archaeological data base that should allow further exploration of this problem from an archaeological perspective.

General Anthropological Questions

Recently a great deal of attention has been directed toward developing predictive models regarding hunter-gatherer settlement-subsistence systems (e.g., Jochim, 1976; Perlman, 1976; Winterhalder, 1 "7). Such models do not require archaeological data to generate predicted archaeological patterns. Rather, they utilize general principles drawn from the ethnographic literature or employ principles such as economic optimization or optimal foraging to generate these predictions. The present project provides an opportunity for refinement of such modeling techniques. The concommitant implementation of a large scale regional survey will provide a regional data base with which to evaluate the accuracy of the predictions of these models. Use of the model to help structure field surveys has the potential of greatly increasing the efficiency of the field survey program. A predictive model based on behavioral principles would also have utility in evaluating the significance of the archaeological resources present in the study area.

EXISTING DATA REVIEW (2.2.4)

This section consists of three subsections. First the existing data is described and some of the biases inherent in it are evaluated. Then the inventory of archaeological sites from some 77 hydrologic subunits in the Nevada/Utah are used to explore regional level patterns in the existing data base. The third section uses only a portion of the existing data in order to make some preliminary evaluations of site density and distribution in a portion of the study region. These data are from a regional sample survey conducted recently on Nellis Air Force Range. This was the largest systematic sample to have been conducted in the Great Basin prior to the M-X regional sample survey of Summer 1980, and thus represents an especially valuable data base.

The Archaeological Data Base (2.2.4.1)

The principal data sources for the discussion that follows have been the existing site records on file with the Nevada State Museum, the Archaeological Research Center of the University of Nevada, Las Vegas, the Desert Research Institute, and the Utah Division of State History. Additional data have been obtained from BLM offices in Tonopah, Ely, and Las Vegas. Tier II efforts include the extensive compilation of site records from other sources. Published and unpublished reports on surveys and excavations serve to supplement the site records.

The study area under consideration here includes watersheds within Nevada/Utah (Figure 2.2.4.1-1). This study area includes all valleys that are part of the Dedicated Deployment Area (DDA) for the Proposed Action, as well as additional adjacent valleys. Inclusion of these additional valleys helps ensure that baseline conditions in potential indirect, as well as direct, impact areas are considered.

There is a great deal of variation in the quantity and quality of information recorded on existing site forms. To some extent this is due to the long time span over which site records were completed for the earliest form from this study area is dated 1922. Since that time many different archaeologists have used a series of different site forms to record information of sites they encountered. Variations in their skills, interests, and diligence in completing forms is clearly observable in the records on the 1957 sites that form the data base from this study area. In recent years there has been a movement toward standardization of forms. A wider range of information is elicited by these forms, and there are generally fewer sections that the field archaeologist has left blank.

Data Coding Procedures

Because of the high degree of variability in the amount and quality of the information recorded on site forms over the years, only a limited number of variables were selected for coding. The final set of variables employed fall into

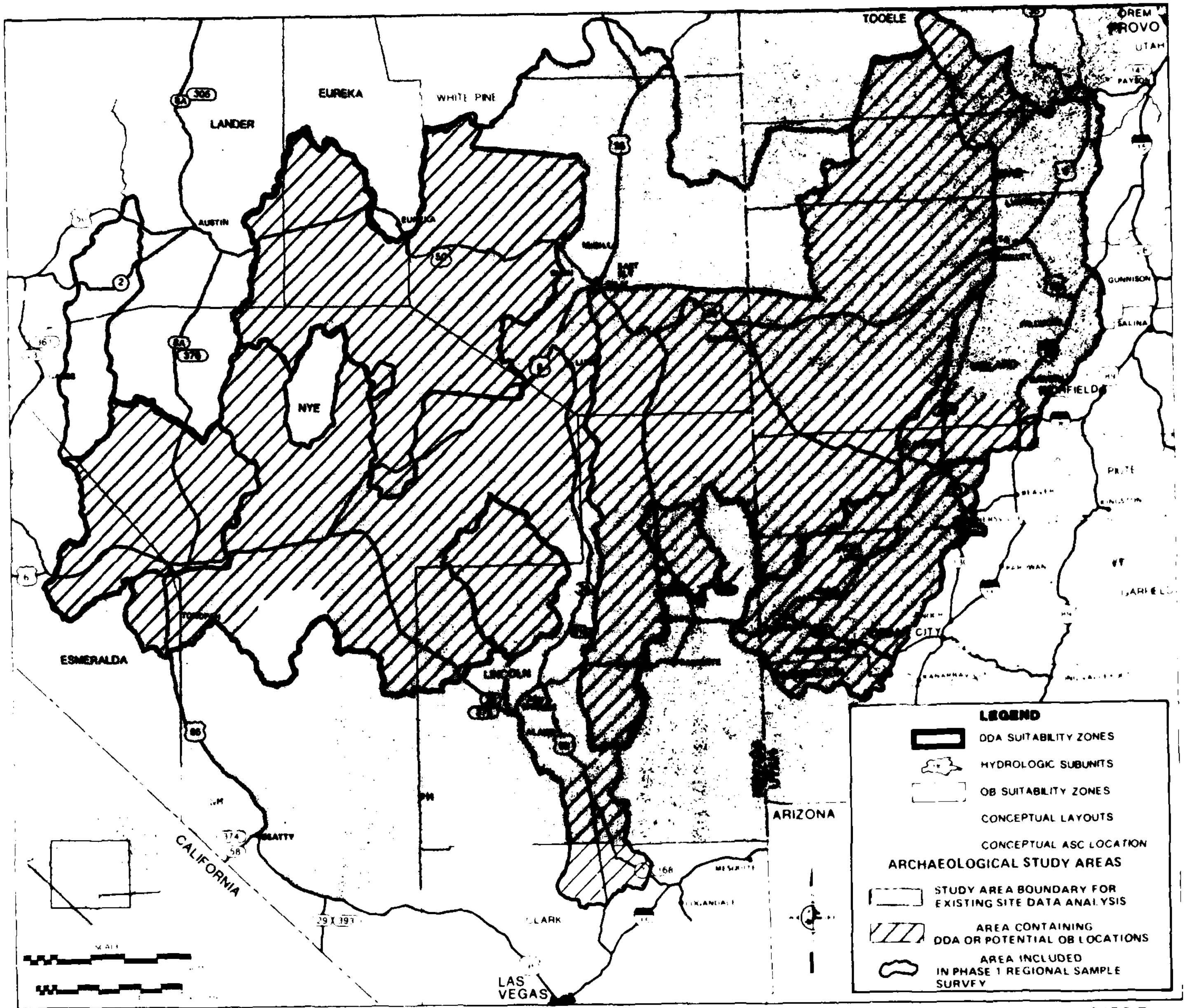

Figure 2.2.4.1-1. Area boundaries considered for archaeological and historical resources in the Nevada/U'ah study area.

three categories: administration, locational, and site attributes. Administrative variables consist of such things as site number, National Register status, and BLM district. Locational variables include Universal Transverse Mercator (UTM) coordinates, and information about the topographic setting and landform on which a site is located and its relationship to permanent water. The above information is either readily available on the site forms themselves or is relatively easily obtainable from maps, thus the accuracy of this information is good. One limitation on the accuracy of these data is the map scale of 1:250,000 which was employed throughout this phase of the project. Given the very large study area, the large number of known archaeological sites, and the preliminary nature of this work with existing site records, working at a larger map scale was not justifiable. The final set of variables, those recorded on site attributes, are the ones that posed the greatest problems for accurate data coding. Many times forms do not contain adequate detail to allow variables of potential interest to archaeologists to be coded, and other times there is a strong likelihood that different coders will interpret the same information in different ways. These problems were dealt with in two ways. First, the number of variables coded was reduced to the following: Site type, site subtype, cultural affiliation, period of occupation, site area, site condition, type of survey, and the date the site was recorded. Since the variable "site type" plays an important role in the discussion that follows, the criteria employed in inferring this variable from the information on site forms is briefly reviewed.

The typology that was employed here was intentionally a very simple one, but it was constructed so as to have relevance to past behavior. The categories include "Multiple Activity Sites," "Special Activity Sites," Limited Activity Sites," and "Isolated Artifacts." The category "Special Activity" refers to such sites as petroglyphs, pictographs, or burial sites, and these are generally easily inferred from site forms. Isolated artifacts are also easily identifiable from site forms because they consist of only one, or sometimes a very few artifacts, and they are generally recorded on a special short form. Thus the principal difficulty faced by a data encoder is the distinction between "Multiple Activity" and "Limited Activity" sites. It should be noted that the typology employed here is conceptualized as representing a continuum as to the amount of time of occupation and the diversity of activities performed at a site. Thus Isolated Artifacts are assumed to represent a brief episode of past human behavior consisting of a single or very few types of activities. Length of occupation and diversity of activities increases at Limited Activity sites and is greatest at Multiple Activity sites. Special Activity sites are not assumed to fall at any particular place along this continuum, and must be considered separately if behavioral inferences are attempted.

The following criteria were used to distinguish between Multiple and Limited Activity sites: site size, density of cultural material, and diversity of cultural material. These criteria were evaluated individually and then the interactive effects of all of them were considered in making the final decision regarding the appropriate site category. The site size threshold for Multiple Activity sites tended to be around 10,000 sq mi. Diversity of cultural materials was based primarily on the presence of ground stone or pottery because those items were most frequently mentioned, but numerous hearths or the presence of diverse chipped stone tool types were other significant criteria. Density of materials was frequently not precisely stated by the field recorder and had to be inferred from qualitative statements made by that individual, or had to be excluded as a decision-making criterion. When considering all of these criteria together, the following general approach was taken.

Limited activity sites tend to be small and/or light scatters of flakes with very few or no tools or potsherds, no groundstone, and at most, one or two hearths. But these sites may also be extremely large flake scatters with only a few other artifact types present. Sites with greater density and diversity of cultural materials and greater size than indicated above would be classified as Multiple Activity sites. To minimize variation introduced by different encoders applying these criteria in different ways, all encoding of site attributes was done by a single individual who has had previous field experience in Nevada. The result of the above procedures has been to create a data base that is roughly equivalent for the entire region of the study area and that is based on general behavioral principles.

Evaluation of the Data Base

There are two types of biases that might be expected to occur in a data base of this sort that can be evaluated with currently available information. First is bias introduced by the passage of a significant amount of time since a site was originally recorded. The observations of early observors would not have the benefit of information accumulated in more recent times, and they certainly would be inadequate for evaluating the current condition of a site. It has also been notea that early site forms do not contain the same level of detailed observations about a site that is characteristic of more recent forms. Fortunately, a significant percentage of the sites included in the present sample have been recorded in recent times, while the first site in our sample was recorded in 1922. Figure 2.2.4.1-2 shows graphically the dramatic increase in the rate of recording of archaeological sites that has taken place recently. In fact, fully 75 percent of the sites in our sample have been recorded since 1967. As a result, the potential problem of bias that results from old data is substantially lower that what might be expected from a data base that has accumulated over so many years.

A second potential problem in this regional data base is bias in the kinds of sites recorded by archaeologists. For example, it is a relatively well-established generalization that earlier in this century archaeologists tended to record only those sites that were large, had diverse and abundant remains, and were easily visible and accessible. Such a bias is clearly detectable in the present data base. Figure 2.2.4.1-3 allows a comparison of the rates at which different types of archaeological sites have been recorded over time. It is evident that prior to 1960, archaeologists focused primarily on Multiple Activity (MA) and Special Activity (SA) sites in their field studies. Interestingly, there is a similar rate of recording these two site types right up to the present, with slightly over four MA sites being recorded for every one SA site for most of the five year periods since 1930. Limited Activity (LA) sites are very clearly under-represented in the sites recorded before 1955. Prior to that time nearly two MA sites were recorded for every one LA site, but after 1955, the relationship is dramatically reversed with more LA sites being recorded. The average for the 25 year period from 1955 to 1979 is three LA sites recorded for every one MA site. Isolated Artifacts (IA) have by far the most biased representation in the current sample. Almost no IAs were recorded in Nevada prior to 1975, and it still is the policy in the state of Utah not to prepare site forms in IAs.

The information on IAs provided by the current sample is too biased to be very informative on a regional level. Furthermore, this bias is clearly the result of the very different site recording policies that are employed by Nevada and Utah. Therefore IAs are not considered further in this exploration of causes and eifects of bias in the current sample.

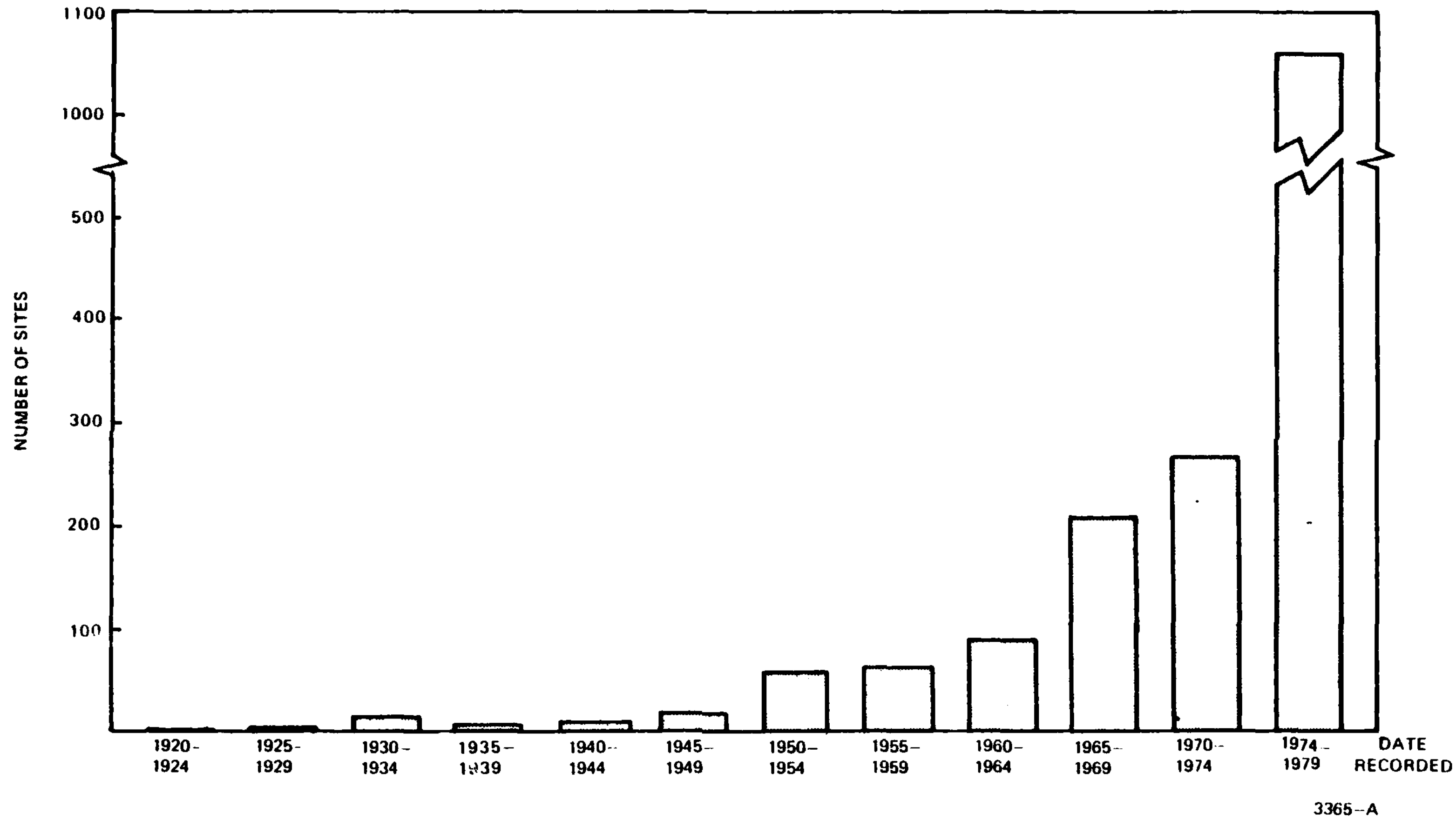

Figure 2.2.4.1-2. Number of archaeological sites recorded in each five-year period since 1920 within the Nevada/Utah study region.

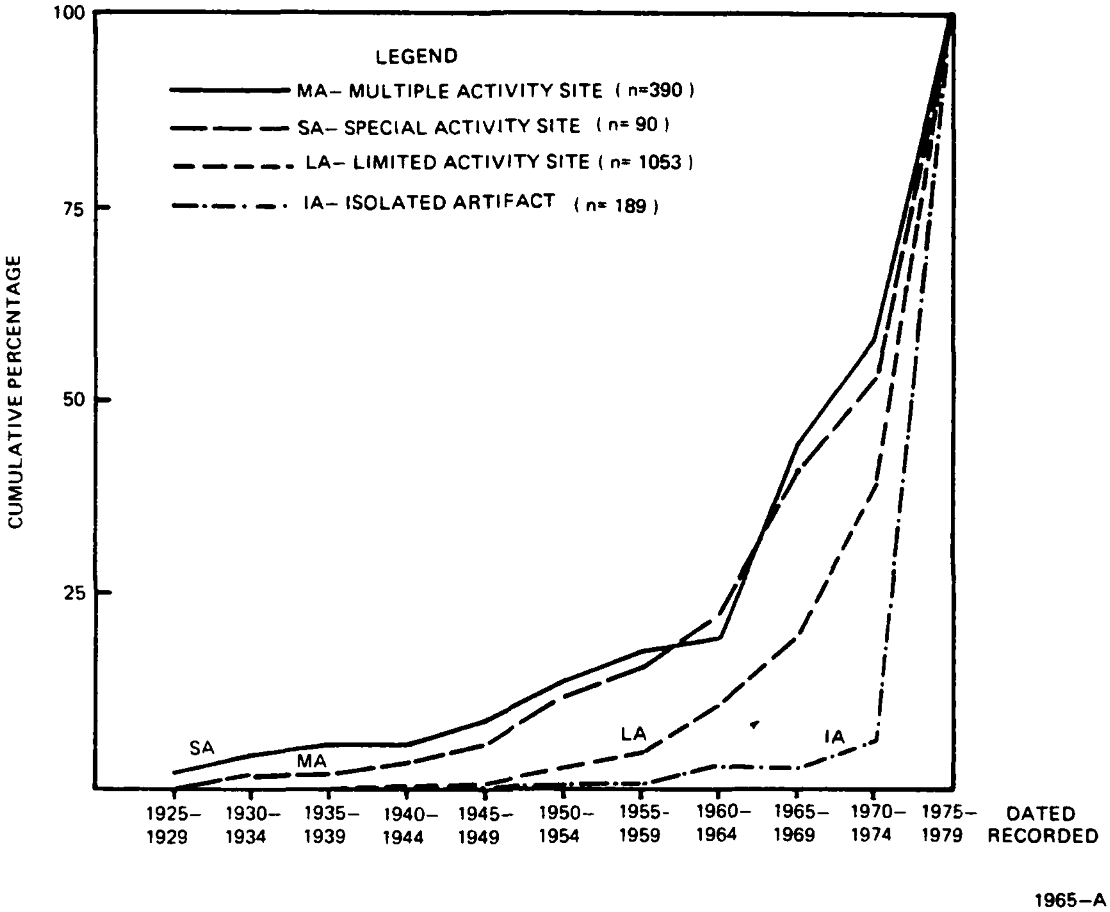

Figure 2.2.4.1-3. Cumulative percentages of sites recorded by five-year periods for four archaeological site types.

It would appear from the preceding discussion that the greatest potential bias in the present sample is in the differential policies applied by archaeologists to the recording of Limited Activity sites. When coding the present site data information regarding the type of survey that was employed to discover the site was recorded where possible. The three survey types identified were as follows:

- o Nonsystematic - any survey that did not employ a specific, statistically based sampling design and did not cover 100 percent of the area investigated.

- o Systematic Sample - some of the surveys in this category employed explicit, statistically based sampling designs, while others selected sample units according to explicit, consistent criteria believed to be related to site location (e.g. in the BLM Tonopah Resource Area, all springs were surveyed). Intensive survey techniques were employed within the sample units selected.

- o 100 Percent Intensive - generally these are clearance surveys done as part of the environmental assessment process for land modification projects. Survey location is most often determined by the requirements of the project, and intensive survey techniques are generally employed over the entire project area.

It is not presently possible to evaluate how much land area within the study area has been surveyed by each of the above techniques. It is possible to indirectly assess whether different topographic zones have been differentially sampled by these three survey techniques, and whether there is evidence of bias in the site recording practices employed. The procedure used here is to examine two sets of figures: the total number of sites (MA and LA sites only) recorded in each topographic zone by the different survey strategies, and the ratio of LA to MA sites recorded (Table 2.2.4.1-1). Several interesting patterns are suggested by this table. First, it is clear that the 100 percent intensive surveys (Type C) are recording a much higher frequency of LA sites, with the Nonsystematic surveys (Type A) recording the fewest LA sites. It is especially interesting to examine the individual topographic zones for variation. If we assume that the number of sites recorded in each topographic zone is a rough index of the amount of survey that was conducted in that zone, then the following conclusions can be drawn for each zone.

- o Mountain - This is the only zone where there is rough equivalence in the LA:MA ratios obtained by all three survey types. It appears that Type C is the dominant type of survey in this area. Given that over one-third of all sites in our sample are from the mountain zone and that there is close agreement between the results of all three survey types, the mountain zone data would appear to have a high likelihood of being representative.

- o Upper Bajada - While roughly equivalent numbers of sites have been recorded by the three survey methods, there is great variation in the ratio of LA to MA sites recorded. It would appear that LA sites were being systematically ignored by Type A surveys in the upper bajada zone.

- o Lower Bajada - Again there is great variation in the ratio of LA to MA sites recorded by the three survey types. It appears that Type A survey

Table 2.2.4.1-1. The ratio of limited activity sites to multiple activity sites (LA:MA) recorded by three different survey types.

SURVEY TYPE	TOPOGRAPHIC ZONE				
	MOUNTAIN	UPPER BAJADA	LOWER BAJADA	VALLEY FLOOR	TOTAL
A. Nonsystematic	2.8:1 (92)[1]	1:1.4 (67)	1:1.6 (18)	1.7:1 (24)	1.4:1 (201)
B. Systematic Sample	2.4:1 (94)	3.8:1 (67)	2.8:1 (53)	1.8:1 (141)	2.3:1 (355)
C. 100 Percent Intensive	3:1 (162)	12:1 (78)	16:1 (52)	6.4:1 (81)	5.2:1 (373)

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[1]Figures in parentheses are the total number of sites recorded (LA + MA).

was rarely conducted in the lower bajada zone, and when it was, MA sites were strongly emphasized. This is the type of situation that might be expected to result if local informants were being used as sources of leads regarding site locations.

- Playa and Valley Floor - In this zone, Type B survey has been the most common, with Type A the least common. Interestingly, both survey types have resulted in almost exactly same LA to MA ratios. However, Type C surveys resulted in a LA to MA ratio over three times higher.

The differences in LA to MA ratios noted above are probably best explained as the result of the choices made by archaeologists regarding where to survey. Such choices are possible in both Type A and B surveys. Type A surveys allow the archaeologist to choose both the general and the specific areas in which to search for sites. Most Type B surveys allow the archaeologist to choose a general area in which to survey, with specific sample units chosen by random or other means.

On the other hand, Type C surveys allow for little or no input by the archaeologist as to where survey is to be done. Furthermore, the archaeologist is responsible for recording all evidence of cultural remains within that study area. With the apparent exception of the Mountain zone, then, the differential results obtained by the different survey strategies would appear to be explainable in two parts. First, the strong contrast noted between Types A and B and Type C would appear to be the effect of archaeologists choosing places of known (or at least expected) high abundance of MA sites as locations to conduct either a Type A or B survey. On the other hand Type C surveys have been conducted in a much broader range of settings. The result has been a much lower frequency of MA sites recorded relative to LA sites. This is not unexpected, for MA sites are apparently less frequent than LA sites overall and furthermore they tend to distribute in a clustered rather than a uniform or random pattern over space. On a regional scale, Type C surveys could be conceived as random surveys with very small sampling fractions. Because it is known that sampling is not a very effective method for the discovery of rare elements, it is not surprising that the LA to MA ratio of the Type C survey is high, relative to the other survey types.

The second factor that appears to account for the differential results obtained by the three survey methods is believed to be observer bias. While Type B was noted as sharing a similar study area selection process with Type A surveys, Types B and C employ comparable methods of ground inspection once in the field. That is, both attempt to record all cultural remains encountered. It is for the Upper Bajada Zone that there is the clearest evidence of systematic bias in the results obtained by Type A surveys. Based on the arguments presented above, the principal factor accounting for differences in the LA:MA ratio between survey types A and B in the Upper Bajada should be field examination and recording technique. Thus it would appear that there was a strong bias against searching for and/or recording of LA sites during Type A surveys in this zone. This point gains significance because of the large number of sites for which survey type could not be reliably determined from the site form during the data encoding process. These "indeterminate" survey types comprise over half of the total sample of sites and many may have been recorded by Type A surveys.

These sites are briefly considered to determine if they may be introducing a significant bias into the overall sample. The LA:MA ratios by topographic zone are as follows: Mountain--2.4:1 (146 sites), Upper Bajada--2.6:1 (144 sites), Lower Bajada--3.2:1 (114 sites), Valley Floor-2.2:1 (167 sites), Total--2.5:1 (571 sites). It is immediately apparent that for each topographic zone the LA:MA ratios for which the sites survey type was indeterminate closely resemble the ratios for systematic sample surveys (Table 2.2.4.1-1). Thus, this set of indeterminate sites probably does not introduce a significant additional bias to the sample of sites used in this analysis.

A potential source of bias that has not yet been evaluated is whether there are any major differences over space in the kinds of surveys that have been conducted. For example, if only Type A surveys have been conducted in a contiguous set of hydrologic subunits, then it is conceivable that LA sites would be significantly under-represented in that region. Because the patterns that are being considered in this analysis are on a very large spatial scale, it is unlikely that such a situation would arise.

Global Features of the Spatial Distribution of Great Basin Sites in the M-X Project Area (2.2.4.2)

Introduction

The data being obtained through the sampling stages of the survey of cultural resources in the impact area in conjunction with the previously collected data from the project region, form a data base of unique character and enormous scientific value for the study of prehistoric societies in this region. This data base, with an overall spatial scale for the distribution of sites equal to, or greater than, the spatial scale of the societies represented therein, creates the potential for a pan-societal study, perhaps for the first time in the archaeology of this or any other region. The data being accumulated under the scope of a single project has the potential for serving as a rich reference source for scholars involved in virtually any phase of archaeological study in the Great Basin.

The 2,000 or so sites identified from previous research in the project region can aid in establishing broad patterns of the use of space by whole social/cultural systems as represented through settlement locations. These patterns are preserved in site locations that represent the loci of activities, settlements in space and time by the prehistoric inhabitants of the region. Identification and analysis of systems of spatial use at the level of whole societies is a significant advance in the study of settlement patterns in archaeology. Most research into spatial patterns and subsequent inference about the properties of the system generating that pattern of settlement location have been limited to a portion of the whole system of settlements. While these studies (e.g. Hodder 1979) have made significant advances with respect to clarifying the relationship between settlement pattern and societal system, they are nonetheless limited by examining only a portion of the total system of usage of a geographical space. As will be argued below, the collection of extant sites in the project region is quite likely the record of a substantial portion of prehistoric settlements in the project region. The size of the region--some 60,000 square miles for the 70 odd valleys making up the total project area--is sufficiently large to encompass what were perhaps several contemporaneous, distinct former societies. These two observations justify the assertion that this project can initiate the comprehensive archaeological study of whole systems, and even comparison of differences among such systems at a comprehensive level.

In this report some of the global properties of the spatial distribution of sites in the region will be examined. The theme is description of spatial distributions in terms that are indicative of global subsistence patterns, societal divisions and spatial distribution of groups of persons living together for day-to-day activities, and making up the set of all persons who occupied this region in prehistoric times.

This type of study, based on a large scale regional data base, is complementary to present and past research in the Great Basin, and has the potential for resolving issues that need a pan-regional perspective for resolution. It also requires a shift of focus from emphasizing a few sites with unusually rich deposits of artifactual material, to examining the extremely large number of comparatively mundane sites which in fact make up the whole settlement pattern of these past societies. At the same time, new approaches to data recovery and analysis will be required. The sheer number of sites that will eventually come under the scope of this project overwhelms traditional approaches based on examining in detail a few, select sites. This report will also give, in part, steps that are being taken towards resolution of some of these difficulties.

The Present Data Base

A search of published reports on previous archaeological work in the region has yielded over 2,000 sites. These reports are the result of more than 50 years of research in the Great Basin and represent a wide variety of research goals, methods of data recovery and consistency of effort. Sites have been recorded for reasons ranging from fortuitous knowledge to systematic study. In the last several years, contract archaeology has introduced a variety of restricted sampling schemes, typically involving long transects along various proposed rights of way. Systematic studies of localities in the area using statistical sampling techniques are, however, virtually nonexistent. The nature, amount and care with which information has been recorded on individual sites is highly inconsistent, and even the kind of sites that have been recorded is uneven. Isolated finds have been recorded in Nevada, for example, but not in Utah.

As a data base, this collection of sites leaves much to be desired. The only measures that can be consistently recorded across all sites give but minimal information about particular sites and what they represent about past societies. Data are virtually nonexistent beyond the most gross of time periods. There is virtually no information on whether local areas were examined extensively, or only on a judgmental basis (if even that).

What little data can be consistently obtained across sites is clearly insufficient for making anything requiring a fine scale of measurement. It is not possible to assign seasonality, type of activity, length of a single occupation or number of years of occupation to these sites, even allowing for wide margins of error.

Previous Research Foci

Sites within the study area have generally been analyzed with regard to: (1) chronological sequences (e.g., projectile point type sequences), (2) "cultural" sequences as manifested by differences in types of artifactual material, and (3) reconstruction of settlement/subsistence systems using, for the most part, the cultural ecological framework of Julian Steward. Data for such studies has generally been from a few, selected sites. This perspective has lead to establishing a variety of local cultural sequences by researchers working in limited areas. These local cultural sequences are not necessarily differentiated one from the other because of demonstrated cultural boundaries. Rather, they may simply be distinguished by the geographical accident of where research has taken place. Ford's objections in the Ford-Spaulding debate over the reality of types may very well be approximate here. Various authors of Great Basin prehistory discuss a limited number of sites representative of the Basin. Yet there are literally hundreds of thousands of sites in that same region. To assume that these sites, selected for unusual characteristics, can be representative of the full variety of sites and factors structuring settlement locations over the whole region, would be in error. Thus a different viewpoint is required, namely that of seeing a region from the vantage point of the totality of sites in the region.

From the viewpoint of the individual site with a rich deposit, the isolated type of site with one artifact seems to be an unimportant and insignificant finding perhaps the chance occurrence of a passing family or group. And from the viewpoint of the kind of question one tries to answer with the deeply stratified site, indeed it is insignificant. But from a different viewpoint, that of the site as built up from the repeated usage of the same area, year after year, the isolate changes from an unimportant chance occurrence to representing, perhaps, a single camp. It thus serves to identify the location of a group of persons during the yearly round of resource exploitation. If the isolate is not a chance event, it is part and parcel of the whole system of settlements and thus part of the domain to be studied.

The other main perspective for analysis of these sites is their overall spatial distribution and consequent association with environmental resources, of whatever kind. Provenance data are available for almost all of these sites and information on the area of the sites is available for the majority of them. Direct information on resources in association with sites is not yet available. The sites have been classified into a minimal typology which distinguishes multiple activity sites, limited activity sites, isolates, and special use sites. Subtypes of these main types have also been formulated, though most of the sites represent only one or two of the subtypes. The region has been topographically subdivided into 5 zones: mountain, upper bajada, lower bajada, valley bottom and playa. A variety of landforms have also been distinguished. These data are available for the majority of the sites. The topography, and to a lesser extent the landforms, provide an indirect measure of resource availability and so analysis of the spatial distribution of sites by these subdivisions should distinguish some of the more pronounced features of the pattern of site location. The general aim, given the nature of the data base, is to determine qualitative differences in patterns of spatial distribution of sets of sites. These qualitative differences should override the undoubted, but unknown, bias built into this collection of sites by lack of systematic study at a regional level. A more specific goal is to utilize these patterns to identify zones of site variability.

Briefly, one can expect that the locality and size of groups of persons (except for the unusually large aggregations that may be primarily responsive to the internal working out of social dynamics) are principally responding to resource distribution and seasonal abundance, with certain constraints imposed by the social system in sequences as manifested by differences in types of artifactual material, and (3) reconstruction of settlement/subsistence systems using, for the most part, the cultural ecological framework of Julian Steward. Data for such studies have generally been a relatively few, selected sites in a relatively few localities. This perspective has lead to establishing a variety of local cultural sequences by researchers working in limited areas. These local cultural sequences are not necessarily differentiated one from the other because of demonstrated cultural boundaries. Rather, they may simply be so distinguished by the geographical accident of where research has taken place. Ford's objections in the Ford-Spaulding debate over the reality of types may very well be approximate here. Various authors of Great Basin prehistory discuss a limited number of sites representative of the Basin. Yet there are literally hundreds of thousands of sites in that same region. To assume that these sites, selected for unusual characteristics, can be representative of the full variety of sites and factors structuring settlement locations over the whole region, would be in error. Thus a different viewpoint is required, namely that of seeing a region from the vantage point of the totality of sites in the region.

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This assumption has several implications. First, the number of persons and the repeatedness through time with which a given locality will be utilized is determined by the relative constancy and abundance of resources in that locality. Thus permanent sources of water are likely to be used repeatedly through time as a locus for a group (or groups) during dry seasons. It should be noted that "permanent" need not mean unchanging, but assumes only a substantial time frame (e.g., tens to hundreds of years). Similarly, certain kinds of faunal resources often provide a major source of nourishment; localities offering such resources can be expected to be used repeatedly so long as those major resources are present. Conversely, other resources may have only a very short flourishing period in a particular locality, thus leading to relatively little repeated use of that area. Other resources may only be used on a fortuitous basis.

The point being established here is not an exhaustive determination of expectable patterns of utilization of resources at a locality in terms of resource availability at that locality through time, but to indicate that there are expectable patterns of use which are determined in a given year by relative abundance and predictability of resources, and through time by changes in the character and quantity of resources in response to changing environmental conditions.

It should be noted that because of the Liebig effect, high abundance of a given resource need not correlate with intensive exploitation of that resource as measured by the percentage of the resource used. *Population size is bounded above by the* least abundant, critical resource; other resources may be plentiful but the "bottleneck" of a relatively scarce, critical resource will prevent population size from increasing with more intensive utilization of the abundant resource. The Mongongo nut for the Kung San is a classic example of the problem. Perhaps one-third or more of the nut crop is not utilized because water is unavailable during part of the season when the nut crop can be harvested.

Consequently, expected patterns of resource utilization as given by frequency of use of a locality are tenuous and require careful consideration of the dynamics interrelating resource location, predictability, abundance, nutritional and other requirements, and group size. Rather than trying to formulate a model of expected resource utilization, it is more profitable to view the matter here from the reverse direction. The spatial distribution of sites represents the consequences of these various factors affecting settlement location. That spatial distribution can be recovered. Then the characteristics of the spatial distribution, e.g., association between resources and patterns of site distribution, overall spatial distribution of types of sites, and so on, can be examined in order to reconstruct the "strategy" that lead to that spatial distribution. This, then, is the guiding framework for the analysis of the spatial distribution of the sites in the data base.

Distribution by Topographic Zone

Since the total area of each topographic zone is not presently available, the main comparison will be between LA and MA site areas for each topographic zone. The basic data are given in Table 2.2.4.2-1.

The distributions are essentially the same. Thus the main distinguishing feature is the number of units by topographic zone, though these relative frequencies need to be corrected by the area represented by each topographic zone. The pattern that has been observed in the Mojave (Coombs 1979) is repeated here; namely, the zone between the valley bottom and the beginning of the mountains has the fewest number of sites.

Site areas can also be compared and are given in Tables 2.2.4.2-2 through 2.2.4-4.

While the difference between LA and MA sites from the playa zone may be due to sampling error, the same is not true for the other zones. The pattern of site areas is a curious one with reversals between the LA and the MA sites. For the MA sites the rank order of the zones is given by 4, 2, 1, 5, 3, but for the LA sites the rank order is 3, 5, 2,4,1 which is almost the exact reverse of the MA sequence (only zone 1 is out of reverse order). This suggests an inverse relationship between the LA and the MA sites, in which zones with large MA sites are zones with small LA sites, and conversely.

Zones 2 and 4 (upper bajada and valley bottom) stand out as locations for large MA sites. The four largest MA sites are in these two zones (three of them are in Zone 2 and one is in Zone 4). Since these zones contain all of the largest sites, it is also useful to compare the medians for these five zones. The medians are given in Table 2.2.4.2-3.

The medians give about the same ranks for the topographic zones for MA sites. However, the ranking for these zones for the LA sites differs considerably from that based on-site area. Because of the biasing effect of a few large sites on the mean area, the medians may be a better indication of the site-size pattern by topographic zone. Zones 2 and 4 still remain the zones with the largest MA sites, and the pattern of zone 4 of having the largest mean site area for MA sites and the smallest mean site area for LA sites is almost perfectly duplicated for these median values. Only the Playa zone has a smaller median for LA sites than the valley bottom zone.

Of the five topographic zones, the area least likely for the largest aggregations would likely be the mountain area. This may be tested through the site distribution for large and small sites in the topographic zones. The basic data are given in Table 2.2.4.2-5.

It may be seen by inspection that the valley bottom has about twice the proportion of large sites as does mountain and upper bajada. Interestingly, the lower bajada is both the area with the fewest number of sites and a virtual absence of large sites. Of the largest sites, the biggest mountain site is about 400,000 m^2, whereas the upper bajada has one site over a million square meters and the valley bottom has two such sites. For the lower bajada sites, sites with area 10,000 m^2 represent 85 percent of the sites. Comparable figures for the mountain, upper

Table 2.2.4.2-1. Frequency distribution of spatial units by topographic zone.

TOPOGRAPHIC ZONE	OBSERVED FREQUENCIES		EXPECTED FREQUENCIES	
	LA UNITS	MA UNITS	LA UNITS	MA UNITS
Mountain (1)	225	78	224	79
Upper Bajada (2)	154	69	165	58
Lower Bajada (3)	114	27	104	37
Valley Bottom (4)	131	44	130	45
Playa (5)	6	3	7	2
Total	630	221		

$\chi^2 = 7.2$, df = 4, $p > 0.10$

4071

Table 2.2.4.2-2. Mean site areas for topographic zones (in square meters).[1]

TOPOGRAPHIC ZONE	LA SITES	MA SITES
Mountain	15,000	26,400
Upper Bajada	26,400	70,000
Lower Bajada	34,500	10,500
Valley Bottom	25,900	142,300
Playa	27,200	12,900

4072

[1]Standard deviations are approximately 1/3 to 1/2 of the mean site area. Since the distributions are highly skewed by large sites, the standard deviations are not given.

Table 2.2.4.2-3. Median site areas for topographic zones (in square meters).

Topographic Zone	Median LA Site Area	Median MA Site Area
Mountain	930	1,443
Upper Bajada	1,480	4,047
Lower Bajada	471	502
Valley Bottom	400	6,283
Playa	104	88

T4073/10-2-81

Table 2.2.4.2-4. Cutpoints in the frequency distribution of the MA site area by topographic zone.

Mountain Cutpoints				
0-1,120	1,767-8,094	10,000-19,684	30,000-202,000	250,000-404,000
Upper Bajada Cutpoints				
0-982	1,640-8,094	11,163-41,861	60,476-221,027	508,000-1,593,000
Lower Bajada Cutpoints				
0-875	1,895-8,767	22,326-39,270	162,086	
Valley Bottom Cutpoints				
0-500	1,096-7,854	10,000-54,978	117,810-176,315	508,327-2,000,000
Playa Cutpoints				
0-88		38,543		

T4074/10-2-81

Note: The numbers are the largest and smallest site areas (in square meters) for each of the intervals.

Table 2.2.4.2-5. Frequency distribution for small, medium, and large sites in five topographic zones.

Topographic Zone	Small Sites	Medium Sites	Large Sites	Percent Medium and Large Sites
Mountain	69	7	2	12
Upper bajada	59	8	2	14
Lower bajada	26	1	0	4
Valley bottom	34	6	4	25
Playa	3	0	0	0

T4075/10-2-81/a

Small: 0 to 100,000 sq m.
Medium: 100,000 to 1,000,000 sq m.
Large: >1,000,000 sq m.

bajada and valley bottom are: 74 percent, 65 percent and 54 percent, respectively. Thus, there is a rather consistent pattern of avoidance for the lower bajada and a gradient in the other three zones running from mountain to upper bajada to valley bottom in terms of increasing percentage of larger sites. These figures also support the interpretation of the largest sites as representing aggregations due to social dynamics, as opposed to simple resource distribution.

The LA sites show a slightly different pattern. The separation into size categories is not as pronounced, though there are striking differences in the frequency distributions for site areas in the five zones. This can be seen in a table for percentage rank of the cutpoints of site size (Table 2.2.4.2-6).

For zones 3 and 4 (lower bajada and valley bottom) there are more small and large sites. This suggests that, at higher elevations, a given resource locality is exploited over longer periods of time, but that long-term exploitation of a single resource locality occurs primarily in the valley bottom.

Distribution by Landform

The site distribution for MA site area across landform is largely homogeneous with the exception of dunes, flat/valley plain and gentle slope/alluvial fan. These landforms are the locus for the largest sites. These three groups contain the four largest sites even though only about 1/3 of the sites are to be found on these landforms.

The distribution of LA sites across landforms is much like that of the MA sites, except that there are no large LA sites in the dune area (the largest LA site in that landform is about 8,000 m^2.

Taken together, these distributions for LA and MA sites across landforms suggest that the presence of large MA sites excludes the presence of large LA sites. In other words, the "role" of the Limited Activity sites is being subsumed by the Multiple Activity sites.

Conclusion

Sites have been found to be differentially distributed across topographic zones, thus contributing to the identification of sensitivity zones which form the basis of impact assessment. This data base was not, however, amenable to an analysis of site distribution in relation to vegetation types. Such data were obtained from a large intensive survey of Nellis Air Force Range. These data also permitted a detailed exploration of the spatial patterning of archaeological resources associated with springs, an important stratum in the study area. A detailed description of the Nellis Air Force Range survey is given in Section (2.2.4.3).

Analysis of Cultural Resource Data from an Intensive Sample Survey on Nellis Air Force Range (2.2.4.3)

In 1978, the Archaeological Research Center of the University of Nevada, Las Vegas, conducted a cultural resources inventory of the Nellis Air Force Range. The data from this survey provide an opportunity to assess a number of aspects of cultural resource density and distribution that could not be considered with the

Table 2.2.4.2-6. Percentage of limited activity sites by topographic zone.

Topographic Zone	A	B	C	D	E
Mountain	50	80	96	100	100
Upper bajada	44	77	96	100	100
Lower bajada	65	83	100	100	100
Valley bottom	61	85	95	99	100
Playa	66	83	100	100	100

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A - Sites with area <1,000 sq m.
B - Sites with area between 1,000 and 10,000 sq m.
C - Sites with area between 10,000 and 100,000 sq m.
D - Sites with area between 100,000 and 1,000,000 sq m.
E - Sites with area >1,000,000 sq m.

existing data base for the entire M-X study region. For example, the regional data base considers topographic zone and landform, but contains no information on vegetation type. Because vegetation was one of the criteria incorporated in the stratification scheme employed on Nellis Air Force Range, these data provide an opportunity for refining inferences regarding cultural resource distribution in relation to vegetation types. In addition, it is a well-established fact that within the Great Basin, sites tend to occur in association with springs; the Nellis data allow a more detailed exploration of the spatial patterning of archaeological resources that occurs with increasing distance from springs. Finally, these data provide a means for assessing differences in site density that occur in different environmental settings within a large region, such as was sampled at Nellis Air Force Range.

One of the simplest steps in this latter direction involves an examination of the basic statistics which describe the results of the regional sample. Tables 2.2.4.3-1 and 2.2.4.3-2, for example, contain a number of comparative statistics for the various sampling strata. (Note the original "spring" stratum has been divided, for purposes of analysis, into "spring" and "well" categories. These data are from the 1 percent sample of the North Range only.) Any of these may serve as potential estimates of site density or distribution. Measures B and C are particularly valuable, since they are mathematically independent estimators.

It is noteworthy that all three statistics suggest the predominance of prehistoric sites (Table 2.2.4.3-1) in two sampling domains: the spring and Pinyon/Juniper strata. This is consistent with other results from the Great Basin and should be taken as evidence that prehistoric cultural resources are especially common in these environments.

It should also be pointed out that the three measures depicted in Table 2.2.4.3-1 are also quite consistent in terms of their predictions with respect to prehistoric sites. That is, the ordering of sampling domains based on each statistic is quite similar. For example, the rank-order correlation measure, Spearman's r, attains a value of + 0.49 when the rankings based on the two independent measures are compared. This consistency suggests two conditions. First, it provides supportive evidence that each of these estimators of site patterning has validity. Secondly, it suggests that prehistoric sites in the study area tend to be distributed in a particular fashion: specifically, sites tend to be comparatively dense (Measure C) in those environmental domains in which one is most likely to find sites (Measure B).

One of the factors that must be considered in evaluating Table 2.2.4.3-1 is the number of sample units inventoried for each particular stratum. In general, the more observations that contribute to a given measure, the more reliable that measure will be. This is reflected in the ranges provided for Measure B. More precisely, these range predictions are 90 percent confidence limits based on the binomial distribution. Note, for example, that the range limitations for three strata (wells, playa, and unclassified mountains) fail to exclude any possibilities. This is because the sample sizes involved are so small. Accordingly, one should be particularly cautious when attempting to interpret the results from these strata.

Results from the Eureka Valley Planning Unit in California, for example, would suggest that prehistoric site densities in the unclassified mountain domain are actually comparatively high (on the order of six sites per square mile). Eureka Valley is used for comparison here because of its geographical proximity to Nellis Air Force Range, and the striking similarity of site estimate parameters for the two

Table 2.2.4.3-1. The distribution of prehistoric sites by sampling stratum.

Stratification	A. Sites per sq mi	B. Percentage of Sample Units with Sites	C. Sites Per Sample Units with Sites
Spring	13.4	78 (58-96)	2.2
Well	0	0 (0-1)	--
Lake terrace	3.0	24 (23-37)	1.5
Playa	4.0	58 (0-1)	1.0
Playa margin	7.4	40 (22-45)	2.3
N. desert shrub	4.5	33 (21-45)	1.7
Salt desert shrub	5.6	33 (23-44)	2.1
Unclassified mountains	0	0 (0-1)	--
Pinyon/juniper	13.0	62 (47-78)	2.6

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Table 2.2.4.3-2. The distribution of prehistoric sites by sampling stratum.

Stratification	A. Sites per sq mi	B. Percentage of Sample Units with Sites	C. Sites Per Sample Units with Sites
Spring	8.5	78 (58-96)	1.4
Well	10.6	100 (0-1)	1.3
Lake terrace	0.4	2 (0-8)	2.0
Playa	0	0 (0-100)	--
Playa margin	2.2	16 (2-31)	1.8
N. desert shrub	1.2	10 (2-18)	1.5
Salt desert shrub	0.5	100 (0-100)	1.1
Unclassified mountains	0	100 (0-100)	1.0
Pinyon/juniper	0.5	6 (0-16)	0.9

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regions. For example, 50 percent of the Eureka Valley sample units in the Pinyon-Juniper domain contain sites compared with 62 percent for Nellis, leading to density estimates of 12.0 and 13.0 sites per square mile, respectively. The BLM inventory of the Eureka Valley Planning Unit contained a third stratum: valley bottoms. Forty-three percent of the sample units in this domain contained prehistoric sites, 5.9 sites per square mile was estimated. Among other considerations, the similarities of the Nellis and Eureka Valley estimates support the notion that these figures have validity for other nearby areas within the Great Basin and may be used, with caution, as rough predictors for such areas.

Table 2.2.4.3-2 is identical to Table 2.2.4.3-1 except that historic rather than prehistoric sites are treated. Differences between strata are more difficult to characterize for historic sites, largely because the three measures of site density produce quite different rankings. The Lake Terrace domain, for example, ranked sixth among strata in terms of sites recorded per square mile, but first in terms of sites per sample unit with sites. Conversely, the well domain ranked first and fifth, respectively. Spearman's r-value for rankings based on Measures B and C is actually slightly negative, suggesting that there is considerable variability across strata in terms of within-stratum variation in the number of sites per sample unit. That is, some strata have few if any historic sites in most locations, but high site densities in a selected number of highly localized areas, while other strata have low but relatively consistent numbers of sites in most areas. The well and lake terrace strata, respectively, are perhaps the best examples of these two extremes. The discrepancies between these measurements may also lead one to question the overall reliability of any one measure as a predictor of historic site densities and distribution patterns within the study area.

It is perhaps important to note that the estimates of historic sites for the study area, on the one hand, and the Eureka Valley Planning Unit, on the other, are quite different. This is particularly true for Measure B; none of the three Eureka Valley strata yielded density estimates of one historic site/mi^2 or more. Obviously this weakens one's ability to successfully generalize from either of these sets of results to other areas.

There are a number of factors that should be considered whenever one attempts to estimate the absolute numbers of cultural resources within a region or area. One such factor is crew spacing, for obviously at least some cultural loci will not be observed unless that spacing is quite small. For both the Nellis and Eureka Valley inventories, crew spacing was fixed at a consistent 50 meters. This makes it relatively easy to compare the two sets of results, but it also suggests that many smaller sites and isolated artifacts were overlooked in both cases. Accordingly, it is important to state that the estimates provided above and in Tables 2.2.4.3-1 and 2.2.4.3-2 are more accurately described as predictions of what a new inventory, utilizing the same crew spacing and survey methods, would be expected to recover, rather than predictions of actual site numbers and densities. Clearly, the actual numbers of sites will be generally higher than the numbers provided here, but the magnitude of the difference is difficult to assess. Previous experience suggests that the numbers of isolated artifacts and small features is actually several times as large as any estimates based on 50-meter-spaced crew sweeps, that estimates for small flake scatter sites should be doubled at the very least, but that very few large or prominent sites are missed with this spacing.

Among the other factors that can adversely affect the integrity and meaningfulness of a set of site density estimates are: crew composition (i.e., the differential ability of crew members to recognize and record sites); weather conditions; the suitability of the terrain for observing sites; fatigue and other health factors; and so on. An effort was made to assess the possible influence of the first two of these on the site density estimates. This involved a fairly simple analytical design based on the principle of controlled comparison. The analysis failed to reveal any substantial variability resulting from either crew composition or weather conditions. (More analysis should be conducted before final conclusions regarding the effects of these agents are made.)

Certain other negative analytical results are worth detailing here as well. The first of these involves the construct/variable "hydrologic subunit." Eleven such subunits were identified and examined as part of the Nellis data analysis. The results suggest that there exists very little variation between basin systems that cannot be accounted for in terms of sampling stratum. (It is far more likely, however, that such differences, if they exist, will materialize only when the individual basins have been collapsed into a smaller number of meaningful basin types. This is due to the fact that the demonstration of statistically significant differences requires both a minimization of variability within categories and a maximization of variability across categories). Similarly, no differences were observed between geotechnically suitable and non-geotechnically suitable areas. This too would seem to reflect the substantial amount of variability, particularly within the latter category.

Site Clustering

Table 2.2.4.3-3 provides data regarding the clustering of prehistoric sites and isolates within the Nellis sample. The Clustering Coefficient, (Cc), provides a relative measure of site clustering that varies from 0 to 1 and is independent of relative sample size and mean (see Coombs, 1980). The Cc values shown in the table indicate no substantial differences between strata in terms of clustering (i.e., all show evidence of clustering), with the possible exception of the three strata ("well," "playa," and "unclassified mountain") for which the sample sizes are too small. This conclusion is further supported by the probabilities provided in Table 2.2.4.3-1 which indicate the likelihood that the most populous sample unit in each stratum is the result of a random distribution of sites within the stratum.

The notion that sites tend to cluster in space is given further credence by examining the co-occurrence of sites and isolates within sample units. There is, for example, a strong tendency for prehistoric sites and prehistoric isolates to be found in the same sample units. This association persists across all strata for which there exist usable data and is especially strong in the Northern Desert Shrub stratum. The pooled probability of this result is less than one in 250 (Table 2.2.4.3-4).

Similarly, historic sites and historic isolates tend to occur in the same sample units, although this pattern is not nearly so evident, due largely to the comparatively small number of historic remains recorded. However, historic and prehistoric remains do not exhibit this tendency to co-occur except at springs.

These results are essentially what one would expect to find. On the one hand, sites from the same basic cultural milieu tend to cluster in space, sometimes

Table 2.2.4.3-3. Site clustering information.

STRATIFICATION CATEGORY	SAMPLE SIZE	CLUSTERING COEFFICIENT	LARGEST NO. OF OBSERVATIONS IN ANY SAMPLE UNIT	PROBABILITY
Spring	18	0.38	18	0.001
Well	3	1.0	3	0.11
Lake Terrace	41	0.35	4	0.04
Playa	2	Undefined	1	–
Playa Margin	25	0.33	8	0.01
No. Desert Shrub	52	0.30	6	0.09
Salt Desert Shrub	69	0.29	9	0.001
Unclassified Mts.	2	Undefined	0	1.0
Pinyon/Juniper	32	0.30	10	0.01

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because they were contemporaneous and components of the same settlement and subsistence system, and other times simply because they reflect foci on the same environmental resources. Sites representing vastly different cultures, on the other hand, do not cluster. Together, this evidence strongly suggests that we are looking at a real and meaningful clustering phenomenon.

Spring-Associated Sites

As noted above, site densities are unusually high in spring stratum sample units. This is true for both prehistoric and historic loci and both types tend to occur in direct association with the springs. Indeed, nearly half (8 of 18) of the spring stratum units have sites with both a prehistoric and a historic component immediately adjacent to the spring. This is a particularly telling statistic when we realize that only 11 other sample units in the Nellis sample contain both prehistoric and historic sites anywhere within their bounds (three of these are other spring-stratum units).

Table 2.2.4.3-5 shows the densities of prehistoric sites and isolates at various distance ranges within one mile of springs in the Nellis sample. It should be noted that the figures are high near the spring (the evidence indicates that this is not simply a by-product of sites located directly at the spring) and decline up to a distance of approximately 0.6 miles, at which point the densities appear to increase once more. This higher density region may extend to the one-mile boundary and perhaps somewhat beyond.

It is noteworthy that this pattern of density decrease followed by increase also was observed in data from the California Desert (Coombs, 1979a) and has been noted by others (e.g., DRI, 1980, personal communication; Thomas and Bettinger, 1976). It may be that this is a result of the differential use of springs as hunting areas, on the one hand, and for water and plant resources, on the other.

The effect of springs on site densities at greater distances is not evident within the Nellis sample. That is, sample units located 2, 3 or 4 miles from the nearest spring do not appear to have higher site densities than those units located more distant still. Comparatively few sample units outside of the spring stratum lie in the immediate vicinity of a spring, however. Thus, this conclusion cannot be supported with particularly impressive statistics. Nevertheless, visual inspection of the cross tabulated data leaves one with the clear impression that within most strata (other than the spring stratum), prehistoric loci are more or less randomly distributed with respect to spring distance.

Habitation Sites

The distribution of sample units containing habitation sites is depicted in Table 2.2.4.3-6. The table suggests that such sites may be found in all strata (although none were recorded in the two strata represented by very small sub-samples, namely the "well" and "unclassified mountain"). Nevertheless, it would appear that sites of this type tend to predominate in areas associated with springs, pinyon-juniper stands and playa shore features.

Table 2.2.4.3-5. The distribution of prehistoric loci in the vicinity of springs.

DISTANCE TO THE NEAREST SPRING (MILES)	AREA COVERED (SQUARE MILES)	SITES AND ISOLATES RECORDED	ESTIMATED DENSITY
0.0 - 0.15	1.2	17	14.0
0.16 - 0.30	0.94	5	5.3
0.31 - 0.45	0.72	4	5.5
0.46 - 0.60	0.45	1	2.2
0.61 - 0.75	0.16	1	6.3
0.76 - 1.00	0.05	2	38.1

3984

Table 2.2.4.3-6. The distribution of prehistoric habitation sites.

STRATUM	HABITATION SITES ABSENT	HABITATION SITES PRESENT	TOTAL
Spring	9 (50.0)	9 (50.0)	18
Well	3 (100.0)	0 (0.0)	3
Lake Terrace	35 (85.4)	6 (14.6)	41
Playa	1 (50.0)	1 (50.0)	2
Playa Margin	18 (72.0)	7 (28.0)	25
No. Desert Shrub	46 (88.5)	6 (11.5)	52
Salt Desert Shrub	60 (96.8)	2 (3.2)	62
Unclassified Mts.	2 (100.0)	0 (0.0)	2
Pinyon/juniper	22 (68.8)	10 (31.2)	32
			3985

Row percentages are shown in parentheses.

Topographic Setting, Sampling Stratum and Site Distribution

As part of the present analysis, all sample units were classified according to a simple landform typology: 1) valley floor, 2) mid-fan, 3) pediment, and 4) mountain. To perform the classification, nominal definitions of each of the four classes were provided to a single laboratory assistant who then used USGS topographic map information to categorize each sample unit accordingly.

Obviously there is a strong relationship between this classification and the original stratification system. Nevertheless, there are differences between the two and it is instructive to examine these. We find, for example, that there is a strong tendency for sample units located in the three lacustrine-related strata (i.e., "playa," "lake terrace," and "playa margin") to contain prehistoric loci only if the unit lies within the "valley floor" domain. This association is depicted in Table 2.2.4.3-7.

This pattern is most likely due to the impression of the initial stratification (for which the Archaeological Research Center should not be faulted, for this kind of imprecision is an inevitable part of most stratification systems) and to the apparent fact that prehistoric site and isolate densities tend to be especially high in direct association with extinct lake features. That is, our crosscutting landform classification (the "valley bottom" domain in particular) has served to highlight and differentiate that region within the vicinity of playas which contain the greatest densities of prehistoric remains.

Previous research in the Great Basin has shown the transition zone between the upper bajada and the mountains to be one of especially high site density (e.g., Thomas and Bettinger, 1976, Lindsay and Sargent, 1978), but those studies have tended to be confined to relatively small study areas. The larger size of the Nellis study region provides an opportunity to explore the significance of this transitional zone further. Only three of the Nellis sampling strata contain significant numbers of sample units within the upper pediment and mountain topographic settings. They are the pinyon-juniper, northern desert shrub, and salt desert shrub strata. For present purposes, the latter two strata are combined into a single stratum, the desert shrub stratum. Table 2.2.4.3-8 summarizes the distribution of prehistoric loci from these two strata in upper pediment and mountain settings. When comparisons are made between strata, the pinyon-juniper stratum is found to have a higher percentage of sample units with sites in both topographic settings. Within-stratum comparisons show that, for the pinyon-juniper stratum, sites are most abundant in the upper pediment setting, while for the Desert shrub stratum, they are most common in the mountains. Figure 2.2.4.3-1 provides a basis for making a more detailed assessment of these differential site distributions. Within-stratum comparison shows that MA sites predominate in the upper pediment setting for the pinyon-juniper stratum. This suggests that this was the preferred locus of longer term occupations for exploiting pinyon nuts as documented by Steward, 1970 and Thomas, 1973. The desert shrub stratum has a predominance of LA sites in both topographic settings, but LA sites are most abundant in the mountains. Between-stratum comparisons further support the contrast between shorter term occupation within the Desert Shrub stratum and longer term occupation in the pinyon-juniper stratum. The behavioral significance of these different patterns are not explored further here. This discussion does serve to establish the need to explore, in much greater detail, the variability in the spatial distribution of archaeological resources within the study region. For example, for present purposes it has been necessary to assume that all foothill zone areas are of equivalent sensitivity in order to conduct the

Table 2.2.4.3-7. The distribution of prehistoric loci within the playa, lake terrace, and playa margin strata.

PREHISTORIC LOCI	TOPOGRAPHIC SETTING		
	VALLEY FLOOR	OTHER	TOTAL
Absent	20 (40.0)	13 (73.0)	33
Present	30 (60.0)	5 (27.0)	35
Total	50	18	68

3986-1

Column percentages are shown in parentheses.

Table 2.2.4.3-8. Site distribution in the upper pediment (UP) and mountain (MT) settings.

PREHISTORIC LOCI	SAMPLING STRATUM			
	PINYON-JUNIPER		DESERT SHRUB	
	UP	MT	UP	MT
Present	9(90%)	14(67%)	17(45%)	6(60%)
Absent	1(10%)	7(33%)	21(55%)	4(40%)
Total	10	21	38	10

4078

Column percentages shown in parentheses.

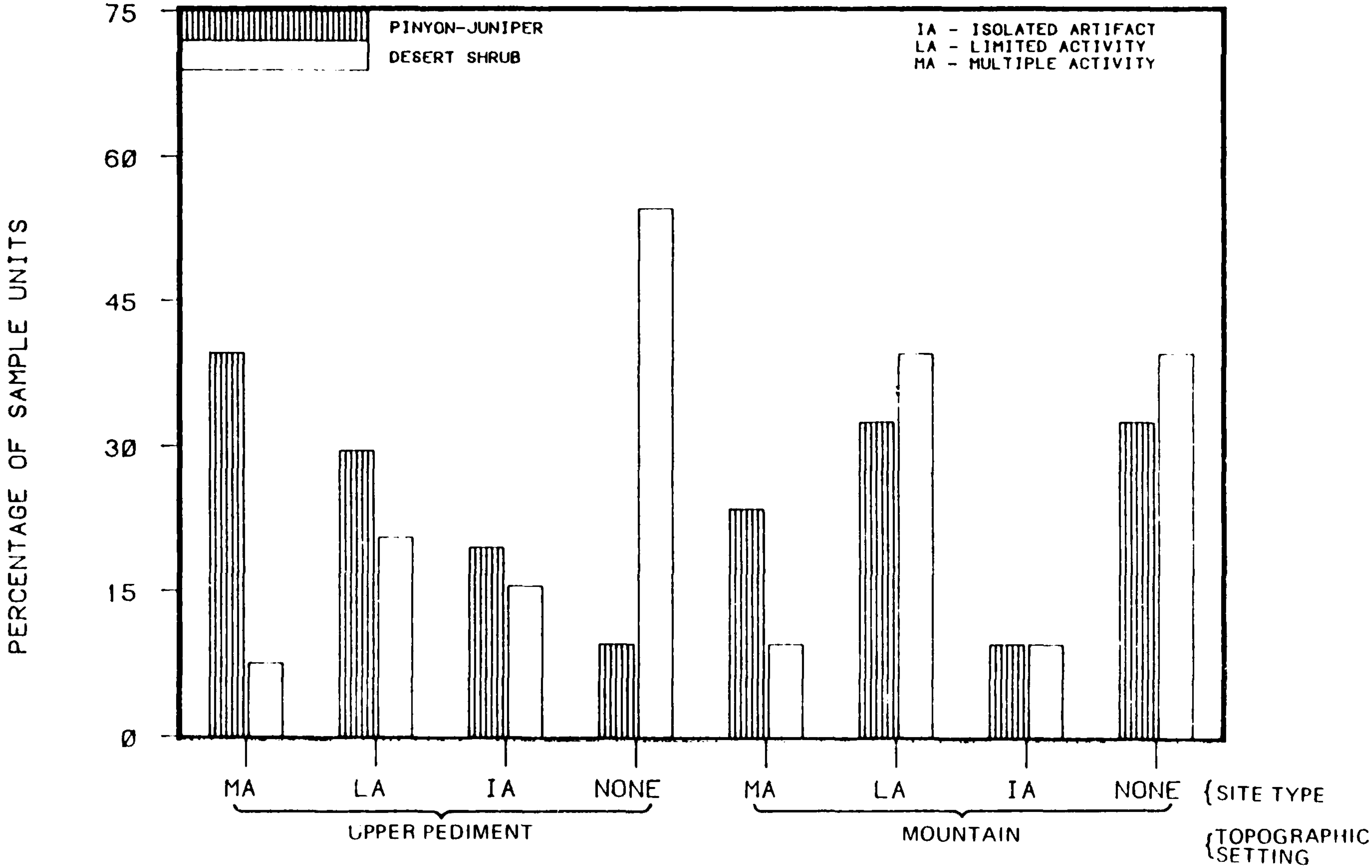

Figure 2.2.4.3-1. The distribution of archaeological site types in upper pediment and mountain settings.

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region-wide impact analysis for 2.5. The present information suggests that such an assumption may overestimate archaeological sensitivity in some cases while underestimating it in others.

Summary

Collectively, this evidence would seem to suggest that two loci of major prehistoric importance were the spring and the pediment area in direct association with juniper-pinyon stands. Habitation sites tend to occur at these locations and site densities seem to be noticeably higher. One would expect to find clusters of sites distributed out from these loci, reflecting well-developed and defined habitation and subsistence activities centered around them.

Additional Archaeological Data (2.2.4.4)

In the Draft Environmental Impact Statement the existing data base and the Nellis Air Force Range data were used to identify sensitivity zones to aid in the impact assessment. These zones were qualitatively ranked according to site sensitivity. Table 2.2.4.4-1 illustrates these determinations. Numerous states and individuals felt these rankings, and the data which were used in their formulation, were inadequate. For example, the State of Utah noted:

> "This section shows some thought relevant to the kinds and general extent of impacts anticipated. However, there is no quantification of the sort that one can really come to grips with. "Real" numbers on sites, density types, and projected losses will have to be produced for a satisfactory analysis." B0156-8-402

Similarly, the State of Nevada commented:

> "The current data base is inadequate... It is a legal obligation of the Air Force to provide a more adequate data base . . ."

Arthur Brunwasser of San Francisco, California, similarly commented that "with respect to archaeological impacts, there are deficient explanations concerning the alternatives. The DEIS and ETR-23 cannot form the basis for selecting alternative sites."

As a result of these and similar comments, new data have been incorporated into the Impact Assessment. The bulk of these data are derived from the 100 sq mi (64,000 acres) regional sample survey conducted in 1980. This systematic survey examined 31 hydrologic subunits, or watersheds, in Nevada and Utah, and identified 966 sites and isolates including 405 prehistoric sites, 451 prehistoric isolates, 54 historic sites, and 56 historic isolates. Analysis of this data base identified new sensitivity zones and permitted the calculation of their site densities. A detailed discussion of the surveys sampling design, methodologies, and results is provided in Section (2.4).

In addition, the new baseline data are derived from recent surveys in Coyote Springs (EDAW 1981a), WahWah Valley (Ertec, 1981) and the Beryl/Milford area (EDAW, 1981b). These small surveys provide site density data for areas not adequately sampled during the 100 square mile survey. A total of 58 sites and 66 isolates were located during these surveys.

Table 2.2.4.4-1. Sensitivity descriptions for the Nevada/Utah study area utilized in Draft EIS.

SENSITIVITY DESCRIPTION	DEFINITIONAL CRITERIA
Very high	National Register sites (2-mi radius) or districts (1-mi buffer zone)
High	Springs: Valley springs - a radius of 1 mi (1.6 km) Playa margins - a 1-mi (1.6 km) wide zone around the perimeter Perennial streams: (a) a 1-mi (1.6 km) zone along each side of streams flowing through valleys (b) a 1-mi (1.6 km) radius around the point where permanent mountain streams enter a valley Known site clusters
Moderate	Unwatered foothills - a zone 2 mi (3.2 km) wide at the juncture between mountains and valley alluvium The area between 1-2 mi (1.6-3.2 km) from springs
Low	Unwatered mountain areas Playa bottoms Unwatered Mid-lower bajada areas
Very low	Not used. Further research may show that certain highly disturbed areas have very low sensitivity

500-1

In sum, the analysis provided in the present document is based on a much broader data base than utilized in the Draft EIS. Analysis of this data base, presented in Section 2.5, has allowed the statistical identification of sensitivity zones, and their associated site densities.

2.3 HISTORICAL AND ARCHITECTURAL RESOURCES

This section provides a historical overview of the development of Nevada and Utah and the factors which contributed to the patterns of land use in each state. Although there are other historical dimensions affected by M-X, the physical domain in which the history of a region is played out is of primary importance in understanding and interpreting the less tangible aspects of history. Historical and architectural sites are also the dimension of history which M-X deployment will most immediately impact. Below, a short discussion of the state of historical research and writing in the Great Basin prefaces the overview of historical development of the region. The section closes with a statement on methodology and research problems which might be illuminated by the Great Basin historical data base.

HISTORICAL OVERVIEW OF UTAH AND NEVADA (2.3.1)

Previous historical research in Nevada and Utah has produced a number of state histories. In Nevada, these have been general works, detailing the chronology of political and economic developments, with less attention to ethnic history, topical studies such as labor, politics, education, ranching or mining, or county histories. Nevada history in particular has been little researched and written. Utah has fared somewhat better, especially in the detailing of the history of the Church of Jesus Christ of Latter Day Saints (LDS Church) and its impact on the secular state. However, even in Utah, most attention has been paid to the settled areas of the Wasatch Range, with very little research on the sparsely settled western desert region. In both states, the regions to be most affected by M-X deployment are inadequately covered in the historical literature. As a result, the detail needed for an evaluation of M-X impact on Nevada and Utah historical and architectural resources is lacking for the regions most affected. Furthermore, because of the scarcity of published data, an evaluation of historical significance and relative value of historic resources cannot be made with certainty, unless primary research work in the regional records and thorough oral interview is accomplished.

The State of Utah has expressed concern in addressing previous research that identify historic resources in the western states.

> There is no review of the previous research accomplished on identification of historical resources as there is for archaeological resources . . . . This review of previous research in identifying historical resources is necessary to indicate the relatively recent concern with determination of historic sites in Nevada/Utah and an explanation of the small number of sites (including archaeological) which appear on the National Register by comparison to other western states.

In response, an expanded listing of research is provided below.

Recent published works offering a picture of the general historical developments in the areas of Nevada and Utah which will be impacted by M-X include, but are not limited to the following publications. This list is not exhaustive and is intended to provide only an introduction to the writing of the last forty years.

Nevada: Athearn, 1971; Bartlett, 1962; Carlson, 1974; Cline, 1963; Edwards, 1978; Elliott, 1973; Hulse, 1978; Jackson, 1952; Lillard, 1942; Myrick, 1962, 1963; Paher, 1970; Shepperson, 1970; Thompson, 1947; Federal Writers' Project, 1940. Regional and topical works are available and listed in the bibliography of historical references.

Utah: Arrington, 1958; Arrington and Bitton, 1979; Carr, 1972; Francaviglia, 1978; Jenson, 1941; Miller, 1968; Neff, 1940; Peterson, 1977; Utah Writers' Project, 1940, 1945. Additional works on regional and county histories, and topical studies, are included in the bibliography of historical references.

Government agencies have produced some special subject reports which provide much valuable historical material. The U.S. Bureau or Mines, Geological Survey, Bureau of Land Management, and Forest Service have all produced important papers dealing with area geology, mining, water resources, cultural resources, and ranching. State agencies have also produced papers on these subjects. Relevant papers are included in the bibliography of historical references.

Architectural resources have received perhaps the least attention of all in the historical literature. In Nevada, very few inventories exist of the state's historical architectural resources. None are county-wide except where individual properties have been listed in the inventory of historic engineering properties conducted by Texas Tech (1980), and in the survey for the State of Nevada conducted by the Desert Research Institute (Mordy and McCaughey, 1968). Aside from individual properties nominated to the National Register of Historic Places and thus described in detail, there is very incomplete information in the record regarding the architectural styles, design and materials of the historic structures. For Nevada, the City of Las Vegas Historic Preservation Inventory and Planning Guidelines prepared by Page & Associates (1978) contains the most complete record, but of only a portion of Nevada's most populous city. In Utah, there have been a few studies on Mormon landscapes (Francaviglia, 1978) and buildings (Kepper, 1979; Mortensen and Anderson, 1969; Pitman, 1973) but in general the work of describing the full range of historical architectural resources remains to be done in both states.

The historical overview of Nevada and Utah is focused on developments that influenced and shaped land use in the portions of the two states that will be affected by the deployment of the M-X system.

Great Basin history can be divided into two periods: Spanish/Mexican and American. These two periods coincide with political developments that also signal major changes in regional land use. The Spanish/Mexican Period lasted from the discovery of America in 1492 to 1848. The American Period began in 1848 with the acquisition from Mexico of the territory John C. Fremont had called the Great Basin. At the onset of the American Period, the Great Basin was drastically affected in a "future shock" manner by the Gold Rush of 1849 and by the coincidental arrival of the Mormons in Utah in 1847. Their arrival at the end of the Spanish/Mexican Period placed the Mormons in the vanguard of Anglo-American impact on the Great Basin. Thus, the division of the history of the Great Basin into these two periods reflects changes in the region's political, social and economic history.

Nevada and Utah share a similar history up to 1850. The Great Basin was one of the last frontiers of continental United States to be explored by non-Indians. The history of the region during the Spanish/Mexican period is one of gradual penetration and discovery by people whose activities covered the entire Basin. The history of these activities pertains to one ecological region, not to separate political entities.

I. SPANISH/MEXICAN PERIOD: 1492-1848

A. Spanish/Mexican Exploration 1540-1825

Spain laid claim to the American southwest following the discovery of the New World by Columbus in 1492. Subsequent voyages of discovery and overland explorations were made by Pizarro, Cortes and others. By 1540, Don Francisco Vasquez de Coronado had explored from New Mexico, overland, all the way to present-day Kansas. Hernando de Alarcon attempted to rendezvous with Coronado by way of the Colorado River. Failure of these expeditions to locate a great wealth of silver and gold or land with good agricultural potential caused the Spanish government to dismiss the region as unproductive. On Spanish maps for the next two hundred years, the region was labelled "Land of Northern Mysteries" (Cline, 1963), although the Spanish continued to place mythical mountains of silver and interior rivers on maps, attesting to the persistence of the belief that there were such phenomena somewhere in the land north of Mexico.

Little attempt was made to explore the "mysteries" of the northern territories. New Spain pushed its frontier only as far as Santa Fe (1610) and coastal California (1769) in the two centuries following Coronado's and Alarcon's expeditions. Finally, in 1776, an attempt was made to open up a route through Utah and Nevada and join together the frontier outposts of Monterey, California and Santa Fe, New Mexico. Two Franciscan monks, Fray Atanasio Dominguez and Fray Silvestre Velez de Escalante, and a small party of civilians set out from Santa Fe in the summer of 1776. They headed north, following routes known by traders and fur trappers, passing into unknown territory in southern Colorado. The expedition pushed northward as far as Utah Lake, where they turned south to avoid the searing Great Salt Lake Desert. In southern Utah the men became discouraged by their evident distance from the California coast and by the hardships of the trail. The party turned easterly in southern Utah, crossed the Colorado River and returned to familiar territory in early winter of 1776. The diary of this epochal journey has been translated and interpreted several times in the 20th century. The most recent work (T. Warner, 1976) includes the best information to date on the exact route of the expedition.

The diary of the Dominguez-Escalante expedition and the map made by Miera, one of the civilians who accompanied the party, became important sources of information for Spanish traders in the years that followed. Contact was maintained with the Utes for trade in goods and slaves, and prospecting parties moved northward into the Colorado/Utah region (Hill, 1921 rep. 1964). Much of the Dominguez/Escalante route became known to these New Mexican enterpreneurs, but no one succeeded in travelling from Santa Fe to the missions of California until

American fur traders had first bridged the gap between southern Utah and southern California's Mojave River. This important event occurred in 1826-27, after political control of the region had passed from Spain to Mexico in 1821.

B. Fur Trappers 1826-40

American, British and French-Canadian fur trappers began moving into the Rocky Mountain and Northwest Coast areas in the early 19th century. Some Americans and French had also become established at Santa Fe. By the mid 1820s, the Hudson's Bay Company of Canada was locked in economic combat with the American trappers who sought to dominate the fur market. Peter Skene Ogden of Hudson's Bay Company first entered the northeast Great Basin in northern Utah in 1825 (Miller, 1952; Rich, 1950). In the next few years, he deliberately set out to trap all the fur-bearing animals found along any streams so that the Americans would be kept out of the Pacific Northwest (Cline, 1963; Elliott, 1973). Ogden is generally credited with discovering and naming the Humboldt River and many of its tributaries, the Humboldt Sink, Walker Lake and, incidentally, demonstrating that the legendary San Buenaventura River of the Spanish map makers did not exist.

American Jedediah Smith, partner in the Rocky Mountain Fur Company, in late 1826 set out to discover a new route to the California coast which could provide a direct connection with China, the world's chief fur market. Smith and his colleagues were trapping the northern Rockies that year. He and a small party of men left the fur rendezvous at Cache Valley, travelled south through Utah along the western foothills of the Wasatch Range, moved into Nevada via the Virgin River which they followed to its junction with the Colorado. They then crossed the river, made their way to the Mojave Indians at Needles, and finally moved into southern California by way of the Mojave River and Cajon Pass. Smith eventually led his men into the San Joaquin Valley, and departed from that place to rendezvous at the 1827 gathering at Bear Lake in Northern Utah. In a truly astounding feat, Smith and his two companions made their way across the trackless central Nevada Great Basin, arriving back at the rendezvous in July 1827 via the Great Salt Lake Desert. Smith returned to California via the Southern Utah-Virgin River route later in 1827, and did not again pass through this part of the Great Basin (Brooks, 1977; Morgan and Wheat, 1954)).

A significant expedition was made by American fur trappers in 1833-34. Under the command of Joseph Reddeford Walker, this expedition, known as the Bonneville-Walker party, was sent to explore a route to California. Walker made substantial contributions to knowledge of the Great Basin, and many "firsts" have been identified, among them that his was the first party of non-Indians to make a round trip from the Great Salt Lake to the Pacific byway of the Humboldt River (Cline, 1963; Elliott, 1973; Ewers, 1959).

Unfortunately, this history of exploration of the Great Basin by mountain men and fur trappers is not well documented because the men themselves did not record their findings. Many frontier trappers located in the Rocky Mountains and other western localities knew the basin and undoubtedly were the "first" to discover many of its features. But little has come to us in the written record to substantiate these discoveries. Jim Bridger, Etienne Proveaux, Peg-leg Smith, Old Bill Williams, Miles Goodyear, Kit Carson and many others established trapping circuits in the Utah-Nevada Great Basin during the years of the fur trade. Bill Williams and Miles

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E. Overland Emigration

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F. Settlements

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II. AMERICAN PERIOD

A. Communication: Emigration a

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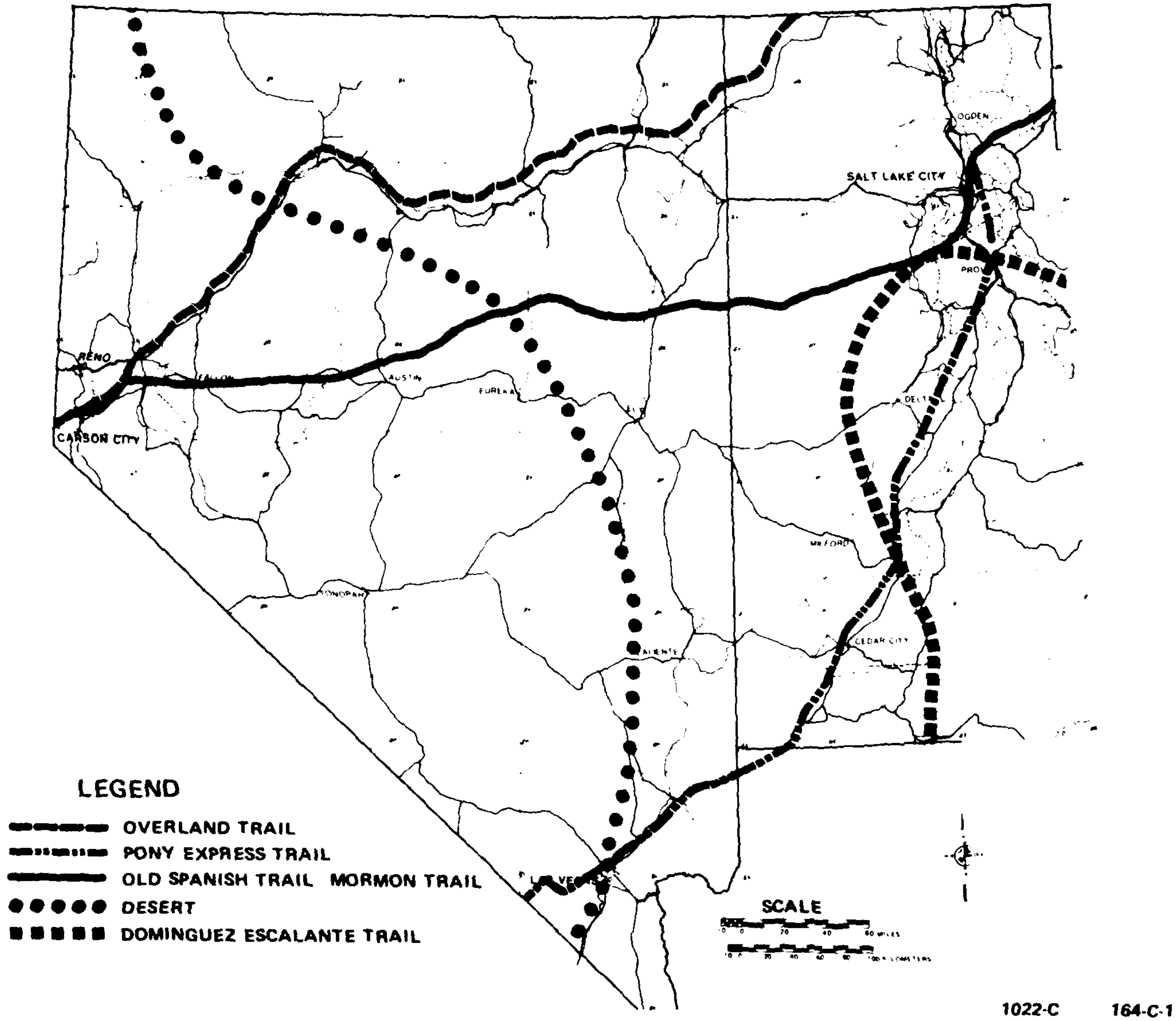

Figure 2.3.1-1. Major historical trails through the Nevada/Utah study area.

1. Humboldt River Route

In the year following the discovery of gold in California in 1848, overland emigration swelled to a tidal wave from the trickle noted in the Mexican Period. Thousands of people poured west by wagon and on foot, churning the trails into dust, their animals using up all available forage, polluting the water and generally inflicting great damage on the Great Basin ecosystem. This, in turn, had a great negative impact on the native population of the region. The earliest trail developed along the Humboldt River in Nevada, the longest Great Basin water course, which traversed generally east to west. Good references on this route include Morgan (1943) and Stewart (1962).

2. Spanish Trail/Mormon Road

Most Forty-niners who crossed Utah and Nevada travelled via the Humboldt River route. Some, who arrived in Utah too late to cross the Sierras in winter, opted for the southerly Spanish Trail route. An offshoot of the first wagon train party to use this trail, then poorly known by Americans, became known as the Death Valley Forty-Niners. They tried to shorten the route by cutting off from the trail at Mountain Meadows in southern Utah and heading directly westward. This route led them through very rough and waterless wastes, and finally into Death Valley itself. Their escape from this extraordinary place has been made famous and is covered in great detail in literature. It is usually forgotten that they were but a single splinter group of a party that made it safely to California with no loss of life by following the established Spanish Trail through southern Nevada. The classic work on the Spanish Trail is Hafen (1954). Recent research has challenged Hafen's interpretation (Warren, 1974), but not the basic identification of the route.

The Humboldt Trail continued as the major overland emigration route until a route across Central Nevada was opened in the mid to late 1850s. Freighting between Salt Lake City and coastal California was developed extensively in the 1850s by Mormon teamsters. Their preferred route was the southerly road that was developed on the Old Spanish Trail through Utah, but which was considerably modified through Nevada and California. This Mormon Road was used by hundreds of wagons conducting commerce between the Rocky Mountain West and California coast, and was perhaps the major connection between the two regions until the 1860s (Warren 1980).

3. Central Route

Howard Egan, a Utah resident engaged in stock raising and marketing, pioneered a new route across the Great Basin in the mid 1850s (Egan, 1917). No significant use was made of this new, shorter route until the end of the decade, when both the postal department and the military became interested in shortening the roudabout Humboldt River journey (Simpson, 1876). In 1859, the mail route was moved to this new route and for that year a special mail service was established, the Pony Express (Figure 2.3.1-1) (Bluth, 1975, 1976; Carter, 1960; Fike and Headley, 1979; Floyd, 1958; Hardesty, 1979; USDI BLM, 1976). With stations built at ever closer intervals over the next several years, this route became the heaviest travelled passage connecting Sacramento and Salt Lake City, and was served by both express and regular mail carriers, stage and freight lines. Some of the first ranches in the Great Basin were established in order to serve the needs of the horses and men who worked this line.

Military bases were also established along this trail to protect the traffic from Indian depredations. The earliest military bases in the Great Basin include Camp Floyd in Utah (1858), Fort Ruby (1862) and Fort Churchill (1861) in Nevada. All were located along the central route (Orton, 1890; Parker, 1978; Rogers 1938; Ruhlen, 1964). Additional explorations to discover good wagon routes were made by the military in the second half of the nineteenth century. Mowry (in Bailey, 1965) and Wheeler (1872, 1889) pioneered many trails which later became wagon roads. Dorothy Cragen's (1975) work contains much information on these activities.

The Department of the Interior also sent exploring parties into the Great Basin during this period. Important information on routes and geography in the M-X region is found in the report of Clarence King's survey along the fortieth parallel (1870-1880). A good summary of the major exploration surveys conducted by the United States after the Civil War is found in Goetzmann (1959).

The transcontinental telegraph line was constructed in 1861 parallel to the Central Route. Its completion signalled the end of the Pony Express, which was then no longer the swiftest mode of communication between east and west (Thompson, 1947).

4. Rail Communication

An important issue throughout the United States in the decade of the 1850s was the best route for a railroad to link east and west. The U.S. Army was assigned reconnaissance duties to discover preferred rail routes, and diligently pursued this activity in the mid 1850s. The thirteen volume Pacific Railroad Surveys (1855-69) which resulted contain a wealth of information on the topography, water, geology, flora, fauna, Native American populations, archaeology, contemporary road and trail networks, towns and ranches. Additional monographs have been published which contribute data bearing on individual railroad exploring parties which operated in the M-X deployment area (e.g., Heap, 1853 in Hafen, 1957; Beckwith, 1855).

Rail communication was finally opened up through the west via the Humboldt River. In the 1860s the Central Pacific Railroad was constructed through Nevada from California, to meet the Union Pacific being built westward from Omaha. Their junction occurred at Promontory Point, Utah, in 1869. Completion of this more rapid transportation system opened up vast new areas to commerce, mining and settlement, and caused relocation of regional networks of supply and communication (Athearn, 1971; Myrick, 1962, 1963). No other regional rail line was constructed that so opened up to development new areas of the Grat Basin until the twentieth century, when the San Pedro, Los Angeles and Salt Lake Line was constructed through southern Nevada. This new line tied together coastal California at Los Angeles with the Union Pacific's lines in Utah. The commercial and mining development of this region boomed as a result (Myrick, 1963).

5. Automobile Roads

Automobile roads linking the Great Basin with the rest of the nation were a relatively late development. The Midland Trail was the first to receive national attention, designated as a major transcontinental route in 1916 (National Midland Trail Association, rep. 1969). The route followed the old Central Nevada wagon road. In later years, much of the Midland Trail was incorporated into the Lincoln

Highway, the first paved transcontinental highway in the United States, and part of the Pony Express route of 1860 became a motor route. Automobile roads grew in number and scope throughout the twentieth century. The changing patterns of road use both reflected and changed the fortunes of settlements located along them (see U.S. Federal Writers Project, Nevada (1940) and Utah (1945)).

B. Settlements

Analysis of the pattern of settlements of Nevada and Utah Great Basin regions reveals significant differences in the motivation for settlement and types of communities that were founded. These differences reflect major differences also in the kinds of people who settled each region and imparted to each a characteristic flavor. The social history of these cultural patterns is of great importance to an understanding of the impact of M-X deployment in the Great Basin. Such a social history remains to be written.

Following are brief overviews of the settlement of the Great Basin of Utah and Nevada. At this stage of the EIS process, the general characteristics of the historical developments are identified and briefly summarized. More detailed description and analysis are appropriate at later phases of the EIS process, after the preferred deployment valleys and base stations have been selected.

1. Utah

Sources for the study of Utah history are generally not specific to the M-X area. There have been numerous general histories focused on the more heavily populated areas of Utah but the sparsely settled western deserts have been given little coverage. Some information is available from the various county histories produced by the Daughters of Utah Pioneers: Bradshaw, ed., 1950 (Washington County); Daughters of the Utah Pioneers, 1961 (Tooele County); Day and Ekins, comps., 1951 (Millard County); Merkley, ed., 1948 (Beaver County); and Dalton, n.d. (Iron County Mission and Parowan); McCune, 1947 (Juab County). Additional information is available from Jenson's Encyclopedia History of the Church of Jesus Christ of Latter-Day Saints (1941). This overview of the general thrust of the region's history has been drawn from general sources. The general trends identified in those sources cited are also found in the specific areas of western Utah that may be used for M-X deployment.

In the early years of settlement of the Great Basin, distinctive patterns were established in Utah that are detectible 130 years later. The Mormon geopolitical strategy, adopted as a result of their lengthy period of persecution in New York, Ohio, Illinois, and Missouri, was to emigrate to an unpopulated region of the West, where they could become established before any other people had come to claim the land. There they could be the first to develop industry and commerce, and their unpopular religion could mature without pressure from neighboring competitors. Once situated in Utah, the Mormons acted to fill up the agriculturally promising lands with their own people, effectively closing out non-Mormon ("Gentile") settlement (cf. Day, 1968:233-4).

The Mormons responded to perceived threats to the well-being and security of their Rocky Mountain kingdom in a variety of ways. The first recognized threat was the sheer number of emigrants to California attracted by gold. These people could overwhelm the small, vulnerable frontier settlements by their demands for food and draft animals. They might antagonize the Indian population against their new neighbors; Mormons had been instructed by their Church elders to win over the Indians with biscuits not bullets. Other social mechanisms for enlisting the support of the Indians included intermarriage with Indian women and adoption of Indian children. In some cases, the latter was accomplished by a form of purchase from the Indian parent or a slave trader. Men who learned the Indian languages well and who were able to trade with them were called to perform missions of interpreting and trading with the Indians in the interests of establishing a permanent bond between the Mormons and Indians. The Native Americans of southern Utah and Nevada learned to distinguish between "Americans" and "Mormons," and generally harassed the former but not the latter (Korn, 1954; Jenson, 1926).

Until 1869, the Mormons were able to develop in isolation in their mountain retreat. With the arrival of the transcontinental railroad, however, the Church feared that the solidarity of the people would crumble in the face of the appealing new consumer goods that would become available, that the people's limited supply of money would be spent on unneeded items, and incur debts, and thus, the Mormon community would collapse. Church elders planned a two-pronged approach to these potential problems. First, the Church established its own mercantile institution (Zion Central Mercantile Institution or ZCMI) that would act as a central agent for all goods entering or leaving the Mormon community. In support of this centralization, each Mormon community would also open a cooperative store where goods could be brought from the community and exchanged for manufactured goods that had been imported via rail with ZCMI as agent. All Mormons were asked to buy and sell only through the Co-ops, so that the entire community of Mormons would benefit from this centralized activity (Arrington, 1958).

Secondly, the Women's Relief Society was organized to provide assistance to families that were in need, and to encourage the women to forego fashion and frills in favor of solid frontier necessities. Women who bought yard goods from the east rather than home-made products were subjected to severe social pressures to comply with the wishes of the Church and make their own. Women were encouraged to grow, spin and weave cotton, linen, and woolen fabrics, and to make their family's garments from these materials. Silk worms were imported and mulberry trees planted to provide food for the worms, in an attempt to produce not just the homespun fabric for everyday use, but fancy goods. During this period, luxuries such as tobacco, coffee, and sugar were discouraged. Sugar was eventually produced by processing sorghum and later sugar beets, but tobacco and coffee became substances of non-use by Mormons that continues today.

Eventually this close-knit society did weaken somewhat, and the hold of the Church over its members in economic matters lessened. However, there is still a strong emphasis placed on the "communal good," with self-reliance instilled in all Mormon families, and strong pressures for each family to provide for its own survival. Ideally, a two-year supply of foodstuffs and basic necessities is stored by each Mormon household in case of civil insurrection or some other disaster. There is still a widespread economic network that makes available the products of one region to the Church members of another region through a barter system. Mormons tend to prefer to deal with one another in economic and social matters as well as religious ones, and Mormon communities still do not welcome outside influences (Lake Mead Monitor, July 17, 1980, 0.2, Col. 2-3).

Politically, the Church is still a powerful force in Utah as well as Nevada, despite the growth of the non-Mormon population (Louder and Bennion, 1978). Part of the reason for this is that the Church emphasizes voting as one of the examples of good citizenship. All members are urged to vote, and the percentage of voters among the Mormon population is higher than among non-Mormons. Consequently, the Mormon influence is proportionately greater than their numbers might otherwise indicate.

Mormonism began as a utopian religion of early 19th century upstate New York farmers. Later converts to the Church of Jesus Christ of Latter Day Saints were drawn primarily from Northern Europe, Scandinavia, and the British Isles (Louder and Bennion, 1978). This fact has had important consequences on the ethnic makeup of the Mormon population, and on its religious tenets. The first blacks encountered by immigrant Mormons were either slaves or freed slaves, and their low social status was reflected in Mormon doctrines regarding the position of blacks in the Church hierarchy. In the past few years the Church decided, by revelation, to allow black members to advance to the priesthood and take a full role in the Church hierarchy. Indians, on the other hand, considered by the Church to be descendants of the "Lost Tribes of Israel," were afforded special treatment and they were to be accorded every opportunity to learn the message of the Book of Mormon and to gain salvation through adopting its precepts.

The Mormon pioneers were often destitute. Some had been reasonably well off financially before they were harried out of their homes in the east. Others, particularly converts from Great Britain in the 1850s, were too poor to be able to afford the costs of emigration to the United States. The Church set up a fund to assist these people to come to Zion on the shores of the Great Salt Lake, and many of them were members of the various handcart caravans that plodded across the plains from St. Louis. The impact of those difficult years had important ramifications for the Mormon community, stressing the value of cooperation and mutual support in the face of all kinds of adversity. It also had lasting impact on encouraging thrift, frugality, and careful use of resources, particularly manufactured items. Recycling has always been a way of life on the frontier, and it was especially important in the Mormon communities.

Polygamy was undoubtedly the Mormon custom that had the greatest impact on its developing community and the relationships between the Mormon community and the rest of the nation. This custom placed the entire Mormon Church outside the accepted marital and family practices of the American nation, and of most of the European communities which were the source of converts. The custom so antagonized the American people that the people of Utah were not permitted to attain statehood until 1896, despite their considerable population. Finally, Church President Woodruff issued a Manifesto in 1890 that foreswore the practice. After this, the Congress was willing to entertain a petition for elevation of Utah to state status.

Although the practice was disavowed in the late 19th century, polygamy persists in isolated pockets of the Great Basin. Within the region of Utah directly impacted by the M-X, some polygamous communities are found. There appears to be no move on the part of the state or federal government at this time to take any punitive measures against the people of these communities.

In most of the area to be impacted by the M-X missile deployment, agricultural settlement was made in waves of Mormon dispersion from the Salt Lake City-Mormon Corridor. In the western desert region of Utah, the land was agriculturally less valuable and would support only a small, widely dispersed population. Mines operated by non-Mormons provided temporary attraction to outsiders, whose large numbers swelled the county censuses for a few years and then left when the boom was over. Persistent settlements in this area include railroad towns as well, which have survived boom and bust cycles because they have come to serve a variety of needs in a dispersed area. Only with the competition from trucking in the last 25 years has there been much decline of traffic at the rail centers. With the current energy shortage, rail centers may well see renewed activity at the expense of trucking.

Utah was pioneered by the Mormons in 1847, when the vanguard of settlers arrived in Salt Lake Valley. For the first twenty years, all Utah settlements radiated out from the Salt Lake headquarters. Only Camp Floyd and Camp Douglas, military bases established in 1858 and 1862, respectively, were exceptions to this (Peterson, 1978). Mormon settlements were first and foremost agricultural; secondly they were villages. Isolated ranches were not apparent until after 1868, when federal homestead laws were applied to Utah (Peterson, 1978). Mining camps were attempted by non-Mormons ("Gentiles") in 1864, but did not persist. A solitary river port was attempted at Callville on the Colorado River, but it was abandoned within three years of its founding (Rosenvall, 1978:59).

The chronology of Mormon settlement of Utah reflects the need for support of traffic along the Mormon Road between Salt Lake City and coastal California. This traffic moved along the foothills of the western peaks of the Wasatch Range. Virtually all the settlements fostered by Mormon Road traffic were established east of the M-X deployment impact area (cf. Co. Histories, Miller, 1968). In 1851, the Mormons purchased land in California and established the community of San Bernardino as the western terminus of the road linking Salt Lake to the coast, via the all-weather route of the Spanish Trail. As traffic increased along this road, settlements were established at key stock-forage and watering spots. Although a few people had begun individual ranches before the towns were begun (as at Lehi and American Fork), by 1850 these gave way to town settlements planned and engineered by the Church elders. The Mormons' penchant for cooperation and their Church's recognition of the desirability of cooperative settlements on the frontier combined to favor farming communities over isolated individual holdings.

This Mormon penchant for cooperation (Peterson 1978) was fostered by the persecution experienced by members of the Church in the years of the developing religion in the East. Forced to rely upon one another and to survive economic, social, and political as well as religious, persecution and ostracism, the Mormons had become thoroughly communal in orientation by the time they arrived in Utah. The strength of the ties that bound them together continued to function in tneir new homes in the west, as they strove to overcome natural and social forces that threatened their survival. The trust they placed in their religious leaders, who became social, political and economic advisers as well, resulted in a mostly unwavering support of the wishes of the church hierarchy.

It was then, and still is, the custom of the Mormon theology to send its people on special missions for the benefit of the entire populace. Such mission might be to convert new members and bring them "home to Zion," to locate and exploit particular natural resources needed by the community, especially resources that would enable the group to become self sufficient and economically independent of the capitalists of the east, or to convert and pacify Indians who lived adjacent to the wagon roads that were essential to the isolated communities. The Church decided when and where settlements would be made, who was to go and what the purpose of the settlement would be. The design and economic focus of the community were set forth also. In the period 1847 to 1900, 497 communities were established in this manner in the United States. While some 69 (18.9 percent) failed, the remainder persist despite modern change and population shifts (Rosenvall, 1976:52).

a. Agriculture. In the area under consideration here, settlements were begun along the "Mormon Corridor" (the trail through Utah to San Bernardino) as early as 1849. Parowan, considered the headquarters for settlement of southern Utah, was established in 1850, and Cedar City was begun as an iron smelting experiment in 1851. Other smaller settlements were established at regular intervals along the trail, with ten miles considered the ideal distance apart although there was variation from this (Peterson, 1978:94).

The Church advised the settlers to build fortified villages for greater security. These "forts" were places of defense for the infant settlements. In time, people would move out of them to build homes, but still within a large, four-square complex. The distinctive settlement pattern of the Mormon community on the frontier, very European in its organization, consisted of a nucleus of homes with gardens and barns, small outlying agricultural plots assigned to individual families, and larger, common hay and grazing fields. Still farther removed were the "big range" areas for dry stock, Church cattle, off-season oxen and cooperative herds. Minerals, building stones and timber, also used for the common good, were not individually claimed (Peterson, 1978:95-6).

In 1855, a new wave of settlements was sent out to the very borders of "Deseret," as the Mormons called their territory. A mission was sent to Mormon Station in western Utah which had earlier been a trading post operated by Mormons from Salt Lake. Renamed Genoa (now in Nevada) the community brought the first attempt at government by Mormons, in whose territory the town was established but who were at odds with the Gentile faction of the town. A mission was also sent to Las Vegas, then in New Mexico Territory, where a fort was built.

The arid basins of western Utah provided few opportunities for agriculture. Natural water sources are scarce and produce little water for irrigation. In the 19th century, a few ranches and farms were established in Snake Valley and Deep Creek Valley in Utah, and in Spring, Meadow and Muddy valleys of Nevada. These were dependent on scanty surface water supplies and many were highly vulnerable to flash flooding, a characteristic of desert precipitation. Beginning in the 19th century, flood control dams were built in the region, providing some protection from flooding and water storage for irrigation. These dams enabled older settlements to survive and new farming regions to develop. The most important new agricultural settlement in the M-X area was at Delta, Utah, which was constructed on the flood plain of the Sevier River (Day and Ekins, 1951).

As agricultural potential was realized, grains were produced in quantity, entailing the need for grist mills. The small mill established at a ford on the Beaver

River eventually became also the southern terminus of the Utah Southern Railroad (Merkley, 1948) but was known by the name describing its two early functions: mill and ford. Milford, Utah, a potential M-X operating base site, was an early commercial center built upon agricultural services. It provided rail service to Utah and nearby eastern Nevada for several decades before the completion of the present Union Pacific Line in the early 20th century.

b. Commercial. Until 1869, the only Mormon attempt at a commercial establishment other than those incidental to the agricultural plan and millsites dependent upon agricultural produce, was the river port at Callville. Callville, the county seat of Pah-Ute County, Arizona, before the land was taken from Arizona Territory and given to the State of Nevada in 1867, was located along the Colorado River a few miles above the mouth of Las Vegas Wash. Here the Mormons hoped to establish a river port that would expedite overland emigration to Salt Lake City by permitting converts to travel to the interior by Colorado River steamer. A river port would also decrease the cost of importing goods from the coast by the laborious overland wagon travel. The warehouses were scarcely built before the town was abandoned in 1867. The transcontinental railroad was nearly completed then, and the Mormons endeavored to convince the railroad company to connect at Salt Lake City (Edwards, 1978; Levitt, 1934).

Salt Lake City was always the center of commerce for Utah because of its location at the junction of several wagon roads. Although the city did not succeed in making a direct link to the main line of the railroad, Ogden was designated the junction point after the Mormons donated the land to the railroad for use as a depot. The proximity of Ogden to Salt Lake enhanced the latter's status as commercial center.

An early Utah railroad town was "gentile" Corinne, north of the Great Salt Lake. This town never prospered following the selection of Ogden, a Mormon community, as the railroad's important shipping and junction point. Other railroad towns in Utah originally were almost entirely Mormon, since the Church and Brigham Young sponsored and paid for the subsidiary lines. After the lines were acquired by non-Mormon purchasers, beginning in the 1870s, service was extended to mining areas that were not dominated by Mormon residents. Few achieved any size.(Arrington, 1958; Athearn, 1971; Myrick, 1963)

c. Mining. The desire of the Mormon leadership to achieve economic independence led to strenuous efforts to mine and process ores that were essential to the community. Iron was always in short supply on the frontier; few iron relics remain from the many wagons that were abandoned along the trails because the iron was reworked by later passersby. For example, the gates at the Las Vegas Fort were fitted with iron reworked from abandoned wagons at a popular camp site along the Mormon Road (Jenson, 1926). In 1851, the Iron Mission was established at Cedar City, but because the Mormons lacked sufficient money and equipment, the project failed within a few years (Jenson, 1941;). In 1856, the Las Vegas Mission was expanded to accommodate a lead mining operation in the nearby mountains. This project, too, failed, because the ores were too "refractory" for the mining techniques of the day (Jenson, 1926).

Other than these and a few other primitive mining operations operated by the Church for its own benefit, the Church hierarchy discouraged its men from trying to prospect and mine gold, silver or other precious metals. The Church, in fact, succeeded so well in closing off all of Utah to this popular "gentile" activity, that Patrick Conner, chief of military operations in Utah during the early 1860s, made it his business to ensure that mining was begun so that the Mormon "stranglehold" on Utah could be broken (Peterson, 1978:94). Connor founded Stockton and Bingham in northern Utah in the mid 1860s. Mining was regarded by Brigham Young as a frivolous activity that caused only grief, thus, anyone who insisted on prospecting and mining was pressured to leave the community. There is some evidence that the claims made by Jacob Hamblin and other Mormons in eastern Nevada in the 1860s may have been attempted on behalf of Church interests in securing all the good ores to prevent "gentiles" from coming into the territory (Townley, 1973).

Mining eventually did become an important industry in Utah following railroad construction, which opened up the territory in the 1870s. Rail lines were extended into southern Utah by the 1880s, supporting mining in southern Utah and eastern Nevada. Generally, non-Mormons operated the mines and Mormon farms supported the mining communities (Arrington 1958; Edwards 1978).

d. Military. Camp Floyd, about 30 mi south and west of Salt Lake City, was established in 1858 by Colonel Albert Sidney Johnson, leading the troops sent by President Buchanan to escort Utah's first non-Mormon governor to office. The camp had important impact on Utah, partly because the military forces paid cash for their supplies provided by the Mormon farms surrounding the area, and partly because it was located at one end of the Central Route across Nevada to California. Consequently, the mails, freight, and other commercial traffic between Salt Lake City and Sacramento passed by the camp, and this traffic was protected by the military forces assigned to the base. Hay fields and stock grazing lands were set aside by Johnston as military reserves, displacing some Mormon activities in Rush and Skull valleys. When the camp was abandoned at the outset of the Civil War, the materials were auctioned off at very low prices to the Mormon residents of Utah, providing them with numerous wagons, cooking utensils and other gear that was hard to obtain on the frontier (Arrington 1958).

In 1862, Major Patrick E. Conner was ordered to Salt Lake City to establish a second base ostensibly to protect the mails and travellers on the Central Route. Conner also regarded it his duty to open up Utah to loyal Americans, hostility being very high at the time between Mormons and "gentiles." The Union Vidette, the first non-Mormon newspaper in the territory, was started at the base by Connor's men. The Vidette counteracted the heavily Church-oriented Deseret News. Camp Douglas was built by Conner on a beach at the east boundary of Salt Lake City; he rejected Camp Floyd as being too far removed from the city. Despite misgivings, there were only minor incidents inimical to Mormon/Gentile relationships. Conner's men did succeed in putting down Indian threats to the mails and overland emigration, and in their spare time prospected for precious minerals (Rogers, 1938). Discoveries were made in 1864, and small but active mining camps were opened at Bingham and Stockton. These camps soon dwindled and became inactive, for the minerals required expensive processing and there was no ready, inexpensive transportation to get them to market. Upon completion of the transcontinental railroad in 1869, this picture changed and eventually even low grade ore bodies could be worked profitably.

Military activity in the Utah area during the 19th century included a number of official exploring and road construction expeditions. Surveys that were either military in nature, or were escorted by the army, included the Stansbury Expedition of 1849; Steptoe, 1855; Simpson, 1859, 1876; and Wheeler, 1869, 1889. Railroad surveys of the Utah area included the Gunnison expedition of 1853 during which Gunnison was killed by Indians in the Sevier Lake region. The project was completed by Captain Beckwith. The John C. Fremont railroad survey of 1848 also ended in tragedy. This survey party became lost in the deep snows of the Rockies, and resorted to cannibalism (Korn 1954). The Simpson expedition was credited with opening up a shorter route between Salt Lake and Sacramento. Simpson followed the Egan route across Central Nevada, found it was by far the best, shortest and most efficient route, and it subsequently was officially adopted as the mail route for the Pony Express.

After the close of the military explorations of the mid-19th century, there was little military activity in Utah until the mid-20th century. In 1941, when the U.S. went to war against Europe and Japan, Utah's open spaces were useful to the military for training and proving grounds, and military reserves were set aside for this purpose. These reserves have been continued and expanded. Hill Air Force Base and Dugway Proving Ground are examples of this use. The Topaz Camp was established near Delta, Utah as a relocation center for Japanese-Americans during World War II.

e. Political capitals. Territorial seats of Utah were Fillmore and Salt Lake City. The first capital was Fillmore, but by the mid-1980s, it was obvious that it was too far from the center of commerce, and the capital was moved to Salt Lake City. County seats were designated as the counties were established, and these have remained to the present day.

2. Nevada

In contrast to Utah, Nevada was not settled in accordance with any scheme nor by any one socio-political group. Nevada's role throughout the early years of the American Period was primarily as a bridge to California. Nevada was not a destination; its mountains, deserts, and Indians all discouraged settlement in favor of better watered climes and above all, the gold country of California.

Nevada was created out of land divided between the territories of Utah and New Mexico as a result of the Compromise of 1850. The New Mexico Territory received all land south of the 37th parallel, and Utah Territory all the land to the north. The trails described previously wound through Nevada, linking the Wasatch Front with coastal California, bringing travellers through the Great Basin and Mojave deserts of Nevada, without enticing anyone to settle there.

Nevada's first settlement occurred at the base of the Sierra Nevada Mountains, relatively well-watered country which provided forage and timber for the wagon trains prior to their last big push across the mountains to golden California. In 1850, a trading post was established at a site that later was named Genoa (Elliott 1970). Within a few years, a small community had developed around the post. Many of the settlers were returnees from California's Mother Lode country who continued to pursue gold prospecting on the eastern slopes of the mountains. The trading post itself was operated by Mormons from Salt Lake City, but while Utah had ostensible political control over the region, no governmental authority was in fact exerted. Brigham Young, Territorial Governor of Utah, was simply too busy organizing government in the more densely populated core of Mormon Utah (Elliott 1973).

This benign neglect spawned a series of attempts by occupants of Utah's westernmost section to set up their own government, to be annexed by California, and finally, to become a territory separate from Mormon Utah. Despite late (1855) attempts to assert territorial authority in these western valleys, and the extension of Utah's county boundaries to include the region, the attempts at separate government were finally successful in 1861, when Congress authorized the establishment of the Territory of Nevada. In 1864, for political reasons, President Abraham Lincoln supported the rush to statehood and the State of Nevada was created. A large population had been attracted to Nevada by the Comstock finds of 1859 , a silver rush comparable to the Gold Rush to California 10 years earlier. The "Rush to Washoe," as it was called, lasted for nearly 20 years, with some booms and busts throughout the entire period (Elliott 1973; Hulse 1978; Lord 1883).

Eastern Nevada mining camps boomed in the 1860s and 1870s, with most declining dramatically by the 1890s. The discoveries at Austin in 1862 spurred prospecting in the remote eastern ranges of Nevada. Crescent, Mt. Irish, Hiko, Pioche, Ely, Eureka, Hamilton and Treasure City are all boomtowns located in the areas under serious consideration for M-X deployment. These communities attracted large populations to the frontier, but their stay was short-lived for the most part. Once the high grade ores were gone, the old works were abandoned for the newest rich site (Gracey 1907-1908; Hulse 1971; Jackson 1963). Their impact on the developing eastern Nevada frontier was nonetheless profound, stimulating new road development, commercial centers and construction of railroads. New counties were created to govern the large populations newly arrived on the frontier, and in the case of Lincoln County, the Nevada governor himself journeyed all the way to the region to collect the signatures needed (Stretch 1867). Nevada's eastern boundary was moved to encompass the newly booming mines; Utah was again the loser in the battle to retain her original territorial lands (Mack, 1936).

The southern tip of today's Nevada remained in New Mexico Territory until the Territory of Arizona was carved out of it in 1863. Prior to that date, a settlement had been attempted by Mormons at Las Vegas with a mission established to provide a way-station for travellers between Salt Lake and San Bernardino, to raise cotton, and to pacify the Indians and teach them hygiene and agriculture. This settlement was occupied by Mormons for only a short time. By 1858, all had left the region (Jenson 1926), and the adobe fort was briefly abandoned. It was reoccupied by non-Mormon miners and ranchers beginning in 1861, and has been occupied ever since (Paher 1971; Warren, et al. 1980). Throughout the entire 19th century, Las Vegas Valley was essentially an area devoted to ranching, with the mining communities nearby dependent on the produce of these ranches for their foodstuffs. In 1867, all of Arizona north of the Colorado River was added to the state of Nevada by Congressional action, giving the state its present-day configuration.

Nevada's story is in extreme contrast to Utah's. Nevada has grown primarily through a series of boom and bust cycles that were tied to the fortunes of hard rock mining. Nevada's mineral wealth attracted thousands of people, but the difficulty in extracting, in processing and, most importantly, in getting the ores to market, made Nevada a state attractive to the middle- and upper-income classes. Unless he was

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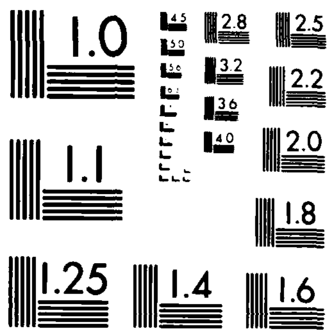


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

the original discoverer a poor man could expect only to work in the mines, not to own them. Most prospectors did not make the big strike, and those that did, sold out early and too low. Very few discoverers of significant ore bodies ever realized much profit from their finds (Lord, 1883; G.H. Smith, 1943).

Agriculture and stock raising had early beginnings in Nevada, but climate, poor soils, and desert vegetation did not lend themselves to success of the individual family homestead or farm. Water is and always has been a critical determinant for the realization of any activity in the Great Basin. Mining communities, ranching, and farming all sought the same resources. The relative fortunes often depended on the availability of water, as much as on the quality of the ores, grasses, and markets. Without water, there could be no activity at all. Nevada water law quickly assumed extraordinary importance in this arid territory. Under Nevada law, it is possible to own water rights without owning the land, of which 86 percent was retained by the federal government as a condition of statehood in 1864. The state retained the right to dispose of water rights, and the peculiar Nevada law reflects a situation in which the two basic, related resources were controlled by two different governmental entities.

A major consequence of this series of related factors was that while the Nevada homestead might be 160 acres, in conformity to federal or state law setting out the size permitted to one individual, in fact stock grazing was carried out over much larger parcels which were primarily in federal hands. The rancher need only file on the water rights to the springs and creeks on that federal land in order to control vast acreages. Generations of ranchers utilized the public lands in this manner, without control or competition, until the beginnings of federal controls in the early 20th century. These controls were made still more stringent in 1934 with the passage of the Taylor Grazing Act, and with the establishment of the U.S. Bureau of Land Management in 1946 (Clawson, 1971).

Development of both mining and farming was retarded in Nevada until the building of the railroad in the northern part of the state. When this line was finished in 1869, there were many mining booms in areas that had been too remote from markets, and cattle-sheep raising was encouraged by the availability of cheap transportation to markets. Northern Nevada benefitted greatly from this economic boom, while southern Nevada growth remained restricted; there was no railroad passing through the region until 1905. Mining and ranching on the perimeter of the area was stimulated by nearby rail lines, such as the extension of rails to southern Utah in the late 1880s and across the Mojave Desert to Needles in 1883. These rail lines enabled mining to thrive where previously high costs had restricted activity to high grade ores (Ver Planck, 1961). El Dorado Canyon in Clark County, Nevada failed to develop significant mines despite the high quality ores known from 1859, until rail transport to nearby Needles decreased the time and cost of shipping goods by wagon and steamer (Drago, 1967). Potosi Mine in Clark County's Spring Mountains, opened in 1856, was always marginally productive until 1905, when the railroad enabled greater production from lower grade ores (Hewett, 1931).

The vast interior of Nevada, however, remained undeveloped until the building of the San Pedro, Los Angeles and Salt Lake line in 1905, the construction of the Tonopah and Tidewater, the Las Vegas and Tonopah, and the Bullfrog and Rhyolite lines, all in 1906-1907. Agriculture was never as successful in the southern part of Nevada except in very well watered valleys such as the Oasis Valley, Muddy River, Pahranagat, Meadow Valley Wash, and Spring Valley. Cattle were permitted to roam on open range but the forage was not plentiful, and without major markets, there was no stimulus to develop the large acreages typical of northern Nevada ranches. Sheep were raised briefly by one of the northern Nevada outfits, Kaiser Land and Livestock, but proved unprofitable and sheep raising in southern Nevada was largely abandoned by 1911 (Warren et al., 1980).

Nevada's economy, closely tied to the extremely limited water supply and the natural resources of a very arid region, was only permitted limited growth over a long period of time. People attracted to the region generally expected to remain a short time, hoped to strike it rich and then move on to more attractive climates, or to return home triumphantly. This transient mentality characterized much of Nevada's population during boom times, while hard times were endured by the small resident population. Prior to the opening of the 20th century boom at Tonopah, Nevada's population had shrunk so low that there was debate in Congress about dissolving Nevada statehood and dividing the land among neighboring states.

Several historical events of the 20th century spurred signficant growth of Nevada's population. The Bureau of Reclamation built its first major public works project in Central Nevada. The Newlands Project with its Lahontan Dam was an arid lands reclamation project which provided additional water for farms in the dry central Nevada region (Townley, 1977). This type of project did not provide a signficant spur to growth, however, and Nevada went on much as before. More important in terms of population growth and the state's wealth was the Boulder Canyon project of 1928. Congress authorized the Bureau of Reclamation to construct what was then the largest dam in the world to provide for several regional needs: flood control of the Colorado River, irrigation of the Colorado Desert of California, and water and power for the burgeoning metropolis of Los Angeles. The timing of this project was, accidently, just right for southern Nevada to benefit from the hugh injection of federal funds at a time when private funds were drying up and the nation was plunged into a deep depression. Nevada's population doubled in the decade of the 1930s, in large part because of the influx of workers for the dam construction, engineering of the water and power supply facilities, and the operation of the dam and National Recreation Area it created (Simmons, 1936; US Bur. Rec., 1961).

When war was declared in 1941, southern Nevada was in a unique position to benefit demographically and economically. Lake Mead, at Boulder Dam, was the largest man-made body of water in the world. It was tapped for its industrial potential at the start of WW II by the construction of the Basic Magnesium Inc. (BMI) plant and a townsite to be built for its workers. Magnesium production requires huge quantities of water in processing. The ores were found in central Nevada, but the water was available only in Lake Mead. An enormous project was conceived to mine the ores and ship them to southern Nevada, first by rail, and then by truck a more direct route, on a new highway system to be built just for the purpose. The Basic Townsite, later named Henderson, tapped the Nevada water allocation from Lake Mead, and when the town was occupied in 1943 and opened its first school, its school district immediately became the fourth largest in Nevada, with 1,000 children (Sadovich, 1971). A major demographic change occurred: migration of southern blacks to southern Nevada lured by the promise of work at BMI. This influx created a pocket of black population in Clark County unequalled anywhere else in the state.

Other direct impacts of WW II on Nevada included the development of the Las Vegas Aerial Gunnery School, which utilized the unpopulated desert lands of southern Nevada for pilot and gunner training. In the 1950s, this base became Nellis Air Force Base, home of the F-111 and a major traning operation for pilots and crews of highly sophisticated jet aircraft. During the decade of the 1940s, Clark County's population doubled again as a result of these activities.

The opening of the Nevada Test Site in the early 1950s caused increased activity in Las Vegas and its satellite communities, and at Nellis Air Base. A new population moved into Las Vegas, bringing with it demands for community services that were not yet available. This population was highly educated, and expected to continue its pursuit of higher education and to be able to educate its children in the community. There was new demand for services such as community concerts, museums, and other cultural facilities which were lacking in southern Nevada. Resulting from these pressures was a college campus, two community colleges, and a branch of the research institute of the university system. Southern Nevada's population tripled between 1950 and 1960, growing from 16,000 to 45,000. This rate of growth continues in southern Nevada, which has water available for growth (at least until 1990), while growth is at a lesser rate in the northern metropolitan centers of Reno, Sparks, and Carson City. The 1980 census places 58 percent of Nevada's population in Clark County. These booms have provided a steadily increasing population base for the state (Elliott, 1973).

Tourism, however, is the mainstay of the state's economy. Prompted by fears of economic decline, in 1931 Nevada passed two pieces of state legislation that were intended to keep the then-poor state in competition with other states for liniency in divorce procedures. The six weeks residency law for divorce was passed in the spring of 1931 so that hotels and dude ranches would continue to be full of out-of-state residents seeking divorce. The tourism economy that was developing around the divorce business, expanded to provide entertainment and diversions for the new "residents," and gaming was conceived as one new way to increase the appeal of Nevada. This combination, while slow to grow in the depression of 30s, made Nevada the divorce (and marriage) capital of the United States.

Gaming was slow to reach the dominant position it now has in Nevada's economy. First the depression, then WW II slowed the construction of casinos and the traffic in them. Now, despite occasional slow periods, gaming and tourism are the number one sources of revenue. Although not totally recession proof, Nevada's economy has continued to thrive with this seemingly unsubstantial basis. Major entertainment has grown with the gaming industry, first as a lure to draw patrons into the casinos, and now an economic activity in its own right. The industry is dependent upon non-residents for its support, and Nevada's economy is directly tied to the fortunes of California (Ralenkotter ed., 1981; Zubrow, 1960).

a. Agricultural. Nevada's agricultural settlement pattern is in strong contrast to the early Utah pattern. Nevada was settled by independent ranchers whose holdings were isolated from one another and often were based at considerable distance from any community. This pattern of settlement is typical of American homesteading in the west, and the landscape this practice creates is quite different from that of the community patterning of Utah. It also is a practice that makes it difficult to locate and identify all of the agricultural settlements, since some were ephemeral. While it is no problem to identify "home ranches," which were the headquarters of large grazing outfits, their "line camps" and temporary sites used during round-ups, branding and marketing of stock are much more difficult to identify.

The only exceptions to this pattern were the agricultural communities founded during the 19th century by Mormons from Utah. Panaca, Spring, and Eagle valleys and the Muddy River communities represent departures from the more typical Nevada Great Basin ranch. Many of these Mormon communities failed (Rosenvall, 1978), but a few have persisted where the community served a wider regional market and adapted to the pressures of change.

Ranching history has not been well covered in Nevada literature. Several useful works are Creel, 1964; Patterson et al., 1969; Sawyer, 1971; and Truett, 1950.

b. Commercial. Commercial centers sprang up in Nevada beginning with the establishment of the first trading post at Mormon Station in 1850. Wherever traffic warranted it, an independent entrepreneur was attracted to provide services, and other settlers were in turn attracted to establish near these posts. Posts located at junctions of major routes of travel, or near mining operations, could expand their services to perform a variety of functions enabling the store owner to withstand economic setbacks. Communities that expanded to serve a variety of economic niches were more viable than single-purpose towns, and therefore some modern towns developed out of humble beginnings. Few centers have reached any size, and some which were sizable in the past have shrunk. County seats that were established in towns that boomed because of mining have persisted into the modern period because of their governmental aspects, and continue to provide a variety of services for a large marketing region which might have a small population. Eureka, Pioche, and until recently Austin (which just lost its county seat status to Battle Mountain) all fall within this category.

Nevada's only river port in the 19th century (aside from Callville, which had a life span of only three years) was at El Dorado Canyon in southern Clark County. This settlement functioned as an important commercial communty until 1910, when river steamboat traffic died out. The site is today buried under the waters of Lake Mojave, one of the reservoirs on the Colorado River (Drago 1967; Woodward, 1955).

Railroad towns became important commercial centers in Nevada. The Central Pacific Railroad built many of the towns in northeastern Nevada; Elko is the largest of these towns today, and serves a marketing region that includes southern Idaho and northwestern Utah. In southern Nevada, Las Vegas was created out of the major ranch in the valley in 1950 by the SPLASL railroad. Caliente was an important division point that declined drastically in size when the railroad switched from steam to diesel locomotives. The town persisted because of its important commercial role and its location on the main north-south highway through eastern Nevada (Myrick, 1962, 1963).

c. Mining. Mining has been one of the most important activities in the development of Nevada. Since mining is exploitive, communities based only on mining tend to have very direct relationships to the fortunes of the mines. Even if the ores are not exhausted in the mines, if world demand for the mineral declines or the price is too high for American mining to compete with foreign producers, mines and their dependent communities close down. There are many documented instances of the immediate impact felt on one mining community brought about by the opening up of another, "boom" mine. Entire cities have disappeared from the Nevada landscape as a result of these processes: Hamilton, Treasure City, and Schellbourne. Others have declined dramatically: Pioche, Goldfield, Tonopah, Belmont, Manhattan and, Round Mountain. Some of these communities are richly documented in the records, and an accurate assessment of their importance is relatively easily reached. Others have been the subject of only minor research and will require much work to uncover.

d. Military. Military sites of the 19th century consisted of various army posts of varying duration. Nineteenth century sites are not as well documented as might be expected, and the exact localities of some sites have been obscured by more recent developments. Few posts were established in the area of Nevada that is expected to be impacted by M-X (Ruhlen, 1964). Fort Ruby, on the eastern slopes of the Ruby Mountains, Fort Schellbourne in the Shell Creek Range, and minor temporary camps used by Lt. George Wheeler in his surveys of Nevada, constituted the 19th century military sites. In southern Nevada, Camp Eldorado was established in the late 1860s, garrisoned by men from Camp Drum in San Pedro, California. These posts were temporary and no permanent establishment was made. Small detachments were stationed briefly at Las Vegas (1867) and Callville (1867) (Casebier, 1970).

In the twentieth century, military bases and depots of various kinds have become important. Much of the federally administered public land in Nevada has been removed for military purposes: Nellis Air Base, Nevada Test Site, and Hawthorne Ammunition Dump. The reserves incorporated both historic and then active mining camps. These have been effectively removed from consideration of M-X impact since they are within the boundaries of military installations and therefore outside the scope of this EIS.

e. Political Capitals. The territorial capital of Nevada was Carson City; it is the present state capital. County seats sometimes have moved with the fortunes of the region. Nye County, for example, has had three county seats: Ione, Belmont, and now Tonopah. In some instances, a new county was carved out of a larger, previous county in order to serve a new booming area. Goldfield was named the Esmeralda county seat in 1907 and retained that status when Mineral County was split from it. As Goldfield's mines declined, so did the fortunes of the entire county, although there is still activity in Goldfield because of its county seat status.

Nevada also lost a county seat in 1867 when Arizona lost to the State of Nevada the portion of Pah-Ute County north of the Colorado. The triangle of land given to Nevada was composed mostly of land later designated as Clark County. The seat of Pah-Ute County, Arizona was Callville, which lost its claim to power when the area was transferred to Nevada. A ghost town after 1867, the site is now covered by the waters of Lake Mead.

HISTORICAL PROPERTIES (2.3.2)

Evaluation of Historical Data Base

The fulfillment of the obligations of the EIS process through implementation of the PMOA require the collection, organization and analysis of data on historical and architectural sites located in the M-X deployment area.

Early in the M-X study process, the decision was maded to use a "tiering" concept in research and analysis. The concept of "tiered decision-making" is discussed in Volume I of the DEIS. Thus, the documents produced for the EIS are not intended to contain all of the information available for specific facility sites, but to provide a general environmental statement on the suitability of the region selected. Basin-specific historic information will be generated when decisions are made about the siting of facilities. This product, then, is necessarily general.

Turning to the question of collecting, organizing and analyzing information about historical sites, several steps were taken in accomplishing the task. The first step was to establish a data base for historical sites. There are few inventories of historical sites in the region, and none is exhaustive. The Nevada State Museum file, for example, in 1980 contained a total of some 2100 sites, primarily identified as prehistoric. These were entered in the computer, making it possible to retrieve all sites with any historical component. Only 116 sites were so identified; these primarily were artifact isolates. These sites had been recorded in the process of surveying and identifying prehistoric sites in Nevada rather than having been the focus of any substantive field work in historical sites.

The Nevada SHPO had contracted with Texas Tech University for an inventory of historic sites (1980). This survey, by county, had identified some 1000 sites and provides a classification system based on Texas Tech's interests--which were primarily focussed on engineering works. A historic site for Texas Tech could be an entire mining town, or some of the works of the mines, or some of the water supply works, residences, or other structures. This is greatly at variance with the approach of Mordy and McCaughy (1968), who identified whole towns, railroad lines and mines but did not give separate listings for bridges, mills, trusses, and other structures. For the purposes of this review, sites were consolidated where possible, and associated features were grouped under one entry. For example, the various mines, mills, residences and other structures at Highland in Lincoln County, Nevada were listed as one complex (H-19 see Appendix B).

Data Coding Procedures

A system of recording the data had to be devised. The first phase of the work involved a literature search of both secondary and where possible, primary sources. Coverage of the available materials is by no means exhaustive. Subsequent studies under the PMOA implementation process would provide more intensive coverage of resource centers in the Great Basin.

In composing the data collection card form, several considerations were important. Some attempt had to be made to correlate data from unevenly focused sources. A typology had to be devised so that the data could eventually be entered in the computer. The prehistoric sites were correlated by hydrologic basins, but historical writing conforms to poltical boundaries (counties, states) and occasionally to natural regions such as the Great Basin, which are then analyzed by using political designations. Historical sites were then mapped in order to correlate them with proposed M-X construction impacts. The selected method of mapping utilizes the universal transverse mercator reference system, which thus required a changeover from the township, range, and section system commonly found in historical records.

To aid in the evaluation of sites for their significance, the data card also provided space for listing features according to the presence/absence of standing structures, ruins, equipment, and the integrity of the site. Sometimes it is possible to make these entries, at least partially, from data found in the literature. However, with respect to current condition of the sites, the data come more directly and accurately from checking the site in the field. None of the sites recorded from the literature have been specifically and intentionally field examined as of this date. Comparison of the field data gathered in the summer of 1980, however, reveals that a few of the sites identified in the field were also recorded in the literature. It was therefore possible to update some of the entries on site condition.

The space on the data card devoted to significance of the site was intended to provide a clue to further consideration. There are many qualities that must be assessed in order for a complete determination to be made of the significance of any site. Some of the values which are incorporated in the NRHP determinations were listed on the card so that the recorder of the entry could make some preliminary statements for future evaluation. The NRHP listings are: uniqueness, integrity, time depth, single or multipurpose use, single or multicultural association, and size of population. A line for contemporary cultural significance was included so that sites already listed on the NRHP or state historical inventories could be so identified.

An additional card catalogue was begun to provide for further analysis of site significance. While discrete sites can be recorded and an evaluation made of some of the aspects of the site's importance, it is very difficult to obtain a full picture of the range of roles a given site has played through time. Yet it is important to know this range and any changes in the site's role, if the site's significance is to be fully understood. One way to measure such roles and changes is to learn the site's place in the economic picture of the region. Aspects of the economic picture can be noted from the trade and communication networks that connected discrete sites with one another and with the financial and manufacturing centers, shipping terminals and similar centers. Material evidence of this economic network is the system of roads that supported economic activities: wagon, rail, and auto. The pattern of roads was adapted to the environment, but it changed through time as new commercial centers opened, as mining camps and agricultural centers developed, and as shortcuts were discovered or modes of transportation changed from pack animals to wagons to trucks and automobiles. Recording of these road networks helps to establish the significance of a given site at one point and its role in the changing picture through time.

Finally, a bibliographical card form was devised to provide systematic recording of these important data, and to serve as a quick reference and evaluation of the written resource. Each site was given a number prefixed by the letter "H" to denote historical site. Since many sites are known by multiple names, careful recording was made of each name and the information was included on the main entry card. Cross-referencing was also accomplished, with only one number given to the site no matter how many names were discovered in the literature. In the case of route record cards, the route was described by means of the known sites along it; for example, the Pony Express route is described as a trail from Salt Lake City to Sacramento, via the various known relay stations. These stations are identified on the route card by number only, facilitating the description of a rather lengthy route onto one data card.

Within the thirty valleys of the proposed M-X deployment area, 1109 sites had been identified in Nevada and 263 in Utah as of July 1, 1981. These sites are illustrated in Figure 2.3.2-1. It is quite apparent from the productive literature search accomplished to date that there is a wealth of historical site data available in the literature and a corresponding wealth of material on the ground. This search would be continued in subsequent studies, as not all the major sources have been consulted and there are many minor works that offer important information on the lesser known sites. County records also remain to be searched; they are the most fruitful resources to tap for specific information on the myriad ranches, mines and home sites that dot the Nevada/Utah landscape.

Historic Sites Typology

A classification system was devised for historic sites. This system incorporates some features from the typology develped by the BLM for its California Desert Conservation Area research. There are some modifications and expansions appropriate for the Great Basin, and for additional data which are useful in retrieving information placed in the computer. For purposes of the ETR, historic sites are defined as loci of past activity or activities of non-Native American populations. It includes sites that have been well documented and sites for which few or no references can be found. The historic period in the Great Basin study area dates to 1776, and for purposes of this study, ends in 1940. Sites of more recent date may be included if they are associated with a significant event or activity (e.g., World War II military training camps), or are unique (e.g., a divorce/dude ranch in Nevada).

Cultural affiliation of the historic sites has been made where possible. Affiliations include Euroamerican (Basque, Scandinavian, French, Greek, Irish, British, etc.), Afro-American, Hispano-Mexican, Oriental, and other. Sites with multiple cultural affiliations are identified by using more than one designation.

There are two major subdivisions of cultural resources of the historic period: travel and settlement. Both of these kinds of activities may be of short or long duration, and may have occurred for any of several major purposes: commerce, mining, military, agriculture, recreation, or transportation/communication. In describing the individual site, the primary designation is cited first in the code for site type and, following that entry, all other historically important features within the settlement that have been identified are also listed. Below is the classification system used and the codes which identify the separate features.

1. Travel

Each route is assigned the number 1, and then a corresponding letter based upon the type of route is added from the typology. Following the number and letter, the primary purpose of the route is also taken from the typology. For example, the Elko to Pioche wagon road is coded as 1C, TRA. The complete typology for routes is shown below:

1a Foot trail
1b Pack trail
1c Wagon road
1d Railroad
1e Automobile road
1f River route
1g Airplane route
1h Telegraph/telephone line

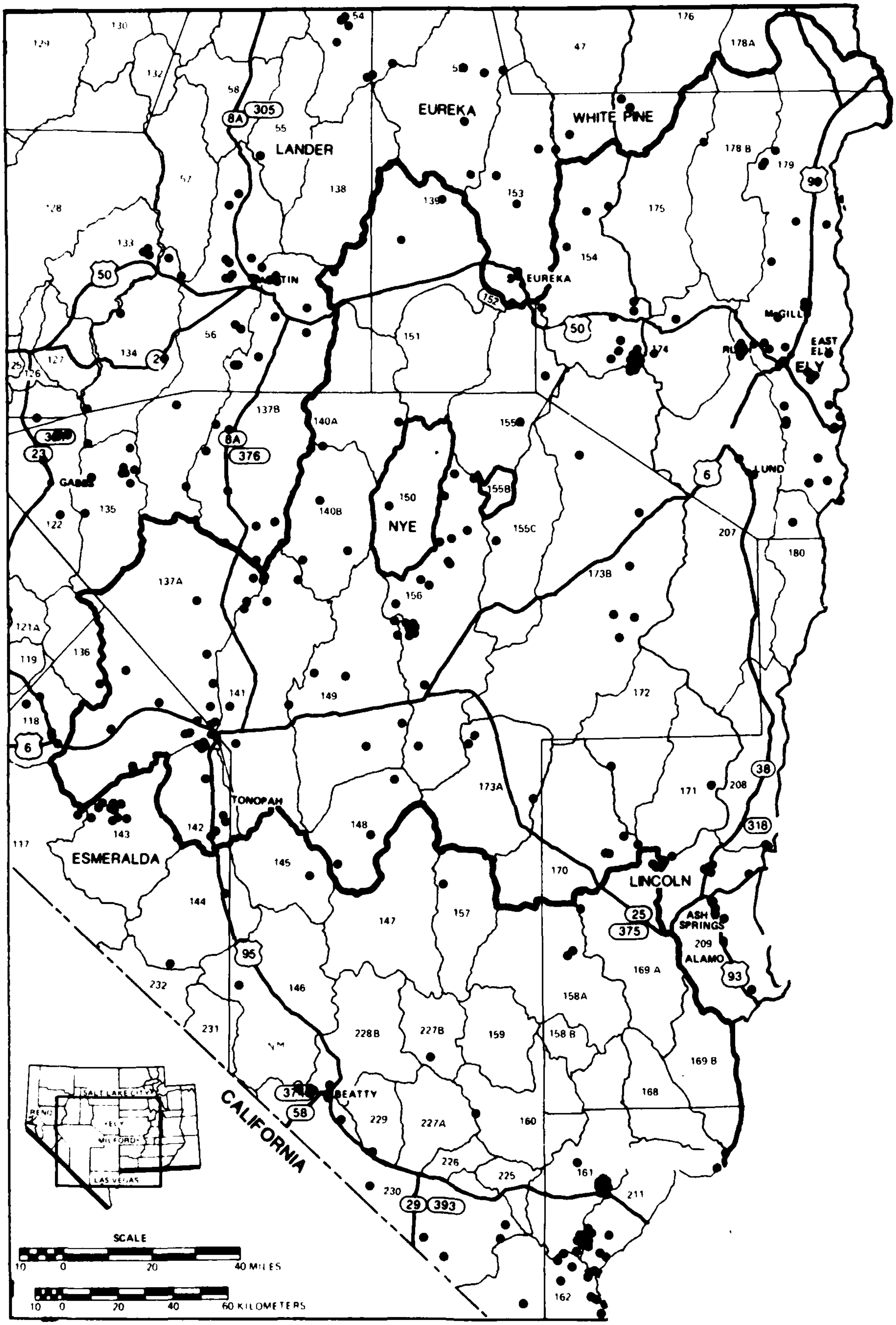
Purpose of route:
Emigration (emi)
Trade/freight (tra)
Military (mil)
Mining (min)
Courier/mail (cou)
Stage (sta)
Stock movement (sto)

2. Settlements

Each settlement is assigned the number 2, then a letter from the list below that corresponds to the identification of its primary function. Following this is a list of all the features that have been identified in the settlement. For example, Panaca is coded as 2B, FT, COST, RT, NPP, ST, etc. A complete list of settlement typology is provided below:

<u>2A Towns--generalized list:</u>

Trash dump (td)
Foundations (f)
Saloons (sa)
Restaurant (rt)
Newspaper (np)
Stores (st)
Assay office (ao)
Railroad stations (rs)
Cemetery (c)
Stables (stb)
Courthouse (ch)
Church (cch)
Transformer (tr)
Telegraph line (tl)
Airport (ap)
Gas station (gst)
Dancehall (dah)
Poolhall (polh)


EUREKA
WHITE PINE
LANDER
NYE
ESMERALDA
LINCOLN
CALIFORNIA
AUSTIN
EUREKA
McGILL
EAST ELY
ELY
LUND
GABBS
TONOPAH
BEATTY
ASH SPRINGS
ALAMO
SCALE
10 0 20 40 MILES
10 0 20 40 60 KILOMETERS

4624-E

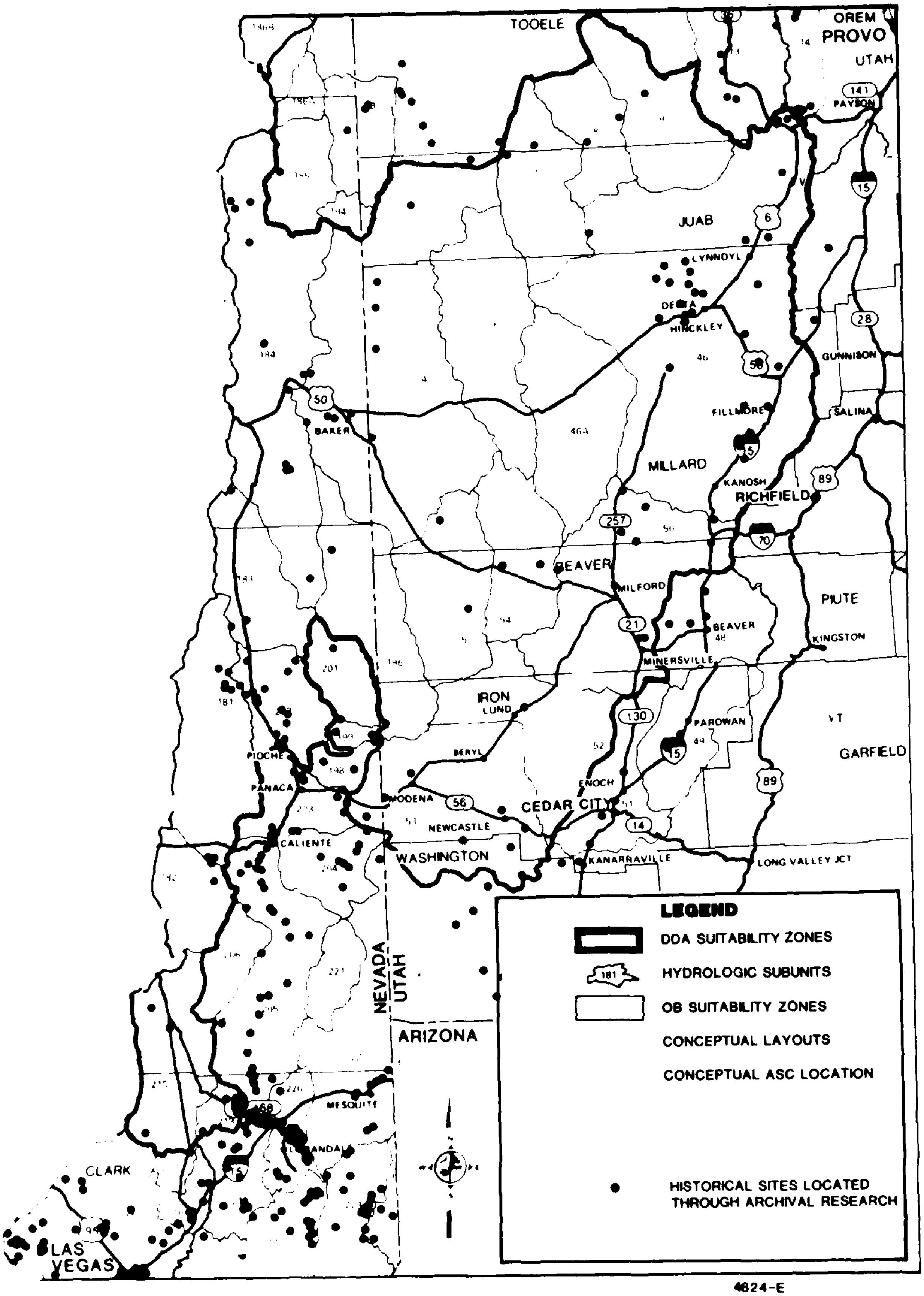


Figure 2.3.2-1. Historical sites in the Nevada/Utah study area.

Racetrack (rctk)
Sanitarium (san)
Opera house (oph)
Living quarters (lq)
Brothels (br)
Blacksmith shop (bs)
Newspaper press (npp)
Boarding house (bh)
Hotel (hl)
Freighting office (fo)
Railroad siding (rrsd)
Schoolhouse (sh)
Banks (bk)
Jail (j)
Tabernacle (tab)
Telegraph relay state (trs)
Telephone line (tpl)
Landing strip (ls)
Post office (po)
Auto stage (ast)
Brewery (bry)
Hospital (hosp)
Theater (the)
Skating rink (sktr)
Library (liby)
Stock exchange (stex)
Museum (muse)
Gambling hall (gamb)
Fire station (frst)

<u>2B Settlements generally associated with Mormons:</u>

Fort (non-military) (ft)
Tithing office (to)
Tabernacle (tab)
Cooperative store (cost)
Desert telegraph relay station (dtrs)
Desert telegraph line (dtl)

<u>2C Settlements generally associated with mining activities:</u>

Poolhall (polh)
Tent platform (ttp)
Stage station/stop (sst)
Shaft (sf)
Quarry (qa)
Dragline (dgl)
Chute (che)
Sorting bins (stb)
Tramway (tmw)
Claims (clm)
Arrastra (arr)

Smelter (sml)
Tailings (tal)
Slag/dump (sl)
Dugout (dgt)
Tent town (tt)
Wells fargo stop/stage line (wwf)
Flume (fe)
Dredge (drg)
Adit (at)
Tunnel (mt)
Head frames (hfr)
Mine railway (mnrr)
Mines (mns)
Mill (m)
Stamp/ball mill (sm)
Chlorination tanks (cht)
Leach field (lef)

2D Settlements generally associated with agricultural communities/ranching/farming:

Corrals (cr)
Windmills (wm)
Farming machinery (fm)
Farm (far)
Wells (wl)
Sawmill (sm)
Ranch (rh)
Homestead (hs)

2D Settlements generally associated with agricultural communities/ranching/farming:

Dairy (dai)
Store house (sh)
Cellar (cel)
Orchards (orh)
Silo (rhsl)
Stables (rhstb)
Trough (trh)
Camp (cp)
Sheep camp (scp)
Horsetrap (hrs)
Fences (ff)
Irrigation system (irrs)
Dam (wd)
Canals (wca)
Waterwheel (ww)
Cabins (cab)
Bake oven (bo)
Spring house (sh)
Smoke house (skh)

Sheepherders cabin (scb)
Barn (rhb)
Blacksmith shop (rhbs)
Equipment sheds (rhes)
Stock camp (stcp)
Loading chutes (flc)
Pastures (fp)
Gates (fg)
Pumphouse (pph)
Reservoir (wre)
Pipelines (wpp)
Headgates (wh)

<u>2E Settlements generally associated with railroad activities:</u>

Roundhouse (rrh)
Machine shop (rms)
Diesel tanks (dt)
Switches (sw)
Tracks (tk)
Railroad grade (rrg)
Railroad tent towns (rt)
Railroad bridges (rrb)
Railroad siding (rrsd)
Pumping station (pust)
Passenger depot (rrsp)
Turntable (rtt)
Freight buildings (rfb)
Railroad repair shops (rrep)
Water tower (wtt)
Roadbed (red)
Railroad employee dwellings (red)
Railroad tunnel (rrt)
Watering stop (rws)
Railroad division point (rrdp)
Railroad yard (rryd)
Freight/mail/relay/dinner stations (rrsr)

<u>2F Settlements generally associated with specialized manufacturing:</u>

Kiln (kn)
Grist mill (grm)
Shoe factory (sfy)
Furniture factory (ffy)
Soap factory (sof)
Sawmill (sal)
Cloth mill (cml)
Iron foundry (ify)
Charcoal camps 9cacp)
Coke ovens (ckv)
Ice ponds/warehouses (icp)

Cotton gin (ctg)

2G Communication-features associated with airports:

Landing strip (ls)
Tower (t)
Airport (ap)
Employee dwellings (ed)
Shops/hangers (shh)
Landing field (lf)
Water tower/cistern/well (wtt)

2H Communication-features associated with road construction sites:

Quarry (qa)
Stores (st)
Tent platforms (ttp)
Borrow pit (bp)
Employee dwellings (ed)

2I Communication-features associated with river ports:

Warehouse (wah)
Dry dock (dd)
Breakwater (bw)
Dock/ramp (do)
Employee dwellings (ed)
Ferry (fey)

2J Communication-features associated with automobile service:

Garage (ge)
Gas station (gas)
Blacksmith shop (ams)
Gasoline tanks/pumps (gt)
Employee dwellings (ed)
Machine shops (ams)
Hoists (ho)
Air tanks/pumps (at)

2K Communication-features associated with Pony Express/stage lines/telegraph lines/freight lines/wagon trains:

Pastures (p)
Wagon ruts (wrt)
Cemetery/burial (c)
Trading post (trdp)
Station house (sh)
Corral (scr)
Dugway (dgw)
Telegraph lines/poles (tlp)

Telegraph relay station (tlsh)
Freight line (ftl)
Well (swl)
Stables (stb)

2L Government-features associated with military sites:

Base (ba)
Camp (cpm)
Redoubt (rd)
Cemetery (c)
Battleground (bd)
Helographic station (hlst)
Fort (ftm)
Outpost (op)
Gunnery range/proving ground/test site (gr)
Ammunition dump/depot (amd)
Military reservation (mres)

2M Government-features associated with governmental controls/founding:

National parks (np)
Japanese relocation camps (jrc)
Directional monuments (dim)
Commemorative monuments (com)
Indian Reservation (ires)
Heliographic stations (hec)
National monuments (nmt)
State parks (stp)
State monuments (smt)
Civilian Conservation Corps camp (ccp)
National wildlife refuge (nwr)
Experimental farms (station) (expms)

2N Ethnohistoric--sites/feautres associated with ethnohistoric use:

Cemetery (c)
Battlegrounds (ebg)
Rock shelter (rsh)
Indian Reservation (ires)
Ceremonial area (cerm)
Farm (efar)
Camp (ecp)
Mormon indian missions (mim)

2O Other

2P Sites/features associated with public work projects:

Springs (spr)

Dam (wd)
Waterworks (wtk)
Telephone line (tpl)
Well (wel)
Creek (crk)
Reservoir (wre)
Pipeline (wpp)
Pumping station (pps)
Power substation (pows)

3. Isolated artifact. A brief description of the isolated artifact is provided.

Site Significance

As stated previously in this section, site significance is both difficult to determine and of highest importance in the EIS process. At the appropriate stage in tiering every effort will be made to arrive at a suitable, adequate and supportable evaluation. Included in these efforts would be a field check of the sites identified from the literature and primary records, to determine if there is on the ground some evidence which requires protection or mitigation. Sites which are eligible for the NRHP would be nominated and protection would be extended to those which are determined to be eligible but which have not yet been processed. Field work is necessary to determine National Register eligibility and because field checks have not been done of sites discovered during archival research, all sites are considered significant.

Locations of Known and Potential Historic Sites

A distinction is made here between potential historic site locations and known historic sites documented in the site files. The previous practice to not record historic properties for inclusion in state and agency site files has rendered these files inadequate for the purposes of documenting the nature and distribution of historic sites within the study area. To supplement the existing record an archival search of published and unpublished literature, maps, journals and diaries was conducted.

County and church records have not been consulted as yet. The archival research is not an exhaustive survey, and more extensive research is needed. Archival research is nearly complete for Nevada, but only partially complete for Utah. To date, 1372 potential properties or locations have been identified (Appendix B, and Figure 2.3.2-1) which conform generally to the site type categories outlined above (Section 2.3.2.3). Known transportation routes, and railroads are provided in Appendix C by state.

2.4 REGIONAL SAMPLE SURVEY

During June-August, 1980, a regional sample survey program was implemented in the Nevada/Utah study area. A total of 813 sample units of 80 acres (0.125 sq mi) each were intensively surveyed in 31 hydrologic subunits.

This systematic survey identified 966 sites and isolates including 405 prehistoric sites, 451 prehistoric isolates, 54 historic sites, and 56 historic isolates.

The locations of these sites and the 2085 sites identified through literature research are illustrated in Figure 2.4-1 and labeled as "New Sites" and "Old Sites," respectively.

Selection of the study area for this survey was done prior to final selection of the DDA for the Proposed Action. Therefore, not all hydrologic subunits within the current DDA have been studied (see Figure 2.2.4.1-1). Of the valleys studied, only Smith Creek (134) and Ione (135) do not contain DDA facilities. However, all hydrologic subunits studied are in the potential indirect impact area of the project.

The sampling design that guided the field program was developed by HDR Sciences. Additional inputs to the design were provided by the Nevada and Utah BLM archaeologists, the Nevada and Utah State Historic Preservation Officers, and subcontractors Woodward-Clyde Consultants, Inc. and Commonwealth Associates, Inc.

REGIONAL SAMPLING DESIGN (2.4.1)

To facilitate the gathering of comparable data from the large area under study, a multi-stage sampling design has been developed that is sensitive to local variability and is applicable over the entire study area. The sampling strategy is outlined here.

The general objective of the sampling program is to provide data allowing for assessment of: (1) the relative significance and importance of valleys with respect to cultural resources; and (2) the impact on cultural resources when specific localities are selected as potential locations for M-X project facilites. Assessment of the relative significance of valleys with regard to cultural resources is made from existing survey data and relevant data that are obtained from the 1980 survey. The sampling program is, therefore, designed primarily for the second objective: assessment of impact on cultural resources by construction of M-X project facilities at designated valley locations.

The sample consists of intensive survey of approximately 100 sq mi (260 sq km). This was the amount of ground coverage that could be reasonably achieved in the first year of fieldwork, given existing logistic and temporal constraints. Moreover, this is a very manageable and useful sample size for analytical purposes.

The adequacy of the survey size was criticized by the State of Utah which commented:

> "The survey involved 100 sq mi . . . which is less than 0.2 percent of the . . . 60,000 sq mi for the 70 odd valleys making up the total project area . . . ." This contrasts sharply with the sample sizes utilized by Thomas during some of his work in the Great Basin: Reese River, 10 percent sample; Monitor Valley, 50 percent sample; Lake Tonopah, 7.5 percent survey (Thomas, 1979:299). Furthermore, fewer than half (31) of the hydrologic subunits were sampled. This seems to be an inadequate sample . . . ."

This comment is based on a common misconception that the sampling fraction (i.e., percentage of the universe sampled) is more important than the actual, absolute size of the sample (i.e., amount of area surveyed). George Cowgill, noted statistician and archaeologist, has cogently discussed this subject in James Mueller's Sampling In Archaeology (1975). Statistical validity derives from the actual magnitude of the sample rather than the sample fraction. The 100 sq mi sample survey is over three times the amount of area surveyed by the Reese River Project (Thomas, 1973) and constitutes a statistically valid sample.

The sampling program considers the division of the study area into separate valleys (hydrologic basins) as a given stratification criterion. Each valley is considered a subpopulation for sampling and statistical purposes.

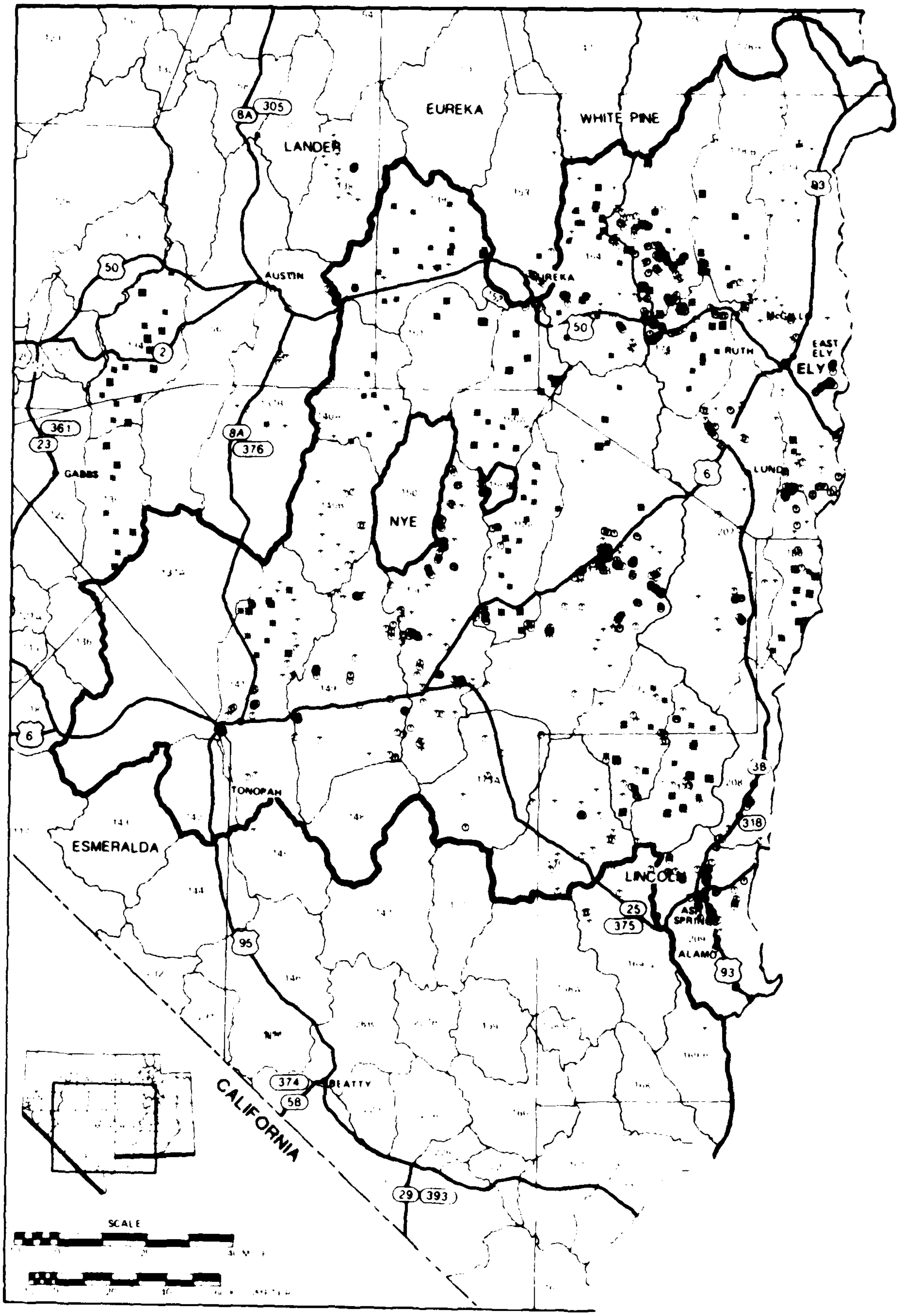
It should be mentioned that while analysis of survey data shows that historic sites in the sample area associated with hydrologic features such as springs and rivers, the complexity of historic site location obviously involves the consideration of other, non-hydrological variables. However, a full 75 percent of all sample units were located in areas that did not have hydrologic resources and the sample indicates that historic sites are few in these areas.

Each valley is divided into "mountain" and "alluvial valley" strata. Because the likelihood of direct impacts to cultural resources is substantially higher for the alluvial valley stratum, all sampling was conducted within that stratum. It is recognized that the mountain area contains numerous historic sites, especially those associated with mining and ranching operations. These resources are likely to be indirectly impacted. The alluvial valley stratum includes the foothill zone which is transitional between the two major sampling strata. Further stratification of the alluvial valley stratum is accomplished by distinguishing areas with relatively greater expected likelihood of site cluster location (Stratum A) and "other valley" (Stratum B). Stratum A is defined on the assumption that areas of site location are largely a function of resource location. Furthermore, subdivision of Stratum A is based on the assumption that the areal dispersion of the resources has a major effect in shaping the spatial distribtuion of archaeological deposits that resulted from exploitation of those resources.

Resource distribution patterns are distinguished by point, line, and area. The first refers to resources such as springs, quarries, etc., which are essentially point sources in comparison to the the scale of the site cluster. The second refers to resources associated with rivers, edges of lake beds, etc. The third refers to resources that are distributed in two dimensions, such as plant resources in open areas.

For point resources we expect a centrally oriented distribution of sites with highest density near the point resource and site density decreasing as one goes away from the source. For lineal resources we expect a linear distribution of sites with density contours roughly parallel to the distribution of resources. For areal resources we expect a two-dimensional patterning that may be affected in detail and configuration by the "grainedness" of the resource distribution.

Point resources are sampled at the location of the resource; for lineal resources, sample units are placed at an even distance along, and to the degree possible, perpendicular to the lineal distribution of the resource; the areal resources sample units are placed in a systematic, unaligned fashion.


EUREKA
WHITE PINE
LANDER
AUSTIN
EUREKA
ELY
EAST ELY
RUTH
GABBS
NYE
LUND
TONOPAH
ESMERALDA
LINCOLN
ALAMO
BEATTY
CALIFORNIA
SCALE

4728-E

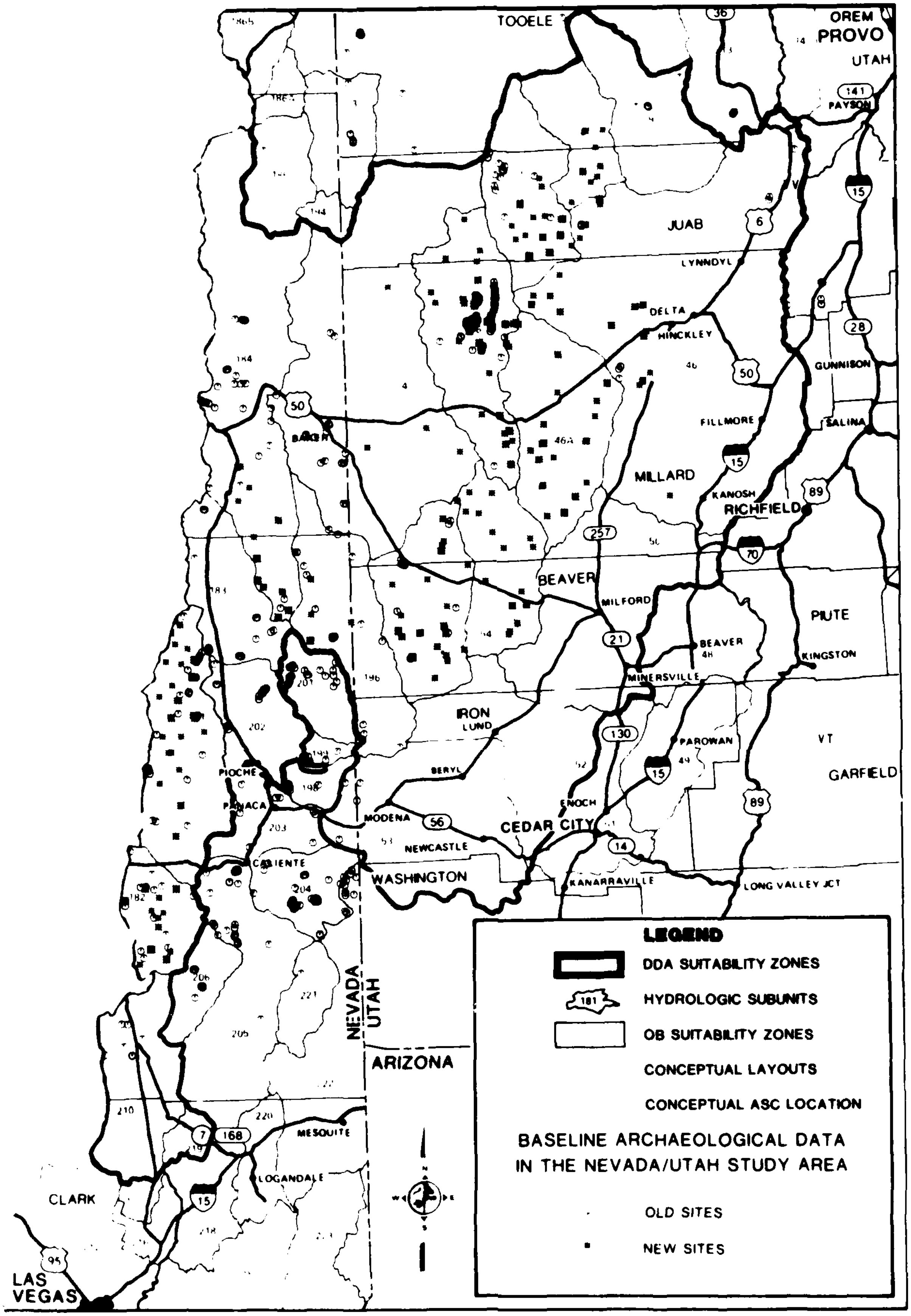


Figure 2.4-1. Locations of "old" and "new" historical sites in the Nevada/Utah study area.

For purposes of operational definition, the following distinction and criteria are utilized for Stage I sampling:

Stratum A

Springs: Springs are considered point resources.

Playas: Playa boundaries are considered as lineal resources.

Permanent Streams:

a. The point of entry of a permanent stream into the valley is considered a point resource.

b. Permanent streams running the length of a valley are considered lineal resources.

Stratum B:

Other Valley: An area of the valley not included in Stratum A is considered an areal resource and sampled as a single, undifferentiated stratum. Sampling is by systematic, unaligned sampling. Sections are systematically selected and sample unit location section are by random selection. Sample units are tied into the cadastral system. The area associated with "Other Valley" constitutes Stratum B.

Resource areas for which prior information indicates site cluster association are excluded from field survey. For example, springs known to have sites in association are not resurveyed.

Flexibility is integrated into this sampling design in two ways. First, crew chiefs are authorized to alter the locations of sample units in Stratum B within a four square mile area if it is discovered in the field that the originally selected unit is highly disturbed or is close to (but not on) a lacustrine feature. Second, ten percent of all of the sample unit locations are determined according to the judgment of the field personnel. This allows immediate testing of hypotheses developed in the field about areas where sites are likely to be located.

Sample units used for the field survey were:

- Oriented along the cardinal directions (i.e., either north-south or east-west). Rationale: for purposes of navigational simplicity and to take maximum advantage of the Township and Range system in areas where it exists.

- Oriented either north-south or east-west so as to maximize environmental variability (or changes in elevation) within sample units. Rationale: sampling is oriented toward the discovery of potential site clusters. Maximizing environmental variability within sample units should raise the likelihood of discovering cultural resources particularly if those resources are differentially disturbed along an elevational or other environmental gradient.

- o Inventoried and recorded so as to ensure maximum standardization of measurement and comparability of data. Standard sample unit and site record forms are adopted for use by all field subcontractors. All other field procedures are replicated to the maximum extent possible. Records of sample unit crew composition and other potential sources of systematic variability in measurement (e.g., weather conditions and time of day) are maintained so that analytical controls for such variability may be applied.

Selection of Sample Unit Locations

The initial locations of sample units for the project area were determined in the following manner.

1. A set of composite maps at a scale of 1:62,500 (1 in = 1 mi) was prepared for each of the 32 hydrologic basins included in the study area. For those areas in Nevada where township, range, and section information did not appear on the USGS base maps, they were projected based on BLM 30 minute maps.

2. On these maps the sampling universe for each valley was defined. The foothills were operationally defined as the area on a USGS map where the contour lines begin to cluster prior to the transition into mountain areas. The universe boundaries were drawn along section lines, and any section that was comprised of half or more of Alluvial Valley (i.e. valley bottom up to and including the foothills) was included within the sampling universe.

3. All potential Stratum A location within each hydrologic basin--i.e. springs, permanent streams, and playa margins--were identified on the maps. The data base of existing site records (these records were obtained from state repositories in Nevada and Utah in early 1979 and later partial updates from BLM district offices were obtained) was consulted to determine whether there were known sites at any of the Stratum A locations. Sample units were allocated to those Stratum A locations without known archaeological sites using the following rules:

   a. Springs--there were treated as point resources and a sample unit was placed at the location of the spring. It was oriented north-south or east-west so as to maximize environmental heterogeneity.

   b. Playa margins--there were treated as lineal resources and one sample unit was placed every four mi around the playa. Sample units were oriented so as to be perpendicular to the edge of the playa.

   c. Permanent mountain streams--these were treated as point resources and were sampled at the point where they crossed the foothill zone. Sample units were oriented to maximize environmental heterogeneity.

   d. Permanent valley streams--these were treated as lineal resources and were sampled with one unit on alternate sides of the stream every four miles. Sample units were oriented so as to be perpendicular to the stream. Permanent valley streams were rare in the study area.

4. All Stratum A units had been assigned, Stratum B units were selected. The sampling universe was divided into 4 mi by 4 mi blocks with each row of blocks offset from the row above and below it by 2 mi. Then the central 2 mi by 2 mi block within the larger block was identified. If a Stratum A unit had already been selected from the 2 mi by 2 mi block, then no additional sample units were chosen, If, however, a Stratum A unit occurred outside of the 2 by 2 mi block or if no Stratum A units had been assigned for a particular 4 by 4 mi block then the following sample unit selection procedure was used.

   a. A random number from 1-4 was used to select a single section (sq mi) within the 2 by 2 mi block.

   b. A second random number for 1-9 was used to select and 80 acre sample unit within this section.

   c. Based on inspection of the map the chosen sample unit was oriented so as to maximize environmental heterogeneity.

5. All sample units were drawn on a master map and numbered, and blueline copies were made of this map. This map was provided to the fieldwork subcontractors with a listing of the Stratum A and Stratum B sample units. It was the responsibility of the fieldwork subcontractor to transfer the sample unit locations onto their field maps.

Field Implementation

The sample units used in the study were ½ mi by ¼ mi (80 acres) and were oriented along the cardinal directions. Sample units were tied into the existing cadastral system. Spacing between field crew members was kept at a constant 25 m for all sample units. For each sample unit, a sample unit record was completed to provide information on environmental, locational, and situational (e.g., weather conditions) variables that may have relevance to the presence or absence of sites in that unit. All cultural resources (including isolated artifacts) were recorded on a standardized site record.

ENVIRONMENTAL SUMMARY OF THE STUDY AREA (2.4.2)

Most of the study area is described as cold desert of the Basin/Range Province. The landform is characterized by long north/south trending block fault mountain ranges. Valleys generally drain to interior playas, forming bolsons that are distinct hydrologic units. Valley bottoms decrease in elevation from a high of 1800m for northern valleys to a low of 600m for valleys in the south. Rainfall varies with elevation, averaging up to 20 in. yearly in higher mountains to 6 in. in northern valleys and 4 in. in southern valleys. This diverse environment is predictably characterized by a wide variety of floral and faunal resources.

The 900m elevation approximates the boundary between the cold desert environment from the Mojave Desert and the warm or hot desert environment found in the southern tip of the area. The non-draining alkali bottoms form dry lakes devoid of vegetation. Ringing these dry lakes are salt resistant halophytes (*Allenrolfea* spp, *Atriplex* spp.) Beyond the playa margin, the most distinctive scrub brush communities (creosote or sagebrush) extend from the valley bottoms up to pediment. In the Mojave Desert areas creosote and its associate, bursage, is dominant. The creosote brush scrub grades into blackbrush and yucca communities in the upper valleys near 1500m in elevation.

The Cold Desert Shrub community which dominates much of the northern valley slopes and bottoms is found in moderately poor to well-drained soils just above the Salt Desert Shrub. Soils are usually salt and alkali free though the alkali tolerant mat saltbrush and gray molly associations are included in this community. Additional associations include sagebrush, small sagebrush, little rabbitbrush, shadscale, horsebrush, winterfat, hopesage/blackbrush, and bud sagebrush.

The pinyon-juniper woodland is spread throughout the region on the upper bajadas and mountain slopes between 1500 m and 2500 m. It extends onto the valley floor in a few of the higher valleys. Above the Pinyon-Juniper zone pine species (ponderosa pine, white pine, bristlecone pine) are found in isolated islands near the tops of the ranges.

Fauna. Durrant (1952) has placed the entire project region within the Great Basin Faunal Area, and of the valleys share a similar faunal array. Prehistorically, the more important species would have included antelope (Antilocapra ammerican), prairie dog (Cynomys spp.), jack rabbit (Lepus spp.), porcupine (Erothizon spp.), coyote (Canis spp.) (Citellus also), skunk (Spilozule spp.) and mourning dove (Senaidura). The uplands and mountain ranges between valleys provided habitat for mule deer (Odociolcus hemionus), mountain sheep (Ovis canadensis), and grouse (Bonasa umbellus, Centrocerus urophosiamus and Denfragapus obscurus). The marsh and river systems provided habitat for numerous ducks (Anas spp. and Aythya spp.), geese (Banta canadensis, Chen spp.), beaver (Castor canadensis), and fish (Moxostoma spp., Semotelus spp. and Salmo clarkii). Populations of elk (Cervus canadensis) and Bison (Bison bison) no longer exist, but have been documented in early historic times (Durrant, 1952) and at archaeological sites in the Basin.

UTAH SAMPLE SURVEY (2.4.3.)

A total of 269 sample units were surveyed in Area C of the M-X study region. Eighty-three of the units were Stratum A designed to sample springs, lake beaches, and streams. Stratum B is represented by 186 sample units designed to provide a systematic random sample of the several valley bottoms. Appendix D summarizes 266 recorded activity loci including both prehistoric and historic sites and isolated finds. A total of some 95 loci were recorded in Stratum A sample units, and approximately 156 loci were recorded in Stratum B. In addition, fifteen loci were recorded outside of the sample units.

The sampling procedure recorded the presence of all known cultural periods in the Eastern Basin except Paleo-Indian. Twenty-eight sites had indications of Archaic use, 38 Sevier/Fremont culture, 10 Shoshone, and 33 European-American. A total of 188 loci could not be assigned to a given culture. Of the 266 loci, many (31) had evidence of two or more cultures using the same loci.

The density of activity loci in the respective valleys cannot be estimated with any statistical reliability at this point. However, preliminary calculations suggest that the sample units in several valleys contained more than one loci (both sites and isolates) each. These include Fish Springs (1.7), Pine (1.1), Dugway (1.1), and the Sevier Desert (1.1). Valleys with less than one loci per unit are Tule (.9), Sevier Lake (.9), Hamlin (.8), Wah Wah (.7), and Snake (.2). These figures include all sample unit strata. Once again, these data are preliminary and the sample size is small such that cultural resources in each valley are only intimated and certainly need to be sampled further.

Site types range from stratified rockshelters/caves to sparse scatters of lithics. Open sites included a variety of camps, lithic quarries, occasional rock art, possible villages, historic ranch sites, and mining towns. Isolated finds included a variety of projectile points, lithic debitage and historic glass.

For purposes of discussion, prehistoric sites have been classified as residential bases, field camps, locations, stations, and rock art. Classification relies on a general index of intrasite variability. The index is calculated using three variables:

(1) the processing variable, or the number of different classes of processing tools observed on the site (e.g., bifaces, scrapers, flakes, ground stone, projectile points, etc.);

(2) the camping variable, or evidence for the presence of a fire hearth; and

(3) the habitation variable, or evidence for the presence of habitation structures.

It should be emphasized that the dividing lines between types are somewhat arbitrary and will undoubtedly be adjusted as research continues. The definitions can also be expressed in prose:

Residential base. Sites that contain artifacts representative of the processing of a variety of resources (e.g., ground stone, scrapers, bifaces, utilized flakes, etc.). Fremont bases will contain evidence for dwelling and storage structures; and Archaic bases should contain some evidence for camping (e.g., firebasins).

Field Camps. Sites that contain artifacts representative of the processing of a single resource especially if there is evidence for camping. Field camps may be seed-gathering camps, hunting camps, quarrying camps, or any other resource aquisition camp site.

Locations. Sites that contain evidence for the procurement of a single type of resource with little or no processing implied and no evidence of camping. Locations may be seed-gathering locations, hunting locations, quarrying locations, or any other resource acquisition site.

Stations. Sites that appear to be vantage points or hunting blinds. Some debris may be present as a result of tool manufacture (this type of site is impossible to reconstruct from the computer data file).

Rock Art. Sites that consist of rock are not accompanied by any of the attributes of residential bases or field camps.

Sites tended to cluster around key resources or locations. Discriminate analysis of the 1980 survey data indicates that the variables predicting site location vary somewhat with the type (residential base, field camp, procurement location) of site being examined (see Table 2.4.3-1). The location of residential bases for example seem best predicted by the presence or absence of the Pinyon-Juniper association. Field camps appear to be oriented more to sand dunes, and the Cold Desert Shrub, Streamside and Pinyon-Juniper vegetational association, respectively. Resource procurement locations, on the other hand, are not highly correlated with a particular topographic or vegetational feature. Interestingly, water did not appear to be critical in determining the locations of any site types, though the analysis suggests that residential bases were loosely tied to this resource. Of course, point resources such as the lithic quarries described for Dugway (Thomas Range obsidian quarry), Pine (Crystal Peak quartzite), and Wah Wah (rhyolite source in the southern end) valleys effectivelv cluster processing sites around them.

These preliminary conclusions are primarily descriptive in content due to the status of our data analysis. As further data are gathered, it is hoped that these conclusions will develop into nomothetic statements about the forms prehistoric life took in these deserts of western Utah.

Utah Hydrologic Basins

Snake Valley (Hydrologic Basin #4). Snake Valley is located along the western edge of the research area. The valley floor elevations range from 1341-1798 m. It is flanked on the west by the highest mountain ranges (Snake 3983 m. and Deep Creek 3684 m.) near the research area. The presence of the Snake and Deep Creek ranges results in a wide variety of resources being available. The valley floor lacks a true playa feature and is covered principally by extensive Cold and Salt Desert Shrub communities, flanked by the Plains-Prairie community. Yellow Pine and Spruce Fir communites exist in the ranges west of the valley. Other resource areas include marsh communities at the north end of the valley around Pruess Lake near Garrison. These marsh communities have been considerably reduced due to agricultural development. Water resources are restricted to the perennial streams and springs issuing from the Snake and Deep Creek ranges, though a few small springs are found in the northeast flank in the Conger Range. Sand dunes are located largely to the southeast portion of the valley in what is locally known as the Ferguson Desert.

A total of five prehistoric activity loci were recorded in sample units in Snake Valley. Three of the five are isolated finds and two are sites. One locus, (42 MD 553) is a field camp located in the Greasewood association near (0.6 km) Pruess Lake. The cultural affiliations of the other loci are unknown, but all are classified as locations. Four of the loci are in the Greasewood or Shadscale associations and one in the Pinyon-Juniper. All of the loci appear to have been impacted variously by relic hunting, grazing, and erosion. This is especially true of 42 MD 553 at Pruess Lake. A total of 27 units were sampled in the valley with five loci being recorded. This represents an average of .19 loci per unit. It should be noted that much of this valley remains to be investigated.

Two sites of note were recorded outside of the sample units. Site 42 MD 553 is an Archaic/Fremont field camp and site 42 MD 554 is a field location of undefined cultural affiliation. Both are stratified rockshelters found on the talus and cliff

Table 2.4.3-1. Relative predictive ability of environmental variables.

	PREHISTORIC SITES TOTAL	LOCATIONS	FIELD CAMPS	RES. BASE	HISTORIC SITES TOTAL
Vegetation					
Pinyon/Juniper	1	2	4	4	10
Sagebrush	4	8			
Shadscale	9	4		5	4
Horsebrush					3
Bud Sagebrush					6
Mat Saltbrush	5	3			
Gray Molly		10		3	2
Cold Desert Streamside			3	2	5
Greasewood	10	5	5		
Alkali Sacaton	6	4			
Rabbitbrush	3	1			
Topographic Setting					
Slope		6			
Canyon				1	8
Alluvial Fan		7	1		1
Talus				8	
Dune	2		2		
Stream Terrace		9		7	
Marsh	8				
Cliff			6	6	9
Outcrop	7		8		
Distances					
to Pinyon/Juniper			9		
to Dunes			10		
to Holocene beaches above valley bottom			7	10	7
to water				9	

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faces on the flanks of the Snake Valley. They may represent similar shelters found in the limestone formations of the area. Their presence indicates the potential long-term, or at least seasonal, exploitation as opposed to the ephemeral nature of the other loci recorded on the sample units. At the present time, cattle and natural erosion are the principal agents of impact.

Pine Valley (Hydrologic Basin #5). Pine Valley is in the south central portion of the research area. It is typical of the Eastern Great Basin valleys, complete with extensive Cold Desert Shrub communities and a hardpan playa. The valley floor ranges from 1551 to 1950 m. Pine Valley is flanked on the west by Indian Peak and Needles Ranges and on the east by the Wah Wah Mountains. The mountains range from 2000-2849 m. and are primarily dominated by the Plains-Prairie community Pinyon/Juniper assocation. During 1980 the valley exhibited luxuriant growth of Indian ricegrass, pickleweed, and, in the foothills, pinyon nuts. Unique resources include a large, active dune field above the hardpan in the northeast corner of the valley. Most of the known springs are located on the west flank.

The valley sample units exhibit a wide variety of site types and affiliations, lacking only Paleo-Indian materials. There are a total of 38 activity loci in the sample units of Pine Valley. Eighteen (47 percent) are loci of unknown cultural affiliation, three are Archaic only, seven others are Archaic/Sevier Fremont multi-component loci, and one Archaic/European-American site. Five sites are associated only with Sevier Fremont, while one is a dual Sevier Fremont/Shoshone site. Two sites are Shoshone only and one is a European-American locus. Archaic sites are all locations found in Pinyon-Juniper or Sagebrush associations. Of the 13 Sevier Fremont associations, two are residential bases, the remainder are temporary field camps or field locations. Shoshone loci include one residential base and two field locations. Both of the European-American loci are residential bases.

A total of 32 (84 percent) of the loci are in the Pinyon-Juniper or Sagebrush associations. Two of the three prehistoric residential bases are found at a water source, the third is within a mile (1.5 km) of water. Pine Valley loci average about 6.5 km to water sources.

There were a total of 38 activity loci in 36 sample units in Pine Valley. This is an average of about 1.06 loci per unit. When isolated finds are eliminated, about .55 sites per sample unit were recorded. Six loci, all isolated finds, were found outside of the Pinyon-Juniper-Sagebrush associations, showing a strong preference for these two associations in Pine Valley. Overall, only one site (42 BE 859) appears to have been greatly disturbed by historic impact. The remainder of the sites have evidence of natural erosion and some grazing impact. The Pinyon-Juniper and sand dune areas are known to be favorite surface artifact collection areas for relic hunters, but direct ground disturbance via digging cannot be demonstrated.

Two additional loci were recorded outside of the sample units. One is an isolated projectile point of possible Archaic affiliation. The second, site 42 BE 857, is a Sevier Fremont residential base similar to 42 BE 843. Both give additional evidence of Archaic and Sevier/Fremont utilization of the Sagebrush and Pinyon-Juniper association.

A unique resource in Pine Valley is a large deposit of coarse quartzite nodules originating in the Crystal Peak vicinity west and north of the valley. Erosion has exposed large quantities of the nodules that were exploited by prehistoric populations for various lithic tools.

White or Tule Valley (Hydrologic Basin #6). This valley is found in the north-central portion of the research area. It is separated from Snake Valley on the west by the Conger Mountains and the Sevier Desert on the east by the House Range. Elevation in the interior ranges from 1342m. near Tule Springs to 1524 m. on the south and east of the Barn Hills. The ranges flanking the interior range from 2316 m (Conger Range) to 2949 m (Swasey Peak on the House Range).

In the northern portion, the valley contains a playa area which is surrounded by a substantial Salt Desert Shrub community dominated by Greasewood, Greasewood/Shadscale, and Pickleweed/Samphire associations. Cold Desert Shrub is predominant throughout the valley, especially in the southern section and around the bases of the flanking ranges. Little Rabbitbrush and Shadscale associations dominate the Cold Desert Shrub community. The southern portion of the Tule Valley also contains a rather extensive hardpan with comparable vegetational communities.

A large sand dune complex is found in the northcentral portion of the valley region. Water in Tule Valley consists of a few scattered springs and intermittent washes in the ranges flanking the valley. Tule and Coyote Spring, however, are centrally located near the large dune field.

Forty-one activity loci were recorded in the Tule Valley sample units. Thirty-nine (95 percent) of the loci are judged to be locations, while two are residential bases. One residential base was on a spring, the other was 7.5 km from a spring, and both were in the Pinyon-Juniper association.

Ten sites could be assigned to a cultural affiliation. One Archaic site was found in a dune area, and appears to be a location. A second Archaic site also contains a Fremont component, and like the former site, is a location. Sevier Fremont sites are represented by a single field location and two resident bases. Four locations and a single field camp represent the European-American cultural resources. Locations commonly occur on alluvial plains and fans (71.9 percent) followed by extinct lake or playa areas (12 percent). Sites are located most often in the Cold Desert Shrub,Little Rabbitbrush-Shadscale associations (54 percent), and the Salt Desert Shrub (22 percent), principally the Greasewood-Shadscale and Pickleweed associations. A total of 44 sample units were surveyed in Tule Valley. Considering the 41 loci, this averages about 0.9 loci per unit. When the 29 isolated loci are deleted, the average drops to about 0.27 sites per unit. The Sevier Fremont resident base at the spring has been subjected to considerable impact by erosion and grazing. The presence of projectile points at many of the sites may indicate that only minimal relic collection has occurred and that most sites are relatively undisturbed.

Eight additional loci were recorded outside of the sample units. Site 42 MD 512 is a stratified rockshelter (field camp). The other loci include one open Sevier Fremont field camp, one field camp of unknown affiliation, one Sevier Fremont and two unaffiliated locations, and two locations (isolated finds) of unknown affiliation. The rockshelter gives additional evidence of long-term or repeated seasonal exploitation of the valley resources. The shelter has not been disturbed by relic hunters at this point. Erosion and grazing appear to be the only threat to the site's integrity.

Fish Springs (Hydrologic Basin #7). Fish Springs is in the northcentral portion of the project area and is bordered to the west by the Fish Springs Range and to the east by the Thomas Range. The valley floor inclines slightly from north to south, with elevations near 1310 m. to 1615 m., respectively. The Fish Springs Range obtains an altitude of 2598 m. and the Thomas Range 2156 m. The valley is one of three with external drainage to the Great Salt Lake. There is no true playa within the valley.

The valley center is a series of small shallow arroyos cutting through a Shadscale-Greasewood vegetation association which is flanked by extensive Cold Desert Shrub, particularly the Shadscale and Horsebrush associations. The nearby ranges are characterized by the Pinyon-Juniper association. The most dominant feature of Fish Springs Valley is the large marsh system at the northwest corner of the valley fed by deep, alkaline, thermal springs. The north end of the Fish Springs Range immediately west of the spring area is known for its large, well stratified caves and rockshelters (cf. Madsen, 1979a). Sand dunes are small, but extend nearly the length of the west side of the valley. An additional resource available in the Fish Springs vicinity is the obsidian quarries on the south portion of the Thomas Range.

Forty activity loci were recorded in Fish Springs Valley of which 23 are isolated finds and 17 are sites. Site 42 JB 240 is the only site with a known cultural affiliation--Archaic.

The Cold Desert Shrub community was the preferred vegetation in the valley interior as this community contained 21 (52 percent) of the loci while the Salt Desert Shrub community contained 4 (10 percent). The remaining 15 (37 percent) are in the Pinyon-Juniper association, of which 12 (80 percent) were concentrated in one sample unit. Water and sand dunes appear to be minor resource considerations as only three (8 percent) are found at or near (less than 1 km) from these resources.

The sample units averaged 1.74 activity loci per unit, and 0.74 sites per unit. However, units with Pinyon-Juniper associations average 5 loci per unit and one site per unit. There is no direct evidence of relic collection on any of the loci recorded by the survey. The primary agents of impact are natural erosion and grazing.

Two additional loci were recorded outside of the sample units. Site 42 JB 230 is a rockshelter (location) of unknown affiliation. The shelter appears to contain some stratified deposits, indicating at a minimum repeated utilization of the resources near the site. There is no evidence in the shelter of the relic hunting that is commonplace at many sites in Fish Springs. The other is a location, a single isolated blade fragment.

Dugway Valley (Hydrologic Basin #8). Dugway Valley is in the northeast corner of the project area. It is similar to Fish Springs Valley in that it has external drainage into the Great Salt Lake and lacks a hardpan or playa. The valley floor dips from south to north. Elevations of the interior range from 1554-1325 m. To the west, the Dugway Range reaches an elevation of 1920 m. and the Simpson Mountains to the east reach nearly 2522 m.

The valley interior is cut by a system of small washes through a Salt Desert Shrub, Greasewood-Shadscale association. A good portion of the valley floor and the alluvial flanks are covered with a Cold Desert Shrub, Shadscale, and Rabbitbrush associations. Water is ephemeral, with a few scattered springs on the flanks of the ranges. There a few scattered sand dunes isolated in the northeast section of the valley and two small dunes in the southcentral portion. The Thomas Range obsidian flows are found just southeast of the valley.

Twelve activity loci were recorded in the valley. Eight are locations of unknown cultural association. One is a field camp of possible Archaic origin with a later Sevier Fremont component. One residential base is a Sevier Fremont manifestation, with evidence of European-American use as well. Two loci are the direct result of European-American use. The Archaic/Sevier Fremont field camp was recorded in the Greasewood-Shadscale association along with one of the three isolated finds. All other sites were in the Cold Desert Shrub, Shadscale and Little Rabbitbrush associations. Water resources seem to have a marginal effect on site location. The residential base was found on a spring. All other sites are at least 3 km away, and average nearly 10.7 km from permanent water. Alluvial/colluvial deposits contain seven (58 percent) of the loci, four (33 percent) are associated with extinct lake features or stream terraces, and a single loci is in a sand dune.

The eleven sample units surveyed in Dugway Valley averaged 1.09 loci and .27 isolates each. The single residential base is an open site with potential depth. It has been impacted by roads, spring development and perhaps surface collection, but the principal agents of impact are grazing and erosion. Little serious damage seems to have occurred at these sites.

Sevier Desert (Hydrologic Basin #46). The Sevier Desert is on the eastern edge of the resource area. It includes Whirlwind Valley and all of the area between the Little Drum Mountains on the north to the north boundary of Sevier Lake. The west boundary is the House Range. Elevations range from a low point of 1377 m at Sevier Lake to 1675 m along the House Range and the north end of Whirlwind Valley. The Sevier Desert lacks a hardpan-playa and has external drainage into the Sevier Lake Basin.

The vegetation is dominated by the Cold Desert Shrub community including the Shadscale, Horsebrush, and Sagebrush associations. Salt Desert Shrub is located principally in the southern portion where Pickleweed-Samphire and Greasewood associations occur. The Pinyon-Juniper association is found on the north and west ranges.

Important resource areas are the sand dunes and extensive slough, lake, and marsh community habitats near the Sevier River/ Beaver River juncture in the southeast corner of the valley. The north and western two-thirds of the basin are dependent totally on ephemeral streams and occasional springs in and near the mountain ranges.

Thirty-seven activity loci were recorded in the Sevier Desert. Twenty-one loci were defined as sites and the remaining 16 are isolated flakes or projectile points (3). Three field camps and 34 locations were recorded in this valley. The absence of residential bases is likely a function of the lack of reliable water and sparse vegetation resources.

Cultural affiliation was assigned to 13 of the loci. Eight of the 13 are sites and the remainder are isolated finds. Archaic affiliation was assigned one location on the basis of diagnostic projectile points. Two Archaic procurement locations exhibit dual occupations, one with a Sevier Fremont component, the other a Shoshoni component. Three field camps and two field locations were labeled Sevier Fremont. European-American remains are found on one site with an unidentified prehistoric component. The remaining loci with unknown cultural affiliation split evenly between sites and isolated finds.

Four sites were recorded in the Salt Desert Shrub Community and four were recorded in the Pinyon-Juniper association. The majority of the activity loci are away from the lake edge in the Cold Desert Shrub, Sagebrush, and Shadscale associations.

Most of the sites in Sevier Desert consist of a light scatter of lithics in a rather bleak environment. Site densities average 0.6 sites per unit and 0.46 isolated finds per unit. The rather unimpressive nature of the loci appears to have discouraged relic collecting in the area. Grazing impact is heaviest around the north end where more water is available. Elsewhere, natural erosion is the principal agent of impact. For the most part, the sites are intact. Diagnostic points, a favorite of relic hunters, are found at a relatively high number of sites.

Sevier Lake (Hydrologic Basin #46a). The Sevier Lake basin is found south and west of Delta and is the easternmost basin in the research area. Elevations range from 1377 m. at lake level to about 1525 m. around the flanks of the lake. Maximum elevations are 2145 m in the Cricket Mountains to the east and 2942 m in the House Range west of the lake.

The single dominating feature is the dry lake itself. Sevier Lake is the largest lake bed and playa in the research area and is second only to the Great Salt Lake in the Great Basin. The heavy clay lake bed is devoid of vegetation and is saturated with saline brine water within inches of the surface.

Vegetation consists of a small beach lined with pockets of Pickleweed/ Samphire and some Seepweed. This association is surrounded by a large area of Greasewood/Shadscale and the Greasewood association of the Salt Desert Shrubs. High on the flanks of the lake, a Cold Desert Shrub community is dominated by Shadscale and Sagebrush association. The Cricket Mountains and most of the House Range are covered by the Plains-Prairie community. Sand dunes are restricted to the region northeast of the lake. Permanent water is currently nonexistent. Year-round water would have been available in the Sevier River prior to historic diversion. A few springs are available several kilometers west on the House Range.

The surveyors recorded 45 activity loci in the Sevier Lake Valley. Thirty-three of the loci are isolated finds and the remainder (12) are sites. Expressed in terms of site types, 6 are field camps, 38 are field locations, and 1 is a residential base.

Twenty-eight of the loci lack diagnostic remains and cannot be assigned a cultural affiliation. Three Archaic loci, one site, and two isolates were recorded. An additional Archaic site also contained Sevier Fremont diagnostics. A Sevier Fremont affiliation was assigned to four sites, all of them field locations. The single residential base site contains both Sevier Fremont and Shoshoni debris. The 28 loci assigned unknown affiliations consist of 4 sites and 24 isolated finds.

The majority of the Sevier Desert is in the Cold Desert Shrub community. The overall loci placement reflects this situation. Twenty-five (61 percent) of the loci were found in the Shadscale association, with an additional six (15 percent) being found in the Sagebrush, Horsebrush, and general Cold Desert Shrub. Seven (17 percent) were found in the Greasewood, Pickleweed-Samphire associations of the Salt Desert Shrub. The remaining six loci were found in the Mud Flats (4) and Pinyon-Juniper association of the Plains/Prairie community. Fifty percent (6) of the sites are found in dune areas, while five (42 percent) are associated with extinct lake or stream features.

Sample units average 0.25 sites and 0.69 isolated finds each. Most of the loci appear to be centered around the dune and lake features associated with the Sevier River. The sites are subject to heavy grazing impact as the dunes and lake features concentrate vegetation such as grass. Relic hunting has likely impacted the sites, but no evidence of subsurface disturbance by relic hunters is evident.

Wah Wah Valley (Hydrologic Basin #54). Wah Wah Valley is in the southcentral portion of the project area. Its internal drainage system drains from south to north and culminates in a large playa known as the Wah Wah Valley Hardpan. Elevations of the interior floor range from 1431 m. at the hardpan to 1706 m. on the far south end. The valley is flanked by the San Francisco Mountains on the east (2944 m.) and the Wah Wah Mountains on the west (2744 m.)

Vegetation on Wah Wah Valley is dominated by the Cold Desert Shrub community. A reduced Salt Desert Shrub community exists around the hardpan, while above the valley floor and along the mountain slopes the Cold Desert Shrub gives way to Pinyon-Juniper association which covers large portions of the bordering mountains. A number of ephemeral streams and several springs issue from the mountains. Prominent among the springs are the Wah Wah on the west side and Squaw Springs on the east side near the pass to Milford. Sand dunes are limited to areas northeast and northwest of the hardpan. Two important resources are the large quartzite quarries associated with Crystal Peak in the northwest corner of Pine Valley and the rhyolite deposits on the south end of Wah Wah Valley. Both stone types make excellent tools.

Eighteen activity loci were recorded in the Wah Wah Valley sample units. Four sites and 14 isolated finds constitute the cultural remains in the units. Two of the loci are field camps. The majority (16) are field locations. Cultural affiliations for all loci are restricted to European-American. All four of the European-American sites are isolated finds, or procurement locations.

Three of the four sites are found within the Pinyon-Juniper association as is one isolate. One site and five isolates are in the Shadscale association. The remaining isolates (9) are nearly equally divided into Little Rabbitbrush, Winter-fat, and Sagebrush associations. Fifteen loci are associated with alluvial/colluvial fans of the valley. Only one isolate was recorded on the sand dunes.

Twenty-six sample units were surveyed on Wah Wah Valley. The units averaged 0.15 sites and 0.54 isolated finds per sample unit. The sample unit site figures will dramatically increase in Pinyon-Juniper as demonstrated in the southern end of the valley by Berge (1974).

Mention should be made of a single site recorded off the sample units. This is the historic mining town (residential base) of Newhouse (42 BE 862). Newhouse is about 4.5 km north of Utah Highway 21 on the east side of Wah Wah Valley. It is on the Shadscale covered bench and extends up into the San Francisco Mountains. Newhouse supported over 500 people engaged in non-ferrous metal mining from the late 1880s into the 1920s.

The lack of diagnostic remains in the valley argues for either heavy relic collection or very limited occupation. The loci are sparse and lack depth. Erosion and grazing are likely the main agents of impact. The Pinyon-Juniper sites have been collected and Newhouse nearly destroyed by relic hunters. Much remains of Newhouse, however, including many known surviving residents that significant data can still be recovered about the area.

Hamlin Valley (Hydrologic Basin #196). Hamlin Valley is in extreme western Utah and eastern Nevada and is the highest valley in the research area. Valley interior elevations range from 1706 m. on the north to 2011 m. on the south. Hamlin Valley is flanked on the east by the Needle Ranges (2987 m.) and on the west by the Limestone Hills and White Rock Mountains (3352+ m.). Hamlin Valley has external drainage via Spring Creek into Snake Valley.

Hamlin has a greatly restricted Salt Desert Shrub community along isolated portions of Hamlin Wash. Most of the valley interior is covered by Cold Desert Shrub, which is in turn surrounded by dense stands of Pinyon-Juniper. Springs cluster in the southern corner, along the White Rock Range and Spring Creek. There are no sand dunes in the valley.

Fifteen activity loci were recorded in the valley, six sites and nine isolates. Only two loci (26 LN 2120 and 2119) can be assigned a cultural affiliation. Site 26 LN 2119 is a dual occupation Archaic/Fremont field camp and 26 LN 2120 is an Archaic/Fremont location. The Archaic/Fremont field camp and six other locations are found in the Pinyon-Juniper association. Seven locations are in the Cold Desert Shrub community and one location is in the Salt Desert Shrub community. All of the loci are in colluvial or alluvial fan deposits. The 20 sample units surveyed average 0.3 sites and 0.45 isolated finds. One unit in the Pinyon-Juniper, however, contained four sites and two isolated finds.

The lack of cultural diagnostics is somewhat surprising. Hamlin and Snake valleys are known to have been favored pinyon nut gathering territories of Paiute and Shoshone peoples (Steward 1938) while the excavated Sevier Fremont Garrison site (Taylor 1954) is not far to the north. It is possible that the shallow surface scatter have accrued considerable impact via relic hunting. This area draws thousands of modern pinyon nut gatherers and big game hunters annually. Grazing and erosion have also impacted the sites.

Preliminary Assessment of Environmental Variables Affecting Cultural Resource Location

Introduction

Implicit in the assumption that environmental factors are significant predictors of site location is that current vegetation, climate, and geomorphological patterns reflect the patterns at the time of prehistoric use. Since a wide range of interrelated and constantly changing factors determine the environment, current patterns cannot be assumed to be constant over time. It probably can be assumed, however, that there is some relationship which can only be unraveled through multidisciplinary examination of selected sites. Some inferences about the nature of the relationship, however, can be generated by accurate observations in the field and by analyses of survey data.

The mathematical approach to the predictive site location model is somewhat different from the usual approach to a stratified systematic sampling design. The technique used here involves the application of discriminant functions (Cooley and Lohnes, 1971) to calculate probabilities of site occurrence in each of the eighty-acre sample unit quadrats. A detailed explanation of the mathematical processes used is beyond the scope of this report. However, a brief explanation follows (cf. Nie et al., 1975).

The problem is organized in terms of a desire to distinguish between quadrats that contain prehistoric remains and those that do not. If there are more than one type of site present or, if there are sites with different cultural affiliations present, then a separate analysis for each type and affiliation should be executed. To distinguish between the "have" and the "have-not" quadrats, variables on which these groups are expected to differ (discriminating variables) must be measured. The mathematical objective of the analysis is to weight and linearly combine the discriminating variables in some fashion (disciminant functions) so that the observed quadrats are forced into groups (have vs. have-nots) that are as statistically distinct as possible. Once the discriminant functions have been derived, two research objectives can be pursued: analysis of the observed quadrat data, and predictive statements about the unobserved area.

The analysis aspect indicates which variables are significant in determining the probability of site occurrence and which are not. Additionally, the single best discriminating variable can be determined; other variables can be ranked according to their ability to contribute to further discrimination.

The classification aspect takes the set of variables found to be significant in determining site occurrence in the observed quadrats and derives classification functions that allow probabilistic statements to be made about the unobserved regions. To test the accuracy of the predictions, the probability of site occurrence is recalculated for the observed quadrats. The comparison yields an overall statement as to the accuracy of the model.

It should be emphasized that the data set as used in the discriminant analyses violates a few important statistical prerequisites. All data, whether associated with discretionary, altered, Stratum A, or Stratum B quadrats, are included in the single data set. This is necessary because in any single group of quadrats, the number of sites (classified by types) is too small to be able to adequately analyze correlations. The aggregation of the data violates all assumptions about the randomness and independence of quadrat selection. Therefore, the results of the analyses may be biased, and predictive capabilities reduced, relative to the results of a more statistically defensible design. It is felt, however that due to the robustness of discriminant functions, a preliminary analysis of site locations can produce meaningful results if viewed with some caution.

The analysis of the archaeological site location data relies on three categories of environmental variables: vegetation associations; topographic situations; and distances to permanent water, Pinyon-Juniper ecotone, sand dunes, and Holocene beaches (Table 2.4.3-1). To date, five analyses have been completed. They consist of general correlation analyses of all prehistoric and historic sites, and specific analyses of prehistoric locations, field camps, and residential bases as expected, the correlations vary among the analyses and, therefore, will be discussed separately.

Of the total 269 quadrats examined during the survey, 115 have evidence of prehistoric use. The significant environmental differences between those quadrats with prehistoric sites versus those without, as analyzed by discriminant functions exist in their vegetation and topographic attributes. By far the most important predictor is the vegetation association of Pinyon-Juniper. Other vegetation associations that correlate with site occurrence (although at a much lower level) are Rabbitbrush, Sage, and Mat Saltbrush. The occurrence of sand dunes is the most important non-vegetative variable, although it is not nearly as important a predictor as the presence of Pinyon-Juniper. The occurrence of currently identifiable permanent water sources ranks near the bottom of the list in predictive ability for prehistoric sites in general; but, as shall be demonstrated below, particular site types do correlate well with water sources.

The discriminant function generated by the analysis and based primarily on the above variables is able to accurately predict approximately 71 percent of the observed site occurrences. If vegetation and sand dune maps were available at this time, a predictive map for prehistoric sites could be generated and it would be expected to be correct for approximately 71 percent of the area.

Eight out of the 269 surveyed quadrats contained evidence of residential bases. Their occurrence correlates most highly with canyon locations near cliffs and/or stream terraces. Important vegetation associations include Cold Desert Streamside, Gray Molly, Pinyon-Juniper, and Greasewood-Shadscale, in that order. Distance to water and elevation above the valley floor are also important. These variables combine to form a discriminant function that accounts for 97 percent of residential base occurrences.

Eighteen of the 269 surveyed quadrats contained evidence of prehistoric field camps. Their occurrence correlates most highly with sand dunes on the upper reaches of alluvial slopes. Vegetation associations include Cold Desert Streamside, Pinyon-Juniper, and Greasewood, in that order. Distance to permanent water is insignificant although the vegetation correlations indicate the major intermittent drainages are important. The combination of these variables yields a discriminant function that predicts approximately 92 percent of field camp occurrences.

Procurement Locations

One hundred of the 269 surveyed quadrats contained evidence for resource procurement locations (isolated finds have been included in this site type category). Unlike residential bases and field camps, no single cluster of variable strongly correlated with their occurrence. Vegetation associations of Rabbitbrush, Pinyon-Juniper, Mat Saltbrush, Alkali Sacaton, Greasewood, Shadscale, and Sage correlate in that order. The only non-vegetative correlation of significance is level ground which is more likely to yield locations than even the gentlest of slopes. The discriminant function based primarily on vegetation-association is capable of predicting approximately 70 percent of procurement location occurrences.

Historic Site Environmental Correlations

Of the 269 surveyed quadrats, 25 yielded evidence of historic use. Those quadrats occur relatively high on the alluvial slopes with vegetation associations of Gray Molly, Horsebrush, Greasewood, Shadscale, Cold Desert Streamside, and Budsage occurring in that order. The discriminant function based on the above variables is able to predict historic site occurrences for approximately 84 percent of the areas.

Summary

The analyses summarized above clearly indicate differential spatial distributions of prehistoric site types. Resource procurement locations occur throughout the valley slopes and bottoms, whereas field camps occur on the upper alluvial slopes in sand dune areas. Residential bases occur near permanent water in canyon mouths as they open into the valleys. In Tier II studies, discriminant functions calculated for each site type will be integrated with vegetation, sand dune, and pertinent data into a spatial data set available for the unsurveyed areas. The technology for providing these maps for the study area is currently available and should be an integral part of future survey efforts.

NEVADA SAMPLE SURVEY (2.4.4)

Introduction

Six hundred and ninety-four (694) prehistoric and historic cultural resource sites were located during the 1980 survey of the 22 hydrologic basins and 542 sample units. Of these, 291 are prehistoric sites, 320 prehistoric isolates, 32 historic sites, 36 historic isolates, and 15 are multicomponent, consisting of both aboriginal and historic materials. Appendix E presents in tabular form a general summary of the inventory results.

Overall, prehistoric materials dominated the cultural resource inventory. Prehistoric cultural resources, both sites and isolates combined, comprised 88 percent of the site total compared to 9.8 percent for historic and 2.2 percent for multi-component sites (Table 2.4.4-1).

Surveys implemented and analyzed in Hunt (1979), Lutz et al., (1979), and Lutz and Hunt (1980) have resulted in the definition of four functional site types. Two major site classes have been ethnographically defined and archaeologically sug-

Table 2.4.4-1. General site inventory results.

SITE CATEGORY	% OF TOTAL SITES
Prehistoric	42.0
Prehistoric Isolate	46.0
Historic	4.6
Historic Isolate	5.2
Multicomponent (Prehistoric and Historic)	2.2

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gested, each of which is composed of two site types (Lutz and Hunt, 1980). It should be noted here that site types were constructed subsequent to the survey, using the data obtained during the course of that effort rather than forcing the sites into intuitive nonfunctional categories of little use in the interpretation of human behavior. These site classes and types were defined as:

1. Short-term specialized activity sites - a class of sites whose length of occupation would consist of several days and where three or less activities took place. This site class is made up of two types, ephemeral and restricted sites, which can be distinguished from other types on the basis of size, content, and locational parameters.

   a. ephemeral sites - a type of site characterized by being closer to water than restricted sites, having no features, being directed towards a single activity, having distinct locational preferences with regard to slope location, which may vary regionally depending upon the local relief, and are the smallest of site types on the average. They are considered to have had an extremely brief use-life (suggested one day or less) and are extremely restricted functionally. The inferred social unit operative at these sites is the individual or small group.

   b. restricted sites - are locationally more similar to ephemeral sites than they are to other types discussed below. These types are oriented toward two to three activities, are larger than ephemeral sites, are the furthest from water of all site types, rarely demonstrate features, and are characterized by specific slope preferences. Slope preferences may vary regionally depending upon local topographic relief. It is suggested that these sites were occupied for a greater length of time; perhaps days to weeks. The social group represented at these sites is interpreted as the family or minimal band.

2. Base camps - a site class which was occupied longer than short-term specialized activity sites and where more than three activities took place. Again, this class is made up of two site types which have distinctive characteristics.

   a. minor camps - are larger than restricted sites, have four activities represented in their lithic contents, occasionally demonstrate features, are closer to water sources than restricted sites, and appear to be locationally diverse. Their hypothesized occupation length is considered to be weeks. Such sites may represent minimal bands or small maximal bands.

   b. sustained camps - are the largest and most functionally diverse of site types demonstrating five or more activities in their lithic inventories. They have distinctive slope preferences (which may vary regionally with local topographic relief) and are closer to water than other types. These locations may reflect an occupation by a maximal band.

In terms of the Bureau of Land Managment (BLM) defined site types, isolated finds (316) and lithic scatters (236) were most representative of the aboriginal cultural resources while isolated finds and trash dumps were typical historic finds

(Table 2.4.4-2). For the defined BRA/CAI (Basin Research Associates/ Commonwealth Associates Inc.) site types, isolated finds and restricted sites were the most numerous, followed by ephemeral, sustained and minor camps. Historic isolated finds and miscellaneous historic sites, respectively, were most representative of the historic categories (Table 2.4.4-3). A detailed listing of both BLM and BRA/CAI site types located during the cultural resource inventory is presented in Tables 2.4.4-4 and 2.4.4-5.

Long-term human occupation of the M-X Project Areas A and B is well documented from our inventory. A complete range of typical Great Basin projectile points (cf. Hester, 1973; Heizer and Hester, 1978), aboriginal ceramics, and Euro-American artifacts were noted or collected from a number of sites. Chronological data ranges from fluted points and crescents of the "Paleo-Indian"/Western Pluvial Lakes Tradition to diagnostic historic materials of the Euro-American exploration and settlement periods. Approximately 46 percent of the located cultural resources (323 sites) had diagnostic chronological indicators present. Of these, 259 were single component prehistoric or historic sites while 64 sites had evidence of multiple occupations spanning several time periods. Table 2.4.4-6 presents a chronological site summary by valley of M-X Areas A and B.

Nevada Hydrologic Basins

Smith Creek Valley (Hydrologic Basin #134)

Basin 134 is a relatively well watered valley in comparison to many of the other valleys within the project boundaries. Numerous intermittent streams (flowing from the Pinyon-Juniper dominated foothill-canyons) and several creeks (Willow, Sunshine, Campbell, Peterson, Birchium, and Smith, among others) drain into the large, distinct Smith Creek playa. Unlike many of the other playas encountered during the survey, this edge or boundary could be more or less delineated on the ground and on the maps. A number of seep springs were also noted around the playa edge. Other springs of a more or less permanent nature are found in the canyons and on alluvial valley slopes and foothills within the valley. Pinyon-Juniper does not extend onto the valley floor to any extent.

Twenty-four 80-acre survey units, or 2000 acres, comprised the valley sample. One-third of the area surveyed was in Stratum A, which yield 39 percent (17) of the sites (isolates included). Stratum B yielded 61 percent (31). Site types include ephemeral (single activity), restricted (multiple activity), isolate, minor camps, and sustained camp. Frequencies of each type are 11, 16, 21, 2, and 1, respectively.

Classifying sites into type and by associated vegetation suggests the following:

(1) Ephemeral/single activity sites in the desert shrub vegetation are closer to water sources (permanent or intermittent) than ephemeral sites in Pinyon-Juniper;

(2) The above site type is found proportionately in both the Pinyon-Juniper and desert shrub vegetation;

(3) Restricted/multiple activity sites in the desert shrub and Pinyon-Juniper vegetation do not exhibit differences in distance to nearest water;

Table 2.4.4-2. BLM site types summary inventory results.

PREHISTORIC SITES	NO. VALLEYS	NO. SITES	$\bar{X}$ PER VALLEY
Isolated Finds	21	316	15.05
Lithic Scatter (Plus Chipping Circle)	22	236	10.73
Milling Station (Plus MS/Lithic Scatter)	6	11	1.83
Temporary Camp/Village	14	47	3.36
Lithic Scatter/Quarry	1	2	2.00
Pinyon Cache/Rock Alignment	2	4	2.00
Rockshelter	3	4	1.33
Prehistoric/Historic Sites			
Lithic Scatter/Historic Trash Dump	6	10	1.67
Historic Sites			
Isolated Finds	13	32	2.46
Trash Dump	6	13	2.17
Miscellaneous (Mining Camp, Structure, Corral etc.)	7	19	2.71

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Table 2.4.4-3. BRA/CAI site types summary inventory results.

PREHISTORIC SITES	NO. VALLEYS	NO. SITES	$\bar{X}$ PER VALLEY
Isolated Finds	21	316	15.05
Ephemeral	19	62	3.26
Restricted	22	189	8.59
Minor Camp	14	40	2.86
Sustained Camp (Prehistoric and Historic)	10	42	4.20
Historic Sites			
Isolated Finds	13	33	2.54
Miscellaneous (Trash Dumps, Structures, Corral, etc.)	6	12	2.00

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Table 2.4.4-4. BLM site types.

	Valley																					
	134	135	137a	139	140a	141	151	154	155a	155bc	171	172	173b	174	175	178b	179	180	181	182	183	184
Isolated Find	21	4	45	14	5	9	6	16	17	20	17	11	2	10	15	8		14	31	12	25	15
Lithic Scatter	23	6	20	15	3	6	1	8	17	12	10	4	9	13	12	4	2	18	13	2	22	8
Milling Station	2					1		1						1								
Pinyon Cache	1																				3	
Lithic Scatter/ Milling Station	3	1					1	1														
Temporary Camp	1		2	1			2	1	1	1					2	5	2	1	5		18	
Rock Shelter			1					2												1		
Lithic Scatter Quarry									2													
Rock Align- ment Lithic Scatter	1																					
Pottery/ Lithic Scatter											1								2			2
Pottery Scatter																			1			
Chipping Circle																			1			
Camp/Village																			1			
Historic Trash/ Campsite																			1			
Historic Trash/Dump		1	6			1		1	2													
Isolated Historic Find		5	2		3	2	1				3	1		1	1		1	5	4	3	1	
Historic Trash/ Lithic Scatter	3		3						1						1				1	1		
Historic Miscellaneous			8			3	1	3			1					1			1		2	
Historic Structure/ Temporary Camp																			1			

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Table 2.4.4-5. BRA/CAI site categories.

VALLEY	ISOLATED FIND	RESTRICTED	EPHEMERAL	MINOR	SUSTAINED	MISCELLANEOUS HISTORIC	HISTORIC FIND
134	21	16	11	2	1		
135	4	8	1	1		1	
137a	44	14	15	1	11		5
139	14	12	1	1	2		2
140a	5	3					
141	9	6	1			4	3
151	6	2		2		1	2
154	16	10		1		4	1
155a	17	14	3	4			
155bc	20	8	1	3	1		
171	17	8	2	1			
172	11	4	1				3
173b	2	7	2			1	
174	10	11	3				
175	15	10	3	1			1
178b	8	3	1		6	1	1
179		2	1	1			
180	14	12	3	3	1		1
181	31	12	4	5	6		5
182	12	3	1				4
183	25	20	6	9	10		3
184	15	4		6	3		

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Table 2.4.4-6. MX project areas A and B, chronological summary by valley.

	Valley																					
	134	135	137a	139	140a	141	151	154	155a	155bc	171	172	173b	174	175	178b	179	180	181	182	183	184
Single Component Sites																						
(A) Paleo-Indian														1	3							
(B) Great Basin Archaic	5	4	6	8	2	3	4	6	4	9	5	2	1	4	3	2		9	10	4	15	3
(C) Rose Spring/ Eastgate	2	1	4	3	1	1		2	2	2	1	2		1	4			4	3	2		3
(D) Late Prehistoric		1	2	2		1	1	1				2						1			3	1
(E) Historic Euro-American		1				7	3	5	3		1	3	1		1	3		1	7	5	5	
(F) Fremont								1													2	
(G) Shoshone	3								1			1							5		4	2
(H) Snake Valley			1																1			
Multicomponent Sites																						
B,D,G																	1					
B,C,G															1		1		1			
A,B,C,D			1																			
B,C,D	2																		1		3	
B,C,D,E	1																					
B,E	1								1							1					1	
B,C			1	1					1			1						1				1
B,C,D,G			1	1												2	1					3
C,D							1											1				
C,D,G							1											1				
B,G								1		1						3					6	
B,C,E										1												
B,D																	1					
B,C,D,F.G,H																			1			
F,G																			2		1	
C,F,G																			1			
D,F,G																			1			
B,H																			1			
C,D,G																			1			
B,C,D,E,G,H																			1			
D,G,H																						1
C,G																						1
B,C,H																		1				1
B,C,E,G																						1
B,C,D,F,G																					2	
D,G																					1	

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(4) The above site type is to be found disproportionately in the Pinyon-Juniper as will the minor camps and sustained camps; and,

(5) Isolated finds are found disproportionately in the desert shrub.

In addition, isolated finds associated with permanent water are further away from the source than their intermittent water source counterparts. If the isolated finds reflect predominantly hunting activity, then the greater distance may reflect a concern not to frighten game surrounding a permanent and predictable source of water (cf. Steward, 1938).

The other three remaining site types are represented by two minor camps (with cultural materials pointing to three or four different activities) and one sustained camp (with cultural materials indicating at least five different activities). The minor camps are located in the Pinyon-Juniper woodlands surrounding either a permanent or intermittent source of water. Site areas are typically very large (1000-640000 m^2). The one recorded sustained camp is also located in the Pinyon-Juniper vegetation along the foothills. Permanent water in the form of a spring and stream is located on the site itself. The suggested activities performed at minor and sustained camps include hunting, tool rework/manufacturing, bone/wood working, hide preparation, and general cutting/processing. These assumptions are based on a field analysis of the lithic materials present at each site and the Lutz-Hunt (1980) report.

The locations of the various types of sites suggest a number of interpretations regarding prehistoric utilization of the valley. First, the largest sites, the sustained and minor camps, are located in the Pinyon-Juniper woodland, suggesting they were occupied either by large groups, or were occupied repeatedly by small groups. In any regard, these sites were probably used during the procurement of resources that were more localized and abundant than those located near or in the valley bottom (for instance, plants along playa/marsh edges and seasonal streams, small mammals). Valley bottom sites are of the restricted, ephemeral, and isolate site types. These types are widely dispersed, as one might expect. These types are also more numerous than the camp types, thus validating Steward's (1938) claim that periods when a wide variety of non-abundant resources were available were much more frequent than periods of resource abundance.

In summary, the resources useful to understand site location in Basin 134 include:

(a) seep springs near playa

(b) 100 meter zone surrounding larger intermittent washes

(c) foothill/Pinyon-Juniper covered area for locating larger sites (substantial sites)

(d) valley floor sites, while numerous and small, probably represent periods of general, wide spectrum resource utilization. The sites are probably indicative of a more dispersed population.

(e) foothill sites, while few in number, are substantial in area and of activities represented in the lithic assemblages. These sites are interpreted as reflective of the optimal diet resource specialization.

Ione Valley (Hydrologic Basin #135)

This alluviated valley is crisscrossed by numerous wide and deeply cut intermittent washes. The valley bottom vegetation is typical Cold Desert Scrub with the surrounding foothills covered with varying degrees of Pinyon-Juniper vegetation and associated understory. The actual survey area in Basin 135 comprised seventeen 80-acre units (1,360 acres) dispersed widely throughout the entire valley floor. Including isolates, 4 sites were located in Stratum A, while Stratum B contained 10 sites. One site was found for every 97 acres. This stands in contrast to the adjacent Smith Creek Valley which averaged approximately one site for every 40 acres surveyed.

The two major landforms on which sites occurred are the valley floor and hill slopes. However, these landforms also correspond with the vegetation zones. The valley floor and hill slopes are covered, respectively, with Cold Desert Shrub and Pinyon-Juniper. The data suggests that a greater density of cultural resources are found in the present Pinyon-Juniper woodland areas while survey unit acreage in the Pinyon-Juniper amounted to less than 20 percent, the number of sites in the Pinyon-Juniper exceeded 35 percent of the basin total. The inverse was true for sites and acreage in the desert shrub. The percent of acreage surveyed in the Cold Desert Shrub exceeded the percent of associated sites. Cultural resources are not distributed in proportion to acreage per vegetation zone.

Big Smoky Valley (Hydrologic Basin #137a)

Big Smoky Valley is a large and topographically diverse hydrological basin with a total of 62 sample units (4,960 acres) typically situated in the Cold Desert Shrub or Salt Desert Shrub valley bottom areas. Much of the Pinyon-Juniper covered foothills were excluded from the survey sample due to National Forest jurisdiction. Thus, what is presented here is based on survey data drawn from limited areas within the basin which do not include the examination of a crucial vegetation zone of the prehistoric procurement system and many of the associated seep springs and streams within the zone. Of a more specific nature, the irregular playa boundaries were never as explicit as portrayed on the available topographic maps. In practice, the assigned sample units placed on the "playa boundary" were often unproductive since the playa edge was never adequately sampled due to inadequate map data.

Stratum A, 22 percent of the area surveyed, yielded 33 percent (22) of the sites. Stratum B, 78 percent of the area surveyed, yielded 67 percent (45) of recorded sites. Of the 67 sites recorded, nearly 80 percent were either isolated finds or ephemeral, single activity sites (61 percent or 41 sites and 17.9 percent or 12 sites, respectively). Only two sustained camps, one minor camp, and eleven restricted sites were discovered. Approximately one site was located per 80 acre survey unit.

In general, the following variables appear to pattern site distribution within the confines of Big Smoky Valley:

(a) The presence of permanent water;
(b) The exitence of the playa (and associated land features) and the Salt Desert shrub vegetation; and/or
(c) The distance to the nearest water source (esp. intermittent).

Kobeh Valley (Hydrologic Basin #139)

Basin 139, Kobeh Valley, is a large, flat valley marked by the presence of Lone Mountain and numerous large, experimental crested wheatgrass fields. The valley drainage is highlighted by Roberts Creek, Coils Creek, and Rutabaga Creek. Numerous intermittent stream courses also crisscross through the basin. Disturbance of the original land surface is prominent in certain areas. Bureau of Land Management (BLM) experimental crested wheatgrass fields cover large expanses of the valley floor, and sample units were occasionally found adjacent to or in disturbed crested wheat fields. As expected, very little cultural debitage was discovered in such areas. A total of 34 sample units (2,700) was surveyed.

Stratum A, 24 percent of the area surveyed, contained 33 percent (10) of the surveyed acreage, while Stratum B contained 67 percent (20) of the sites. Isolates are included in these figures. Approximately one site was discovered for every 100 acres surveyed. Fourteen isolated finds, 12 restricted sites, 2 sustained camps, 1 ephemeral site and 1 minor camp comprise the basin site sample. In general, the only variable which predicts site location is distance to water. It appears that with increased distance from the valley floor and its numerous water sources (seasonal and permanent), fewer sites are found.

The many drainages converging toward the valley floor probably supported seasonal plant and animal resources available for prehistoric exploitation. Thus, unlike several of the other valleys where sites indicating multiple activities (and inferred optimal foraging) are located on the valley slopes and foothills near permanent water, Kobeh Valley's sustained and minor camps can be found on both the valley floor and valley slopes near intermittent and permanent sources of water. These camp sites, inferring episodes of relative resource abundance, tend to be large and few in number compared to general resource utilization sites (isolated finds, ephemeral, and restricted sites). The larger number of general resource sites reflects the gathering/processing or hunting of relatively unpredictable, less abundant resources. It can be further inferred that the population was more dispersed while engaging in wide spectrum resource utilization. Basin 139's valley floor was thus not restricted to a general resource procurement area but could also support optimal foraging activities and larger settlements.

Monitor Valley (Hydrologic Basin #140)

Only a small portion of Monitor Valley was included as part of the M-X survey region. Fifteen survey units (120 acres) were examined. The valley floor area surveyed by the reconnaissance teams has been crosscut by numerous washes and subjected to repeated alluvial deposition. The valley floor has a number of Bureau of Land Management (BLM) crested wheat grass fields which have altered the former vegetation pattern and topographic relief.

Stratum A, 20 percent of the area surveyed, contained 37.5 percent (3) of the sites found while the 80 percent surveyed in Stratum B yielded 62.5 percent (5) of the sites found. All sites were found close to an intermittent stream course. The nearest permanent water was often several kilometers away. All sites were also located in the Cold Desert Shrub vegetation zone. No survey unit crossed into any Pinyon-Juniper woodland as this vegetation zone is restricted to the mountains which ring the valley.

Ralston Valley (Hydrologic Basin #141)

Ralston Valley, Basin 141, was one of the smaller valleys surveyed during the 1980 field season. Surrounded by several mountain ranges and the Toiyabe National Forest, the basin is drained by Willow Creek and other numerous intermittent streams. Springs located in the foothills near the Pinyon-Juniper tree line provide the only sources of permanent water in the valley. The former and present day mining towns of Manhattan, Belmont, and Tonopah, along with numerous smaller mining ventures ("glory holes"), dot the surrounding landscape. The regional economic development connected with mineral exploration and exploitation has contributed severe impacts to many of the prehistoric aboriginal sites in the valley.

A total of 17 units (1,360 acres) were surveyed. Although Stratum A comprised only 12 percent of the area surveyed, it produced 31 percent (5) of the sites found. Stratum B produced 69 percent (11) of the sites found. Prehistoric sites averaged one every 85 acres. Seven historic sites were recorded in the basin, ranging from isolated historic finds (e.g., bottles, tin cans) to historic trash dumps, foundations, and telegraph (?) poles. This compares to only 16 prehistoric sites of which over 50 percent are isolated aboriginal finds. The nine isolated prehistoric finds were the most numerous site type noted. There were six restricted activity sites (prehistoric) and only one ephemeral site. As mentioned, Stratum A units, which were near springs, had a greater percentage of sites per unit area surveyed than did Stratum B. The two Stratum B units located in the Pinyon-Juniper woodland or Pinyon-Juniper/Desert scrub ecotone both yielded archeological sites. One area is located in the Pinyon-Juniper/Desert Scrub ecotone near a spring. The other location is on a hill-saddle which forms a natural pass connecting Big Smoky Valley (Basin 137a) and Ralston Valley. In addition to the presence of Pinyon-Juniper vegetation, the above areas are found on low hills or on the alluvial valley slopes. Future surveys will hopefully elaborate and test for the existence of a possible relationship between site density and vegetation-landform.

While the sample is small, it appears that sites associated with intermittent stream courses are found closer to the water source than sites associated with permanent water. Apparently if water was present at the intermittent source, the aboriginal inhabitants tended to stay near to it. Its occurrence was probably relatively unpredictable. Permanent water sources, on the other hand, are predictable and provide abundant water for extended periods of time unlike the intermittent sources. Thus, site distribution around permanent water may have been to avoid contamination and to prevent the disturbance of watering wildlife.

Basin 141 did not produce a single minor or sustained camp site. Cultural debitage at most of the sites indicated brief occupation with one or two activities (hunting, tool rework/manufacture). Even the sites surrounding a permanent water follow this pattern. Perhaps greater resource abundance in the nearby Monitor and Big Smoky valleys resulted in only infrequent utilization of Ralston Valley. Based on very samll sample, Basin 141 appears to have been utilized for restricted general resource procurement activities.

Antelope Valley (Hydrologic Basin #151)

Antelope Valley contains numerous springs, intermittent drainages, and perennial streams including Allison, Faulkner, and Dagger creeks. Pinyon-Juniper woodlands extend from upper elevations down on to the valley slopes. The Desert Shrub areas are highly disturbed by sheet erosion, cattle grazing, and experimental crested wheat fields. A total of 13 sample units (1,040 acres) were surveyed.

Stratum A, 8 percent of the area surveyed, accounted for 20 percent (2) of the sites. Stratum B accounted for 80 percent (8) of the sites found. While 80 percent of all sites were found in Pinyon-Juniper covered areas, the low percentage of sites in the Desert Shrub may be due to the extensive disturbance of these areas.

The site varieties represented range from minor camps (2) to isolated finds (6). Except for two of these sites, all of the others are found closest to intermittent sources of water. The two minor camps (representative of four activities) were located in the Desert Shrub surrounding a permanent water source and in the Pinyon-Juniper zone on a ridge top nearest intermittent water. Thus, while there are a majority of small sites, the presence of the minor camps indicates that the basin did possess resources in relative abundance that could support a larger group size and/or more prolonged, repeated occupation. The sample is indeed very small but it is also more than adequate to demonstrate the need for intensive survey of the hill pinyon-juniper covered slopes of Basin 151.

Newark Valley (Hydrologic Basin #154)

Basin 154 is a long, narrow valley marked by the presence of numerous sand dunes and large playa (Newark "Lake"). The playa edge is very irregular and, in many areas, indistinguishable from the valley floor. Major intermittent washes flow into the old lake from the south. Several ranches can also be found around the playa edge and at the base of the mountains. Contrasting with the almost flat playa surface are the sharply rising Diamond and Buck mountains. On the east side of the basin, the Elko-Hamilton stage line road can still be observed.

Vegetation on the basin floor is a mix of Cold Desert Shrub and 7salt Desert Shrub. Grasslands are also encountered. Native bunch grass plus fields of crested wheatgrass are found in various valley locations. Juniper and occasional Pinyon trees do not extend much onto the valley slopes. The Pinyon-Juniper woodland is basically restricted to the hill-mountain region separating the valleys.

The 40 sample units for the valley were separated into 13 for Stratum A and 27 for Stratum B. Fourteen sites were recorded for Stratum A and 15 for Stratum B.

Of the 29 sites recorded, 16 (55 percent) of the total were isolated finds. Restricted activity sites (10), rockshelters (2), and one sustained camp accounted for the rest of the site total. All sites were found in either Cold Desert Shrub or Salt Desert Shrub vegetation zone.

With over 3,000 acres surveyed, the number of sites discovered is quite small. The average is one site for every 110 acres surveyed. The Stratum A units averaged a site every 74 acres while Stratum B units averaged one site every 144 acres.

It should be expected that the occurrence of permanent water (springs) in the Stratum A units was responsible for Stratum A site clusters. However, four of the nine units with permanent water did not have sites.

It is possible that some of the present permanent water sources became active (by natural and/or man-made means) in historic times. This may account for why over 40 percent of the units with permanent water do not have any sites nearby. Another reason may be that each source of permanent water was not considered as a critical resource. That is, in this well-watered valley, every permanent source did not have to attract the human population. The presence of at least some permanent water probably did serve to attract human populations. Additionally, landform type may have also been considered in site location choice. Resources surrounding the playa (permanent water and slightly elevated terraces) appear to correlate with site distribution.

Newark's prominent lake-playa is marked by an irregular "shoreline." Thus, it is easier to examine the possible relationship by the vertical distance measure from the valley floor rather than calculate distance from the present playa edge. The number of sites on the valley floor proper decrease with greater distance from the playa. Resources around the lake-playa (not necessarily on the edge of the lake as depicted on present USGS topographic maps), i.e., springs, vegetation and wildlife, served to attract prehistoric populations. However, distance from the playa is not the only variable that predicts site location.

Site distribution and distance to nearest water (permanent and intermittent) are categorized by 100 m intervals. As a valley total, the number of sites decreases with increased distance to nearest water; however most sites are found within 200 m of the nearest water. In fact, over 70 percent of all sites (21 of 29) are located in the first 200 m from water. Yet, of these sites, over half are distributed between 100 and 200 m. That is, the greatest site density may occur within the second half of a 200 m zone (100 - 200 m).

Newark Valley's site distribution can be explained in terms of distance from the valley floor-playa and distance to nearest water. For the latter, a 200 m zone closest to the water is crucial to predict site locale.

<u>Little Smoky Valley (Hydrologic Basin #155A)</u>

Basin 155a is a narrow alluvial valley marked by the presence of several fine grain basalt outcrops and numerous intermittent washes. In general, Fish Creek, Cockalorum Wash, Willow Creek, and Snowball Creek drain towards Fish Creek Valley--a northern portion of the basin separating Little Smoky and Newark valleys. Springs are found in the foothills and usually in the Pinyon-Juniper woodland belt: Vegetation on the valley floor is the typical Artemesia dominated Cold Desert Shrub community.

A total of 22 sample units were surveyed including one in stratum A and 21 in stratum B. The single stratum A unit yielded two sites, while 15 of the 21 stratum B units yielded 36 sites, including isolates.

In some valleys, units in the Pinyon-Juniper woodland have a high probability of containing sites. In basin 155A, over 70 percent of all units in Pinyon-Juniper contained sites. However, the same applies to units in the cold desert shrub vegetation.

A number of sites were found relatively close to their nearest water source. Only one unit had permanent water present. Not surprisingly, sites were found here. Yet the other 15 units with sites did not have any permanent water present, but were located alongside an intermittent stream. In addition, the area between two parallel running or converging washes often produced sites. It should be noted that minor camps were found substantially closer to the water source than the other site types. As well, all minor camps were located adjacent to intermittent sources of water.

A special resource responsible for the high number of units with sites in the Cold Desert Shrub and the valley floor is basalt. This fine grain, high quality basalt is found in many different valley floor locations. Aboriginal utilization of the natural and abundant raw lithic material is hypothesized to explain some of the site distribution and density.

In sum, the relatively well-watered valley with plant, wildlife and lithic resources in both the hills and valley floor account for the high average number of sites per unit.

Little Smoky Valley (Hydrologic Basin #155B-C)

Basin 155B-C is a large, well drained valley system. Alluvial deposition, via permanent and intermittent stream courses, is interrupted in the southern end of the valley by volcanic tablelands. Twenty-six units (2,080 acres) were surveyed. Five of the twenty-six units were designated as Stratum A. In total, 33 sites were recorded. Just over 20 percent of the site total was recovered in Stratum A units. Stratum A units also comprised approximately 20 percent of the total surveyed acreage. The basalt outcrops scattered throughout the basin, the numerous water sources (seasonal and permanent) and the accompanying plant and wildlife probably account for the location of the many lithic scatters and other multiple activity sites.

Coal Valley (Hydrologic Basin #171)

Coal Valley is a moderate-size valley characterized by the remnants of a Pleistocene Lake. Numerous intermittent streams and washes drain toward the valley floor sands and playa from the sharply rising mountains (Golden Gate and Seamen Ranges) which border the valley. Permanent sources of water are non-existent within the valley. The Coal Valley playa edge, like several of the other surveyed valleys, is often much more irregular than shown on the available maps. The northern portion of the playa is covered with a mixture of Cold Desert and Salt Desert Shrub vegetation while the southern portion is undergoing active wind deflation which has exposed a number of buried sites (cf. Busby, 1979). The former lake bed is particularly evident in the southern third of the valley.

The 22 sample units surveyed did not cross into the Pinyon-Juniper woodland. Vegetation within the units was Sagebrush, Rabbitbrush, Shadscale, and Winterfat, with some Ephedra species present on the slopes. Of the 22 units, 5 were designated Stratum A units and 17 Stratum B. Over 50 percent of the Stratum B units had cultural resources present compared to 40 percent (2) of the Stratum A units.

If we examine the number of acres surveyed and the number of sites according to stratum, it is seen that while the Stratum A units comprised more than 20 percent of the total surveyed acres, less than 7 percent of all sites were found in Stratum A.

One reason Stratum B yielded more sites was that cultural resource localities were found in what is now the middle of the former lake bed. Apparently, seasonal pools and washes within the present boundary of the playa sustained vegetation and attracted wildlife in the past. Site occurrance within the playa is not unknown for Coal Valley, as sites attributable to the Western Pluvial Lakes Tradition and other chronological periods have been reported for the southern portion of the present playa area (Busby, 1979).

The old Coal Valley playa is the most noteworthy feature in the basin and undoubtedly its products (seasonal water, vegetation, and wildlife) served to attract human groups.

Garden Valley (Hydrologic Basin #172)

Basin 172 is a small relatively well watered valley bounded by the Golden Gate, Worthington, Quinn Canyon and Grant mountain ranges. Creeks and seasonal streams drain west to east across the basin into neighboring Coal Valley through the "Watergap" in the Golden Gate Range. Unfortunately, due to private holdings and the Humboldt National Forest boundary, land access to these water resources and other potential survey areas was limited.

All 18 sample units were in Stratum B, located in the Cold Desert Shrub vegetation on the valley alluvial plain, alluvial fans, or valley slopes or edges. Permanent sources of water were not present in any of the units.

Isolated finds comprise 70 percent of the total site inventory. No minor or sustained camps were found.

While the sample is small, Shoshone Plain Ware pottery was discovered in this valley. Fremont Pottery has also been found in the immediate vicinity (Busby, 1979). Minor and sustained camps may possibly be found (Busby, 1979), but the existing data indicate that Garden Valley was used only sporadically by the aboriginal inhabitants of the region.

Railroad Valley (Hydrologic Basin #173B)

Sixteen survey units were examined in Basin 173b. Of these, two Stratum A units yielded 4 sites and 14 Stratum B units yielded the remaining sites. All 11 located sites were noted within the Cold Desert Shrub community, although one sample unit crossed into the Pinyon-Juniper woodland.

Three of the 11 sites were found near a permanent water source (spring). The other sites were located close to intermittent stream courses. Of the three sites found nearest to permanent water, only a single activity site and a multiple activity site possessed flowing water within the site boundaries. The other multiple activity site is a small quarry, 500 m away from the nearest permanent water.

Positioned in a natural pass in the hills which partially bisect the basin, two sample units yielded sites which apparently emphasized lithic "workshop" activities--tool reworking/manufacturing, decortification, and the production of bifaces. However, the sites and their lithic debitage component did not apparently indicate a repeated or prolonged occupation.

Despite the fact that both Stratum A units with permanent water have sites present, the differences between units associated with intermittent water with and without sites is not great enough to be statistically significant. It should be noted that the units in the low hills and the natural pass are not associated with permanent water. Thus, while permanent, predictable sources of water are important for some sites, a hill location (i.e., landform) is just as important for predicting other sites.

Jakes Valley (Hydrologic Basin #174)

Basin 174 was one of the smaller valleys surveyed. It is a narrow valley drained by the intermittent Illipah Creek and various smaller intermittent stream courses. Drainages flow into the Jakes Valley Depression approximately in the center of the valley floor. Sagebrush, Bud Sage, and Winter Fat dominate the valley floor and parts of the valley slopes. The Pinyon-Juniper woodland also covers portions of the valley slopes and the surrounding hills of the Egan and Moorman Ridge mountain ranges.

A total of 17 survey units (1,360 acres) were examined in Jakes Valley, 12 in Stratum B, and 5 in Stratum A. Twenty-two of the 24 sites located in the valley were in Stratum B; the remainder in Stratum A.

For this valley, it would appear that areal resources play a major role in understanding site distribution. Additionally, the presence of fine grain basalt (as quarrying material) along the northeast portion of the valley (also in the pinyon-juniper, near small intermittent streams and on hill slopes) can also be considered as another resource that helps explain site distribution in the Pinyon-Juniper woodland.

None of the sites in the Pinyon-Juniper or Desert Shrub vegetation indicate anything more than a very temporary occupation. The lack of permanent water probably restricted occupation of Jakes Valley except for those brief periods when water was present. In general, areal resource distribution predicts the general resource utilization, limited occupation sites of Jakes Valley.

Long Valley (Hydrologic Basin #175)

Basin 175 is noted for its playa, the mixture of Salt Desert Shrub and Cold Desert Shrub vegetation on the valley floor, and the conspicuous absence of permanent water sources. Large intermittent washes run from the south of the valley to the lower edge of the Long Valley playa. Other small intermittent washes flow from the surrounding mountains for a short distance before disappearing under the valley sand. Surrounded almost completely by mountains, access into the basin is gained through several natural mountain/hill passes from Newark and Butte Valleys.

While the northern end of this long, narrow valley has a Pony Express station site, the southern portion is marked by a National Register Archeological District. Lithic scatters within the district are reported to contain artifacts of the Western Pluvial Lake Tradition (York, 1975).

The few springs in the basin are located in the mountains and foothills within the Pinyon-Juniper woodland. Fresh permanent water does not presently reach the playa. As in some of the other valleys, the playa edge is not as distinct in reality as on the maps. The irregular playa boundaries appear to extend substantially beyond the map-depicted playa. Twenty-six units were surveyed with a site density of approximately one site per survey unit.

A high value of six sites per unit (Stratum B) was located in the valley slope next to a developed well. It is not known if this area prehistorically contained a seep spring. Six sites located in Stratum A and 23 sites located in Stratum B.

Butte Valley (Hydrologic Basin #178b)

Basin 178b is another long narrow valley with few permanent water sources. Intermittent seasonal stream courses from the mountains downcut the valley's alluvial slopes and drain onto the valley floor alkali flat/playa areas. Permanent water, in the form of springs, can be found in the foothills at the Desert Shrub/Pinyon-Juniper interface or at the higher elevations. As in Long and Jakes Valleys, permanent water is rare. The valley floor vegetation is dominated by the Cold Desert Shrub community which meets the Pinyon-Juniper community in the foothills. Access into the valley is through a number of low, natural passes in the Butte and Cherry Creek mountain ranges.

A total of 18 sites were recorded, or 1 for every 1.2 survey units (21 units total). Included in the site total are eight isolated finds. In Stratum A, 2 sites were found, compared to 16 for Stratum B. Seventy percent (70%) of all sites and over fifty percent (50%) of all survey units are located in the Pinyon-Juniper woodland or Pinyon-Juniper/Desert 7shrub ecotone.

Little permanent water is present in the entire basin, and it was intuitively felt that sites would not be located too far away from the nearest water source (permanent or seasonal). While our sample size is very small, 11 out of 18 sites, or 61 percent, were found within 100 m of the nearest water source (either intermittent stream courses or springs).

There is one spring of immediate concern, since 11 sites are found surrounding it. These sites are all within 8,500 m of the spring. Three of the sites range from 7,400 - 8,450 m away while the remaining 8 are found within the first 1,400 m of the spring. The eight sites closest to the spring are all located in the Pinyon-Juniper and on the slopes of hills. The mean distance from this one water source for the 8 sites under consideration is 758 m. Six sustained camps are among the eight sites closest to the spring. Five of these six sustained camp sites also had Shoshone Plain

Ware pottery present. These were the only sites in the basin to have ceramics present in the artifact assemblage.

It would appear that the valley floor/desert shrub areas have only small, one to two activity sites or isolated finds. These sites are inferred to represent general foraging or side activity-satellite sites of the larger sustained camps. The sustained camps are restricted to the Pinyon-Juniper and hill slopes, and are relatively close to the few permanent water sources. Their size and the number of inferred activities (based on the field analysis) point to more sustained or repeated occupation.

Steptoe Valley (Hydrologic Basin #179)

Basin 179 is a long, well-watered valley of which only the southern half was surveyed. Numerous streams leading out of the Schnell Creek, Egan and Ward Mountain ranges drain toward the center of the valley floor. In addition to the numerous streams and creeks, springs are present throughout the foothill and mountain areas. Pinyon-Juniper woodland is restricted to the higher elevation mountains, hills and valley slopes. Cold Desert Shrub vegetation is found on the valley floor along with experimental fields of crested wheatgrass. The original composition and distribution of this basin's plant communities has been altered by both the historic mining activities and the BLM experimental crested wheatgrass fields.

Only 11 units were assigned to Steptoe Valley in the sampling design. Five of the units were considered Stratum A (i.e., units found near springs or creeks). Four sites were recorded in Stratum A while no Stratum B sites were found.

The recorded sites include two restricted sites, one minor camp, and one sustained camp. Each site contained artifacts of the Great Basin Archaic, Eastgate-Rose Spring Complex, and the Late Prehistoric Complex. Shoshone ceramics were also noted at two of the sites. All of the sites were found in the Pinyon-Juniper zone on ridges or ridge slopes. The two sample units that yielded these sites also had springs within the boundary of the units.

Cave Valley (Hydrologic Basin #180)

Basin 180 is a very narrow and small valley. Numerous intermittent stream courses flow out of the surrounding hills onto the Cave Valley depression or flat. The most prominent water feature is the north-south running Cave Valley Wash. In fact, portions of this large, well developed drainage had flowing water, even in the late summer. However, most of the water apparently disappears underground before reaching the Cave Valley depression in the southern one-third of the basin. A number of springs dot the foothills in the northern half of the valley but most are privately owned.

Thirty-three sites were recorded in 14 survey units. Two sites were recorded in the 1 unit of Stratum A and the 12 units of Stratum B contained 8 sites. The high number of sites in Stratum A is due to units located adjacent to springs. In general, the Pinyon-Juniper and the Pinyon-Juniper/Cold Desert Shrub ecotone areas appear to have a greater likelihood of containing more sites than the Cold Desert Shrub areas.

Dry Lake Valley (Hydrologic Basin #181)

Basin 181 is a very long, narrow valley, bounded by the Burnt Springs, North Pahroc, Schell Creek, and Fairview Mountain Ranges. The basin is noted for the Dry Lake playa in its southern half. Numerous intermittent washes crisscross through the alluvial fans and teminate on the valley floor. Coyote Wash, the most prominent stream course in the basin, runs approximately north-south along the eastern side of the valley. Like many other valleys, the playa and its accompanying Dry Lake Valley "depression" do not have completely distinct boundaries. This adversely affected the Stratum A units that attempted to sample lineal resources (i.e., a lacustrine shore).

Stratum A units comprised over 25 percent of the total unit sample. However, the Stratum A units yielded approximately 40 percent of the basin's site total: 22 of the 56 recorded sites in 11 of 40 units. The Stratum A units averaged two sites per unit compared to Stratum B's 1.17. Both strata exhibit a wide variation in the number of sites per unit (0 to 10 for Stratum A and 0 to 11 for Stratum B).

Only five units in the Cold Desert Shrub (mixed Salt Desert Shrub vegetation) were located near the Dry Lake playa. Of these, only two units contained sites. The irregular playa boundary prevented accurate sampling of the lineal resource (the old lakeshore). One unit contained only two isolated finds, while the other contained two restricted activity sites. The latter were not found on the playa edge, but several hundred meters away. With so little permanent water available in the basin, it was intuitively felt that sites would be located relatively close to the nearest water source. In actuality, nearly 84 percent of all sites were found within 100 m of the nearest water source.

In this valley, areas marked by the presence of Pinyon-Juniper and/or permanent water will have a greater likelihood of cultural resource occurrence and a greater site density. In conjunction with this tentative conclusion, it should also be noted that the distance to water (intermittent or permanent) is another factor to consider when attempting to pattern the site distribution in Dry Lake Valley.

Delamar Valley (Hydrologic Basin #182)

Basin 182 is a wide valley surrounded by the South Pahroc and Delamar Mountain ranges and marked by the presence of the Delamar Lake playa. A major wash network runs north to south towards the playa, whose boundaries are irregular and not as distinct as depicted on the available maps. The Pinyon-Juniper belt is conspicuously absent on the majority of the hills (within the hydrologic basin). The vegetation is a combination of Cold Desert Shrub and Warm Desert Shrub biotic communities.

Sixteen sites were found in 21 survey units. In Stratum A, 3 sites were found in 3 units and in Stratum B 13 sites were found in 18 units. The number and type of sites recovered from the valley was very disappointing. Isolated finds amounted to 75 percent of the total while only one ephemeral rockshelter site and three restricted sites were discovered. In general, sites were not plentiful in the center of the valley, but their numbers did increase at the first major elevational contour. Site density then decreased beyond 200 mof the valley floor. Also, 70 percent of all located sites in valley occured within 100 m of water.

Lake Valley (Hydrologic Basin #183)

Basin 183 is a long, wide valley. Springs dot the landscape in the mountain foothills, and at the base of the foothills. The wet grasslands (marsh) and associated springs in the northern half of the valley are privately owned, thus preventing the study/survey of this ecosystem. Private land holdings in the northern half and southern third of the basin removed large regions of the valley from the survey as well. Additionally, crested wheatgrass fields on the valley floor have altered the natural vegetation, and the chance of finding cultural resources on the valley floor is low due to disturbance. This especially affected the Stratum B units.

Fourteen Stratum A units were surveyed compared to 26 units in Stratum B. The Stratum A units were located near permanent water sources in the Pinyon-Juniper and foothills around the first major contour of the Lake Valley depression. Thirty-four sites were located in each stratum with a range from zero to nine sites per unit in each stratum. Twelve of 14 Stratum A units had cultural resources present compared to 13 of 26 for Statum B units.

The portion of Stratum A responsible for the high mean density per unit is the areal resource Pinyon-Juniper. The playa units of Stratum A produced substantially fewer sites. However, it is important to point out that our results may reflect more the degree of disturbance than differential patterns in prehistoric land use. That is, the likelihood is greater for finding sites and finding greater site densities in the Pinyon-Juniper, Pinyon-Juniper/Cold Desert Shrub ecotone area because this part of the valley has suffered less disturbance than the valley floor. Thus, our results must be tempered with the knowledge that the present land surface has been severely altered.

Many sites were found adjacent to stream courses. Thus, intuitively it was felt that Lake Valley, too, would exhibit a relationship between the number of sites and the distance to nearest water. In fact, over two-thirds of all sites were found within 100 m of the water source. Future research must focus on determining the distribution and density of individual site types and the pattern of site density within the Pinyon-Juniper and Pinyon-Juniper/Cold Desert shrub ecotone areas.

In general, the greatest site density is found in the Pinyon-Juniper woodland and Pinyon-Juniper/Cold Desert Shrub ecotone. Based on preliminary analysis, sites also tend to be situated quite close to the water source.

Spring Valley (Hydrologic Basin #184)

Basin 184 is a long, wide valley marked by the presence of numerous springs and marsh grasslands. Unfortunately, access to most of these areas was restricted as large tracts of privately owned land prevented the survey of potential "site-rich" land. The center of the valley is noted for sand dunes and Baking Powder Flat. The Pinyon-Juniper dominated hill slopes encircle the valley floor while permanent water, in the form of springs and streams, can be found in the foothills and on the valley floor itself. Intermittent washes are common and in general, drain into Baking Powder Flat.

A total of 26 units were examined in Spring Valley. Six units were designated as Stratum A units. Seep springs were either directly adjacent to or contained within the unit boundaries. The other 20 units were assigned to Stratum B. Eighteen sites were found in Stratum A and 10 in Stratum B. Of the six Stratum A units, only one did not contain cultural resources. Stratum A amounted to 23 percent of the survey acreage, while representing 64 percent of the valley site total.

Only four survey units had permanent water within the unit boundaries. These units, besides having permanent water, were located on sloping landscapes and in the Pinyon-Juniper. The areas with Pinyon-Juniper woodland, sloping landscapes and permanent water exhibit a greater site density than the other survey areas.

Preliminary Assessment of Variables Affecting Cultural Resource Location

In the above basin summaries, general statements have been made about variables affecting site location. Certain types of sites, for example, have been noted as closer to water or the Pinyon-Juniper woodland than other site types. These statements were based on chi-square (X^2) tests, Fisher's Exact Probability Test, t-tests, and other statistical manipulations.

Table 2.4.4-7 summarizes key site distribution variables identified by these tests. However, this table and statements on this subject within the summaries should be viewed with caution because data coding errors have been identified. For this reason, the statistics of the various tests have not been presented. Also omitted are a number of intriguing statements about variations in the sizes of different site types, their locations, and behavioral implications of these patterns. Statements presented in the summaries are those of a general nature which are not unduly compromised by the data coding errors.

2.5 IMPACT ASSESSMENT

IMPACT SIGNIFICANCE (2.5.1)

Impacts to archaeological resources depend upon their significance. Numerous federal, state, and local laws provide guidance for evaluating the significance of cultural resources. The Code of Federal Regulations (CFR) clarifies the position taken by the U.S. government under Titles 36 CRF 60 (National Register of Historic Places: Criteria for Statewide Historic Surveys and Plans) and 36 CFR 800 (Procedures for the Protection of Historic and Cultural Properties). The latter, issued by the Advisory Council on Historic Preservation, presents the legal measures of significance most relevant to cultural resource evaluations:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:

(1) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(2) That are associated with the lives of persons significant in our past; or

(3) That embody the distinctive characteristics of a type, period, method of construction, or that represent the work of a master, or that possess high

Table 2.4.4-7. Basin summary of key site distribution variables.

Basin Number	Variable(s)
134	pinyon-juniper; springs near playa; distance to water
135	pinyon-juniper
137a	playa; permanent water; distance to water
140	hill slopes
141	distance to water; pinyon-juniper/cold desert shrub ecotone
151	pinyon-juniper; hill slopes
154	distance to water; distance from valley floor
155a	distance to water; basalt
155bc	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; distance from valley floor
171	distance from playa
172	distance to water
173	permanent water; hill slopes
174	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; distance from valley floor; basalt
175	distance from valley floor-playa; distance to water
178b	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; distance to water; permanent water
179	pinyon-juniper
180	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; valley slopes
181	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; permanent water; distance to water
182	hill slope, distance to water
183	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; distance to water
184	pinyon-juniper, pinyon-juniper/cold desert shrub ecotone; hill slopes; permanent water; distance to water

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artistic values, or that represent a significant and distinguishable entity whose components may lack distinctions; or

(4) That have yielded, or may be likely to yield, information important to prehistory or history (36 CFR 800.10; emphasis added).

This definition of significance is the one that determines the eligibility of cultural resources for inclusion on the NRHP, and it is a key measure of such resources in the environmental impact evaluation process.

Cultures may be viewed as systems which do not operate at a point in space but within a region, and there is considerable functional, morphological and technological variability within the system. Consequently, significance is best understood in terms of regions rather than in terms of specific sites. A result of this systemic view is that until there is a substantive grasp to the extant variation in resources, all are significant in that each bit of information helps establish variation parameters.

Furthermore, because these cultural resources are considered non-renewable, and because their destruction constitutes an irretrievable loss, project implementation will result in significant impacts to this resource base. The State of Nevada was concerned that in the draft EIS impacts of all alternatives were judged as highly significant:

> "Archaeological and historical resources are assigned undifferentiated high significant impact for all alternatives as well as Proposed Action. This makes it apparent that their inventory and evaluation was not sufficiently fine-grained or accurate enough to discern differences among the alternative with respect to their effects on archaeological and historical resources. In practice, this is a fancy way of not taking these resources into account in planning for the M-X siting, even though there has been a considerable expenditure of funds directed to studies of these resources."

While the impact analysis in the draft EIS was not fine-grained, it was, and is, clear that the large scale of the M-X would result in the destruction of a significant portion of the archaeological record. Hence, all alternatives result in highly significant impacts. This assessment is not changed by the new impact analysis. This analysis, based on an expanded inventory and quantitative data, indicates that, depending on the alternative, between 667 and 1,270 sites (excluding isolates) will be directly impacted. In addition, indirect impacts are likely to be higher than direct impacts. Thus, the position taken here is that even though alternatives differ in terms of the number of sites to be directly impacted, all alternatives do great damage to a non-renewable resource, the archaeological record.

IMPACT ASSESSMENT METHODS (2.5.2)

The original impacts assessment program in the Draft EIS made use of existing data from over 4,000 sites and other archaelogical information regarding the two major study areas in Nevada/Utah and Texas/New Mexico. On the basis of this information, territory within each of the study areas was partitioned using a fivemember sensitivity scheme with the following categories: 1. Very High (Sensitivity); 2. High; 3. Moderate; 4. Low; and 5. Very Low.

Separate partitions were created for both prehistoric and historic remains, since sensitivity varied depending on the type of cultural resource under consideration.

These sensitivity zones were then plotted over maps of the proposed M-X system, and the numbers of acres directly impacted within each zone were computed using brute force methods.

There were two basic difficulties with this approach. First, while the categorization scheme was based to some extent on existing data it was also developed in large part on untested assumptions regarding the study areas. Secondly, the categorization scheme was never quantified using an interval scale of measurement. This deficiency meant that it was not possible to compare impacts across categories or, far more importantly, across study areas. Without interval scaling it was impossible to determine, for example, the extent to which the "High Sensitivity" category for Nevada/Utah, on the one hand, and the "High Sensitivity" category for Texas/New Mexico, on the other, were equivalent groupings. Without this basic comparability, the sensitivity ranking systems are all but useless as tools for comparative impact assessment.

The present analysis in large part overcomes these two basic deficiencies. First, it evaluates and tests the accuracy of the sensitivity ranking systems by statistical analysis and other means, and revises the systems where necessary. Second, it fully quantifies the various sensitivity categories, by estimating actual archaeological potential represented within each category. With this additional information, the sensitivity system is used more effectively, in conjunction with other tests and comparisons, to complete a more meaningful impacts comparison.

The sampling stratification system used in the 1980 field work, which in many ways mirrored the Nevada/Utah sensitivity rankings used in the draft EIS and the environmental measurements, completed by the field crews as part of the sample unit recordation, makes it quite easy to compute measures of archaeological potential for each of the sesitivity categories as well as to create new categories and compute similar measures for these.

Site density (numbers of sites per sample unit) was used as the basic measure of sensitivity. Among other applications, the standard deviation in site density was used as an indicant of the integrity of the density figures. The proportion of sample units containing sites (or the "success rate") was also applied as a reliability check on the site density measures. These various statistical estimates are shown in Tables 2.5.2-1 and 2.5.2-2.

Prehistoric and historic sites were differentiated throughout, due to the obvious differences in the types and ages of remains and the spatial distribution patterns involved. Among the prehistoric sites, special attention was paid to multiple activity sites, because these tend to be particularly fragile and information-rich, and to large flake scatters, because it seemed likely that these could be multiple activity sites from which artifacts had been removed by collectors or possibly by natural agents. Unfortunately, it was not possible to consider isolated artifacts in the sensitivity/impacts assessment. Their exclusion was necessitated by the fact that some of the Nevada/Utah field crews had made a number of errors and omissions in the recording of isolated artifacts.

Overall, these results indicated that a new ranking system is required, one built upon but different from the original ranking. Initially, efforts were made to use historic as well as prehistoric sites in the development of the scheme. Unfortunately, so few historic sites were recorded during the 1980 survey that this proved difficult to achieve. Nevertheless, it will be seen that historic and prehistoric sites do tend to have some important similarities in distribution patterns, as reflected in the set of sensitivity categories.

The new ranking which eventually emerged contained the following categories.

1) Springs (area within a 1 mile radius)
2) Springs (area lying from 1 to 2 miles distance)
3) Streams (area within a 1 mile radius)
4) Streams (area lying from 1 to 2 mile distance)
5) Playa Margins (area within a 1 mile radius surrounding shorelines)
6) Open Fan (all remaining valley areas in Fish Springs (7) and Little Smoky (155A-C) valleys)
7) Other Valley (all remaining valley areas)

The site density and supporting data for each of these categories are contained in Tables 2.5.2-1 and 2.5.2-2. Table 2.5.2-1 contains mean and standard deviation data for 9 source categories on which the final scheme was based. Table 2.5.2-2 contains mean and success rate figures for the final set of 7 sensitivity categories.

Several things may be observed about the tabular results. All site densities (prehistoric, historic, and prehistoric-multiple-activity) tend to be highest near the permanent water sources and decline with distance from those sources. In the case of historic sites and, particularly, multiple activity prehistoric sites, this drop off tends to be quite rapid. This is consistent with common sense notions about how these water sources were used by humans.

Playa margins were ranked as a high sensitivity zone in the draft EIS but, as the tabular results show, these areas had low site densities. However, playa boundary units did not really sample the extinct lake shorelines, because boundaries are not as distinct in the field as they are portrayed on USGS and BLM maps.

As a result, site densities for playa margins have been derived from a recent systematic survey of Pine and Wah Wah valleys (Ertec, 1981). This survey recovered a much higher site density within 1 mi of the Wah Wah Hardpan Playa and the nearby Sevier Dry Lake. Data drawn from the survey report indicates a density (excluding isolates) of 11.9 sites per sq mi. A density of 12 sites per sq mi was utilized for calculating direct impacts in playa margin areas.

This high density is also supported by the Nellis Air Force Range survey which found a density of 9.6 sites (prehistoric and historic, excluding isolates) per square mile around playa margins. Still, the regional survey placed 72 sample units (9 sq mi) within the "Playa Margin" stratum and even considering the problems in locating margins, it is difficult to accept that all or even most units completely missed these

Table 2.5.2-1. Archaeological sites recorded during the 1980 field program, by environmental domain.***

STRATUM	SAMPLE SIZE: NO. OF SAMPLING UNITS	MEAN NO. OF SITES	STANDARD DEVIATION
A. All Prehistoric Sites			
Springs (0-0.5 mi)	74	1.22	1.59
Springs (0.5-1 mi)	53	0.66	1.51
Springs (1-2 mi)	163	0.39	1.13
Streams (0-0.5 mi)	20	1.15	1.66
Streams (0.5-1 mi)	15	0.40	0.74
Streams (1-2 mi)	18	0.33	0.49
Playa Margin	24	0.25	0.74
Open Fan*	40	0.65	1.12
Other Valley**	310	0.16	0.48
B. Multiple Activity Prehistoric Sites			
Springs (0-0.5 mi)	74	0.31	0.55
Springs (0.5-1 mi)	53	0.04	0.19
Springs (1-2 mi)	163	0.03	0.20
Streams (0-0.5 mi)	20	0.25	0.91
Streams (0.5-1 mi)	15	0.13	0.52
Streams (1-2 mi)	18	0.00	0.00
Playa Margin	24	0.25	0.74
Open Fan*	40	0.00	0.00
Other Valley**	311	0.00	0.06
C. All Historic Sites			
Springs (0-0.5 mi)	74	0.26	0.50
Springs (0.5-1 mi)	53	0.04	0.19
Springs (1-2 mi)	163	0.02	0.16
Streams (0-0.5 mi)	20	0.10	0.45
Streams (0.5-1 mi)	15	0.07	0.26
Streams (1-2 mi)	18	0.06	0.24
Playa Margin	24	0.00	0.00
Open Fan*	40	0.00	0.00
Other Valley**	310	0.05	0.24

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*Category includes all remaining valley areas from Fish Springs (7) and Little Smokey (155A-C) valleys only.

**Includes all remaining valley areas from valleys not listed in the Open Fan category.

***Excludes all judgemental sample units.

Table 2.5.2-2. Archaeological sites recorded during the 1980 field program, by sensitivity zone.[3]

Stratum	Mean No. Of Sites Sampling Units	Proportion of Units With Sites
A. All prehistoric sites		
Springs (0-1 mi)	0.80	0.36
Springs (1-2 mi)	0.39	0.21
Streams (0-1 mi)	0.78	0.38
Streams (1-2 mi	0.33	0.33
Playa margin	0.25	0.17
Open fan[1]	0.65	0.40
Other valley[2]	0.16	0.13
B. Multiple activity prehistoric sites		
Springs (0-1 mi)	0.11	0.55
Springs (1-2 mi)	0.03	0.24
Streams (0-1 mi)	0.19	0.08
Streams (1-2 mi)	0.00	0.00
Playa margin	0.25	0.17
Open fan[1]	0.00	0.00
Other valley[2]	0.00	0.00
C. All historic sites		
Springs (0-1 mi)	0.09	0.09
Springs (1-2 mi)	0.02	0.24
Streams (0-1 mi)	0.08	0.08
Streams (1-2 mi)	0.06	0.06
Playa margin	0.00	0.00
Open fan[1]	0.00	0.00
Other valley[2]	0.05	0.00

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[1]Category includes all remaining valley areas from Fish Springs (7) and Little Smoky (155A-C) valleys only.

[2]Includes all remaining valley areas from valleys not listed in the open fan category.

[3]Excludes all judgmental sample units.

areas. The low density calculated from these 72 units may be mirroring the fact that "Playa Margin" sites are primarily found in sand dunes and are thus localized. It may be that the 100 sq mi survey inadequately surveyed dunes since "Playa Margin" sample units were systematically placed at 4 mi intervals around the margin. At any rate, a site density of 12 per sq mi has been utilized to characterize "Playa Margins."

An attempt was made to calculate site densities within the Pinyon-Juniper zone. Statistical analysis, however, indicated that there was no difference between sample units located in or near Pinyon-Juniper areas and those that were not, regardless of sampling stratum or other controlling variables. This suggests that the moderate rating given in the draft EIS to unwatered foothills, largely covered with Pinyon-Juniper stands, is unwarranted.

Given that substantial documentation attests to the importance of Pinyon-Juniper to prehistoric and historic Indian groups (Williams, Thomas, and Bettinger 1973; Thomas and Bettinger 1976; Steward, 1938), the lack of impor-tance of woodland areas is surprising, if not in error. The negative results may be due to the elimination in the analysis of all judgmentally-selected sample units. These units were predominantly located in the Pinyon-Juniper covered foothills while the systematically selected sample units used in the analysis were primarily located in the valley bottom. Since the Ely OB significantly impacts Pinyon-Juniper areas it is necessary to assess site density in this zone. The intensive systematic survey in the Nellis Air Force Range provides a density figure of 13 sites per sq mi and this figure has been utilized in the impact assessment.

Table 2.5.2-2 shows the site densities per 80-acre sample unit. To obtain densities useful in assessing direct impacts, the strata densities for "All Prehistoric Sites" and "All Historic Sites" have been added and multiplied by a factor of eight, thus yielding densities per sq mi. These densities are listed below:

	DENSITY PER STRATUM (sites per sq mi)
Springs (0-1 mi radius)	7.12
Springs (1-2 mi distance)	3.28
Streams (0.1 mi radius)	6.88
Streams (1-2 mi distance)	3.00
Playa Margin (0.1 mi radius)	12.00
Open Fan*	5.20
Other Valley**	1.68
Pinyon-Juniper	13.00

* Category includes all remaining valley areas from Fish Springs (7) and Little Smoky (155 A-C) valleys only.

** Includes all remaining valley areas from valley not in the Open Fan category.

It is important to understand that all of the various parameter estimates shown in Tables 2.5.2-1 and 2.5.2-2 are based on the assumption that the 1980 field program was built upon a random sampling methodology. In fact, this is far from the truth. The sample was highly structured and systematic and a full 10% of the sample units were positioned on a strictly judgmental basis by the field crews. Since the judgmental portion of the sample is fraught with problems, many of which remain obscure, it was entirely excluded from this analysis. The remainder of the sample was utilized in full, however, including those playa and other Stratum A units that were relocated in the field to more accurately articulate with the topic water source or feature. In defense of the assumption that the non-judgmental portion of the 1980 sample approximates a stratified random sample, it should be noted that the sample is well-dispersed, both within and across valleys. This would tend to support the integrity of the mean density estimates obtained, although the variance figures would need to be questioned once again (assuming that sites do cluster, a dispersed sample like this one should act to produce higher variance estimates than the average or typical random sample).

Another noteworthy underlying assumption is that the field crews recorded all cultural resource sites within the boundaries of the sample units. There are a couple of problems here. First, even with 30 m spacing it is likely that some sites were missed between sweeps. Secondly, some sites undoubtedly lie buried beneath the ground surface, as a result of erosion and deposition processes. Thus, estimates of total archaeological potential are probably lower than the actual numbers of resources present.

In the case of the 0-1 mi zone categories for springs and streams, there existed a particularly troublesome problem, stemming from the fact that the spring and stream strata included units extending from individual springs and streams to a distance of 0.5 mi. While the sample contains other units that are located between 0.5 and 1 mi from these resources, they were part of stratum B rather than A, and thus the ratio of sample units in the 0-0.5 region to sample units in the .5-1 region is different from the ratio of actual on-the-ground areas. Since the site densities are quite different (see Table 2.5.2-1), it was important to combine these in a way that reflected the actual area breakdowns. In the case of the spring zone, sample units in the 0.5-1 area were given three times as much weight as units in the 0-0.5 area (since a circle of radius 1-unit has four times as much area as a circle of radius 0.5-units, the 0.5-1 zone has (roughly, due to overlap and other difficulties) three four minus one times as much area around each spring as the 0-0.5 zone). In the case of the stream zone, equal weightings were applied, since streams are a linear phenomenon. The resulting figures (Table 2.5.2-2) are means based on the contributing means and the weighting factor, if any.

IMPACTS ON ARCHAEOLOGICAL AND HISTORICAL RESOURCES (2.5.3)

Direct impacts were calculated by using the site densities for affected enviromental zones, calculating square miles of surface disturbance in the zones, and then converting this area of disturbance to a number of impacted sites per basin (cf. Tables 2.5.3-1 through 2.5.3-3). It should be noted that surface disturbance figures derive from areas associated with construction of OBs, shelters, and roads, and does not include areas for construction of antennae, ASCs, and other small facilities. These small facilities are only two percent of all surface disturbance.

Analysis of impacts for the Proposed Action and the alternatives is provided below:

Table 2.5.3-1. Estimated numbers of prehistoric sites impacted by sensitivity zone and hydrologic unit.***

VALLEY	SPRING (0-1 mi)	SPRING (1-2 mi)	STREAM (0-1 mi)	STREAM (1-2 mi)	PLAYA MARGIN/ OPEN FAN	OTHER VALLEY	TOTAL
4	11.5	9.6	3.9	1.7	–	32.2	58.9
5	1.0	1.7	–	–	–	12.0	14.7
6	1.2	0.7	–	–	4.4*	10.8	17.1
7	0.1	0.5	–	–	27.2**	–	27.8
8	0.1	0.1	–	–	–	6.4	6.6
46	2.2	4.4	–	–	–	23.6	30.2
46a	0.0	0.6	–	–	2.8*	14.7	18.1
54	1.7	2.7	–	–	–	15.6	20.0
134	0.0	0.0	–	–	–	1.1	1.2
135	0.0	0.0	–	–	–	0.0	0.0
137a	0.3	1.8	–	–	–	12.4	14.5
140a	2.7	4.0	–	–	–	10.7	17.4
141	0.5	0.9	–	–	–	23.2	24.6
151	1.3	2.6	–	–	–	9.8	13.7
154	2.3	2.0	–	–	–	8.9	13.2
155a	0.7	2.8	–	–	38.5*	0.0	42.0
155bc	0.9	0.9	–	–	44.8**	0.0	46.8
171	0.0	0.2	–	–	–	9.4	9.6
172	0.6	1.2	–	–	–	10.6	12.4
173b	4.5	6.8	8.9	2.4	–	18.8	41.4
174	0.5	0.7	–	–	–	6.0	7.2
175	0.0	1.0	–	–	–	6.0	6.2
178b	0.0	1.0	–	–	–	9.5	10.5
179	1.9	1.9	–	–	–	6.5	10.3
180	0.0	1.4	–	–	–	2.3	3.7
181	2.5	3.4	–	–	–	18.8	24.7
182	0.0	0.0	–	–	–	6.4	6.4
183	0.0	2.3	–	–	–	12.1	14.4
184	0.0	1.5	–	–	–	3.9	5.4
196	1.8	3.9	15.1	6.2	–	4.5	31.5
207	4.1	2.6	13.2	6.5	–	11.8	38.2
208	0.0	0.0	2.5	0.6	–	3.5	6.6
202	0.1	1.3	–	–	–	2.6	4.0
139	0.1	1.4	–	–	–	18.8	20.3
140b	0.0	0.9	–	–	–	2.0	2.9
142	0.0	0.3	–	–	–	12.6	12.9
148	0.0	0.0	–	–	–	0.7	0.7
149	3.8	4.2	–	–	–	12.2	20.2
170	0.8	2.2	–	–	–	12.4	15.4
50	1.5	1.4	–	–	–	2.4	5.3
9	0.1	1.3	–	–	–	1.9	3.3
156							
173a							
Total							680.3

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*Playa Margin

**Open Fan

***Actual numbers of sites directly impacted are likely to be higher.

Table 2.5.3-2. Estimated numbers of multiple-activity prehistoric sites impacted by sensitivity zone and hydrologic unit.***

VALLEY	SPRING (0-1 mi)	SPRING (1-2 mi)	STREAM (0-1 mi)	STREAM (1-2 mi)	PLAYA MARGIN/ OPEN FAN	OTHER VALLEY	TOTAL
4	1.6	0.7	0.9	0.0	–	0.0	3.2
5	0.1	0.1	–	–	–	0.0	0.2
6	0.2	0.1	–	–	4.4*	0.0	4.7
7	0.0	0.0	–	–	0.0**	–	0.0
8	0.0	0.0	–	–	–	0.0	0.0
46	0.3	0.3	–	–	–	0.0	0.6
46a	0.0	0.0	–	–	2.8*	0.0	2.8
54	0.2	0.2	–	–	–	0.0	0.4
134	0.0	0.0	–	–	–	0.0	0.0
135	0.0	0.0	–	–	–	0.0	0.0
137a	0.0	0.1	–	–	–	0.0	0.1
140a	0.4	0.3	–	–	–	0.0	0.7
141	0.1	0.1	–	–	–	0.0	0.2
151	0.2	0.2	–	–	–	0.0	0.4
154	0.3	0.2	–	–	–	0.0	0.5
155a	0.1	0.2	–	–	0.0**	–	0.3
155bc	0.1	0.1	–	–	0.0**	–	0.2
171	0.0	0.0	–	–	–	0.0	0.0
172	0.1	0.1	–	–	–	0.0	0.2
173b	0.6	0.5	2.2	0.0	–	0.0	3.3
174	0.1	0.1	–	–	–	0.0	0.2
175	0.0	0.0	–	–	–	0.0	0.0
178b	0.0	0.1	–	–	–	0.0	0.1
179	0.3	0.1	–	–	–	0.0	0.4
180	0.0	0.1	–	–	–	0.0	0.1
181	0.3	0.3	–	–	–	0.0	0.6
182	0.0	0.0	–	–	–	0.0	0.0
183	0.0	0.2	–	–	–	0.0	0.2
184	0.0	0.1	–	–	–	0.0	0.1
196	0.2	0.3	3.7	0.0	–	0.0	4.2
207	0.6	0.2	3.2	0.0	–	0.0	4.0
208	0.0	0.0	0.6	0.0	–	0.0	0.6
202	0.0	0.1	–	–	–	0.0	0.1
139	0.0	0.1	–	–	–	0.0	0.1
140b	0.0	0.1	–	–	–	0.0	0.1
142	0.0	0.0	–	–	–	0.0	0.0
148	0.0	0.0	–	–	–	0.0	0.0
149	0.5	0.3	–	–	–	0.0	0.8
170	0.1	0.2	–	–	–	0.0	0.3
50	0.2	0.1	–	–	–	0.0	0.3
9	0.0	0.1	–	–	–	0.0	0.1
156							
173a							
Total							29.3

T-5851/9-25-81

*Playa Margin

**Open Fan

***Actual numbers of sites directly impacted are likely to be higher.

Table 2.5.3-3. Estimated numbers of historic sites impacted by sensitivity zone and hydrologic unit.***

VALLEY	SPRING (0-1 mi)	SPRING (1-2 mi)	STREAM (0-1 mi)	STREAM (1-2 mi)	PLAYA MARGIN/ OPEN FAN	OTHER VALLEY	TOTAL
4	1.3	0.5	0.4	0.3	–	10.1	12.6
5	0.1	0.1	–	–	–	3.8	4.0
6	0.1	0.0	–	–	0.0*	3.4	3.5
7	0.0	0.0	–	–	0.0*	–	0.0
8	0.0	0.0	–	–	–	2.0	2.0
46	0.2	0.2	–	–	–	7.4	7.8
46a	0.0	0.0	–	–	0.0*	4.6	4.6
54	0.2	0.1	–	–	–	4.9	5.2
134	0.0	0.0	–	–	–	0.3	0.3
135	0.0	0.0	–	–	–	0.0	0.0
137a	0.0	0.1	–	–	–	3.9	4.0
140a	0.3	0.2	–	–	–	3.4	3.9
141	0.1	0.0	–	–	–	7.3	7.4
151	0.1	0.1	–	–	–	3.1	3.3
154	0.3	0.1	–	–	–	2.8	3.2
155a	0.1	0.1	–	–	0.0**	–	0.2
155bc	0.1	0.0	–	–	0.0**	–	0.1
171	0.0	0.0	–	–	–	2.9	2.9
172	0.1	0.1	–	–	–	3.3	3.5
173b	0.5	0.3	0.9	0.4	–	5.9	8.0
174	0.1	0.0	–	–	–	1.9	2.0
175	0.0	0.1	–	–	–	1.9	1.9
178b	0.0	0.1	–	–	–	3.0	3.1
179	0.2	0.1	–	–	–	2.0	2.3
180	0.0	0.1	–	–	–	0.7	0.8
181	0.3	0.2	–	–	–	5.9	6.4
182	0.0	0.0	–	–	–	2.0	2.0
183	0.0	0.1	–	–	–	3.8	3.9
184	0.0	0.1	–	–	–	1.2	1.3
196	0.2	0.2	1.6	1.1	–	1.4	4.5
207	0.5	0.1	1.4	1.2	–	3.7	6.9
208	0.0	0.0	0.3	0.1	–	1.1	1.5
202	0.0	0.1	–	–	–	0.8	0.9
139	0.0	0.1	–	–	–	5.9	6.0
140b	0.0	0.1	–	–	–	0.6	0.7
142	0.0	0.0	–	–	–	3.9	3.9
148	0.0	0.0	–	–	–	0.2	0.2
149	0.4	0.2	–	–	–	3.8	4.4
170	0.1	0.1	–	–	–	3.9	4.1
50	0.2	0.1	–	–	–	0.8	1.1
9	0.0	0.1	–	–	–	0.6	0.7
156							
173a							
Total							135.1

T-5855/9-25-81

*Playa Margin

**Open Fan

***Actual numbers of sites directly impacted are likely to be higher.

Proposed Action

Figure 2.5.3-1 illustrates the relationship between the predicted archaeological and historical sensitivity zones and the conceptual project configuration for the DDA. Because archaeological and historical sites occur throughout the potential deployment area, direct project effects can be expected to occur in all strata where there is overlap with the project. The estimated number of sites to be impacted are listed in Table 2.5.3-4. While greater numbers and a higher diveristy of site types are expected to occur in the vicinity of present and extinct water sources, in the foothill zone, near Playa Margins, and in the Pinyon-Juniper association, it cannot be assumed that sites are uniformly distributed in these areas. Variability in the density, distribution, and types of sites is expected to occur within each zone. Clusters of sites will result due to the occurrence of exploitable resources and other critical environmental features. Furthermore, because of the spatial extent of the M-X project and its large area of potential surface disturbance, it is possible that large numbers of particular types of cultural resources may be impacted. For example, sites consisting of surface scatters of chipped-stone artifacts are very common in Great Basin valleys and large numbers of these sites may be impacted by this project. Petroglyph sites, rock shelters, and ghost towns are site types that will be subjected to substantial indirect impacts but with little or no direct impacts.

DDA Impacts

Direct effects to archaeological and historical sites during construction and preconstruction testing could result from any land modification activities. Because most of the roads, shelters, and other facilities will be constructed within the alluvial deposits of a valley, the alluvial fans and valley bottoms are expected to be the areas where the potential for direct impacts to archaeological and historical resources will be the greatest. Some roads, transmission lines, material sources, and other facilities will occur in mountain areas; thus, some direct effects are also anticipated in mountain and foothill areas.

In the short term, construction within the DDA will cause indirect effects on archaeological and historical resources primarily as a result of the recreational activities of construction workers. For example, ORV use is likely to be a common recreational pursuit of M-X construction workers and is a well-documented source of impacts to the fragile open archaeological sites common on alluvial surfaces within the valleys of Nevada/Utah. Furthermore, deliberate pothunting is a source of recreation for some residents in the study area and is expected to increase substantially with population increase. In addition, the potential for indirect impacts to historic resources is especially high, due largely to their high visibility. Other recreational activities within the DDA are likely to be concentrated in the mountains surrounding the DDA valleys, wooded or well-watered areas where the density of both archaeological and historical resources tends to be relatively high.

Vandalism or unintentional damage to cultural properties are short- and long-term results of intensive recreational use of such areas.

Direct impacts to current National Register properties have been avoided by the cluster layout under consideration. The Sunshine Locality, Word and Tybo Ovens, and the Paleo-Indian site 42MD300 appear to be within one mile of directly impacted areas. These and a number of other National Register properties are

LEGEND

CULTURAL RESOURCE SENSITIVITY

AREAS OF KNOWN AND PREDICTED HIGH SENSITIVITY

PERMANENT WATER: HIGH SENSITIVITY

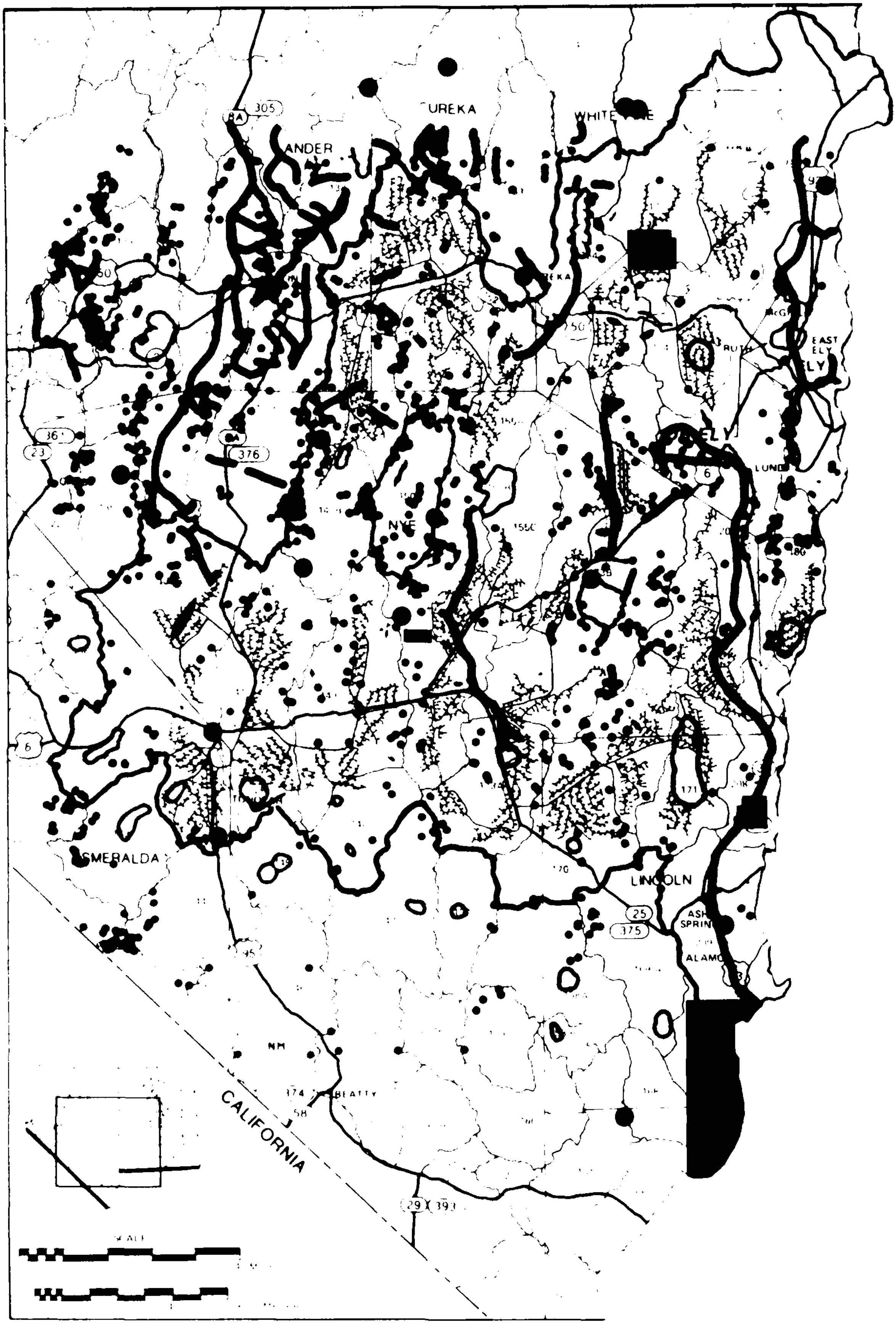
PLAYA MARGINS: HIGH SENSITIVITY

PREDICTED MODERATE SENSITIVITY

NATIONAL REGISTER SITES AND DISTRICTS

PONY EXPRESS ROUTE AND STATIONS

4675-D



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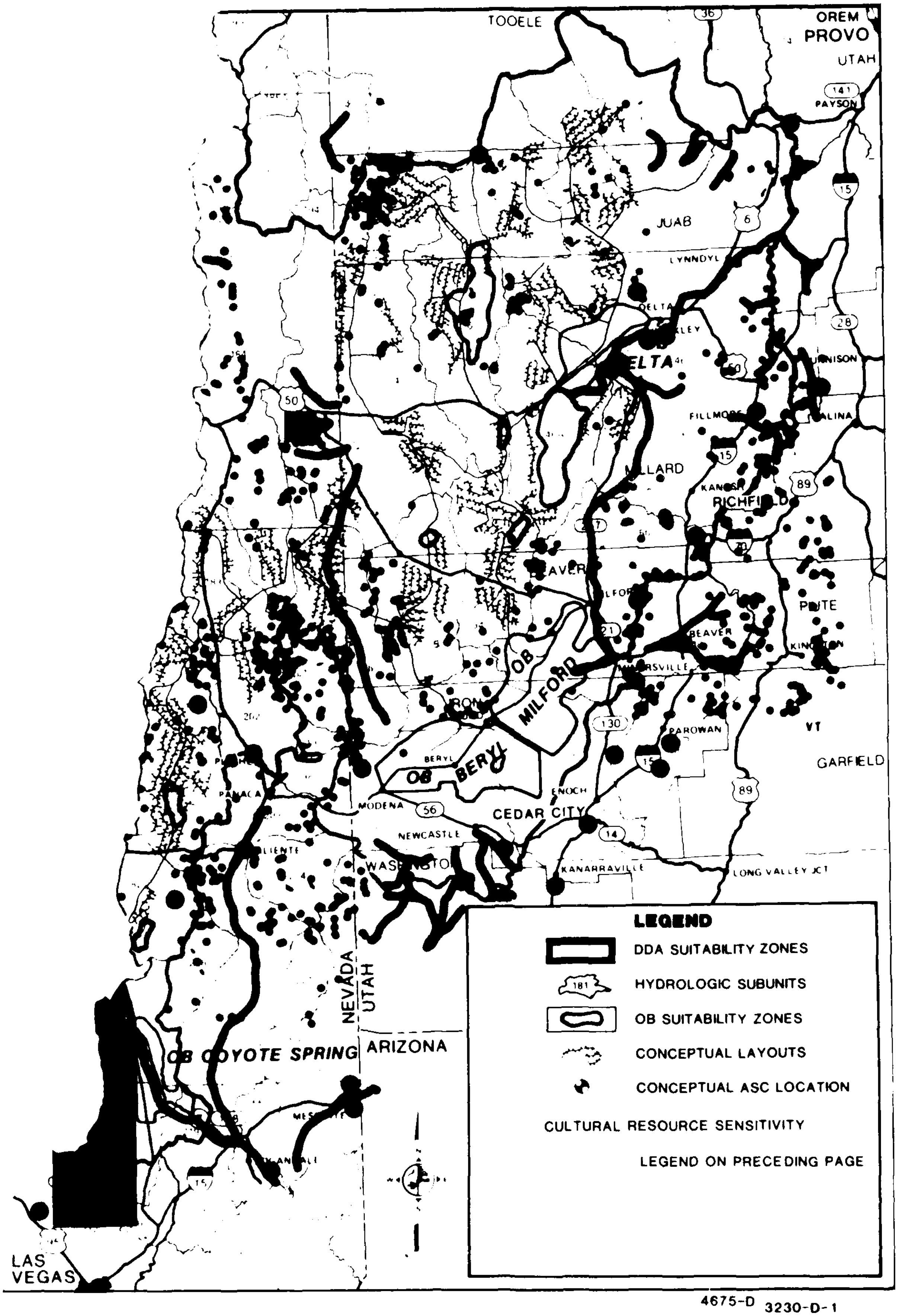

Figure 2.5.3-1. Predicted archaeological and historical sensitivity zones and the Proposed Action conceptual project layout.

Table 2.5.3-4. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for the Proposed Action, Coyote Spring/Milford.

No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	40.8	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	0	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad-South, Nev.[3]	34.0	*****	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	-	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	40.0	*****	Obsidian, 2 NRS
	Totals	1,083.1		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
* = 0-10 low
*** = 10.1-30 moderate
***** = 30+ high

[3]Potential location of construction camp.

subject to high potential indirect impacts due to the proximity of the system layout and construction camps (Figure 2.5.3-2). Subsequent studies will identify specific potential impacts and if necessary, implement mitigations.

The location and rate of occurrence of both direct and indirect impacts within the DDA is determined principally by the M-X construction schedule. The implementation of other planned projects such as IPP or WPPP would increase the amount of direct impacts to the cultural resource base in affected valleys, but the amount of surface disturbance that will result from these projects is significantly smaller and highly localized relative to M-X-related surface disturbance. Cumulative effects of other projects are more likely to be significant when indirect impacts of the OB locations are considered.

Operating Base (OB) Impacts

Figures 2.5.3-2 and 2.5.3-3 illustrate the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring Valley, Nevada and Milford, Utah. Table 4.3.2.14-1 indicates those valleys subject to direct and indirect impacts resulting from the Proposed Action.

Coyote Spring Valley OB Impacts

An intensive field survey of 20 percent of the OB siting areas has recently been conducted in the proposed Coyote Spring suitability zone (EDAW, 1981). The data suggest that sites tend to be located in proximity to water sources with 12 of the 13 prehistoric sites and isolates found being located in the eastern portion of the siting area within one to two miles of Pahranagat Wash. A total of 25-35 small, low density lithic scatters and up to five larger sites are expected to occur and be impacted within the OB siting area (EDAW, 1981:65).

Possibilities for mitigating these potential direct impacts include movement of the residential area to the mid-bajada area (i.e., "Other Valley" stratum) on the west side of the Meadow Mountains and movement of the OBTS to the mid-bajada area north of Kane Springs Wash. Site density is expected to be somewhat lower here than in the foothills north of the Muddy River.

Previous studies (Lyneis, 1980) have shown that population increase, accessibility, and site visibility contribute significantly to increased indirect impacts. Adverse effects include vandalism, collection of artifacts, theft of materials, and especially, increased off-road vehicle use and similar recreational activities. Indirect impacts of this nature are anticipated to be much more extensive and more destructive to cultural resources than the direct effects of OB construction. Furthermore, there will be increased accessibility to once remote areas due to the project road network. National Register properties subject to indirect impacts include the Sheep Mountain Range, Black Canyon Petroglyphs, and the White River Narrows district. Other highly vulnerable areas include the Muddy River drainage, Arrow Canyon in the Moapa vicinity, the Meadow Valley drainage, and the Pahranagat and White River drainages. Numerous sites are known to occur in these areas surrounding the Coyote Spring OB. Many are likely eligible for National Register nomination.

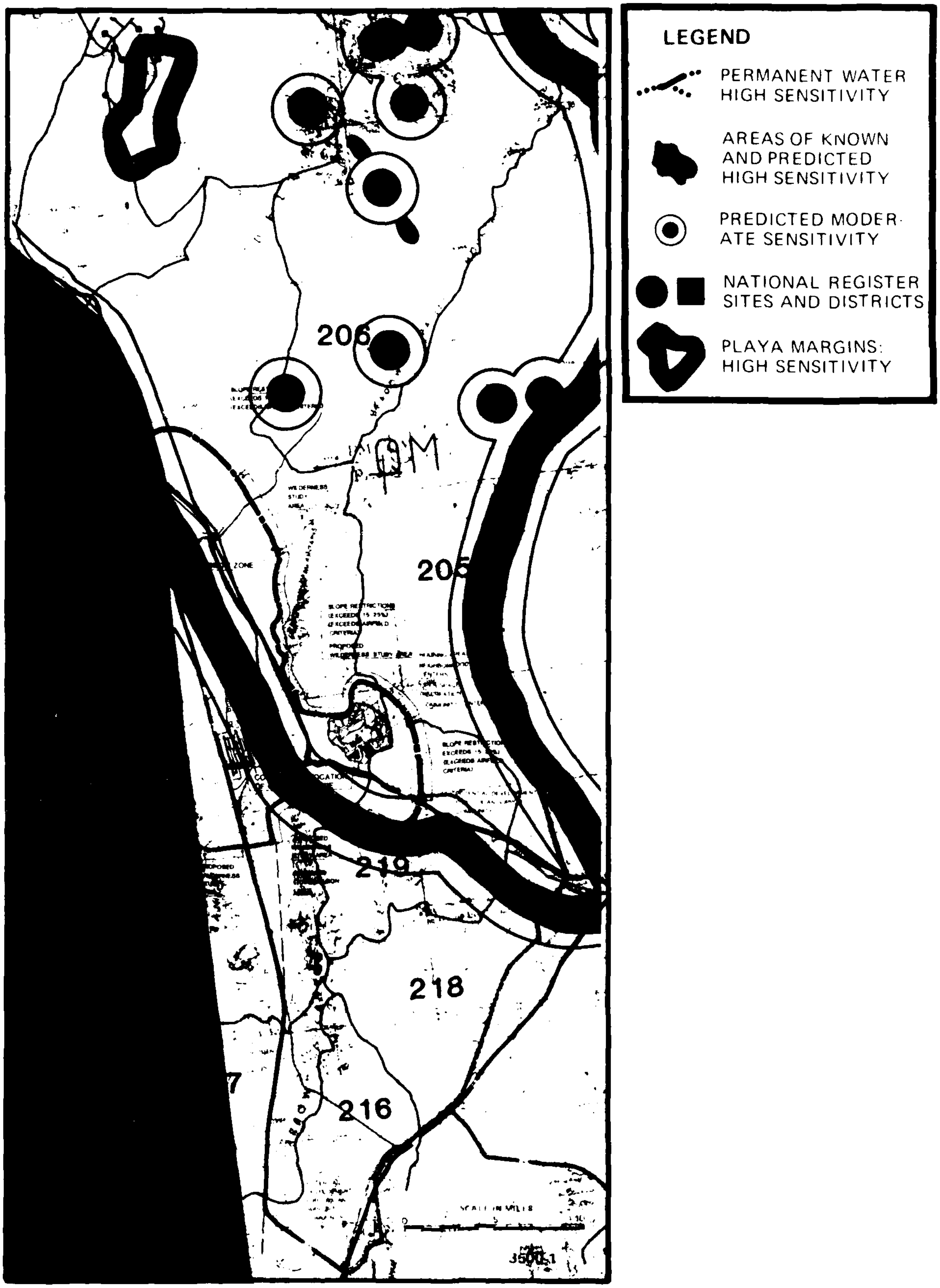

Figure 2.5.3-2. Areas of potential archaeological and historical sensitivity in the vicinity of Coyote Spring, Nevada.

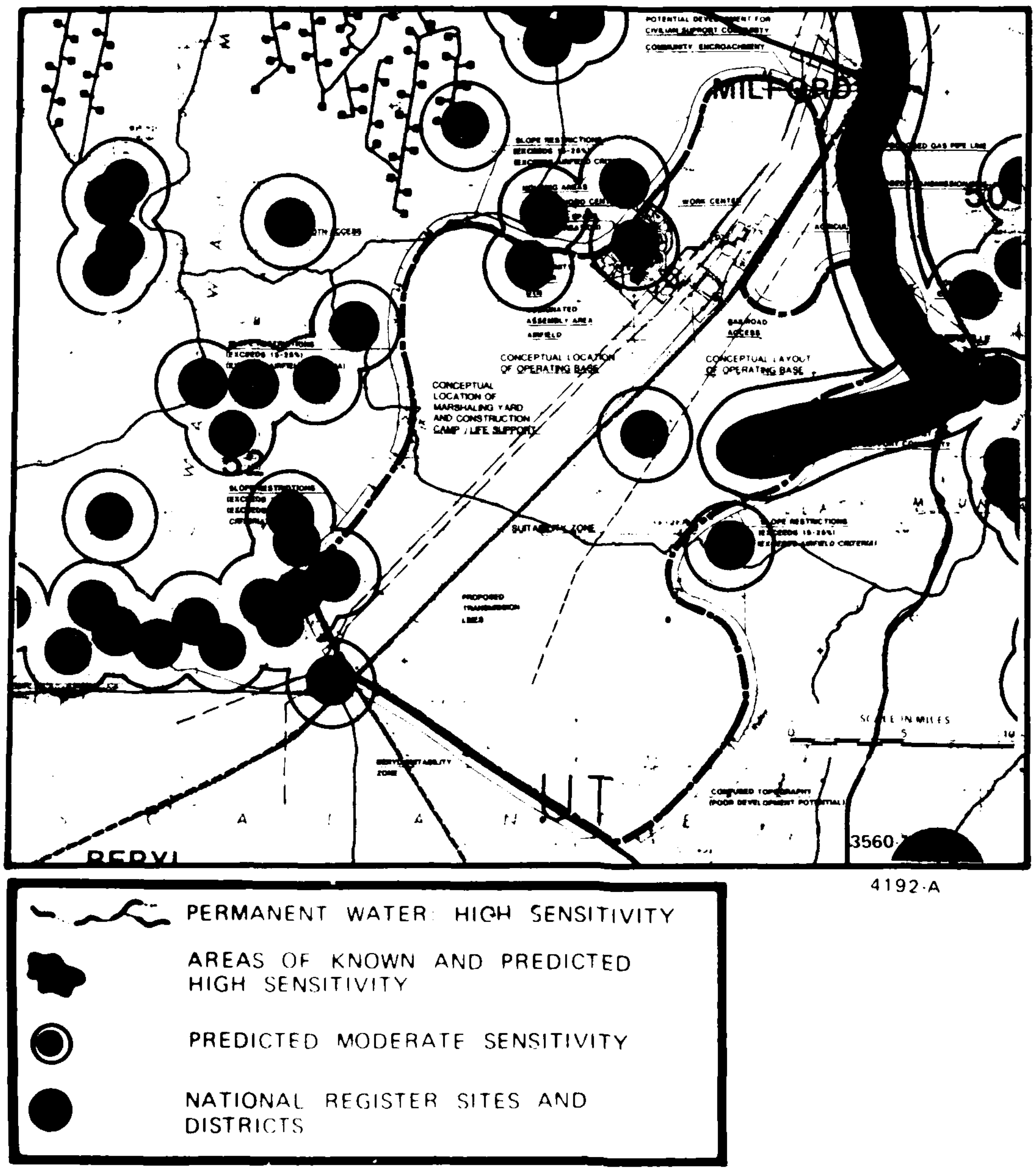

Figure 2.5.3-3. Areas of potential archaeological and historical sensitivity in the vicinity of Milford, Utah.

Growth-related impacts in nearby communities potentially include neglect and decline of architecturally and historically significant properties, incongruous new construction disruptive of the community's architectural integrity, and demolition of significant structures for new construction. Effects of this nature are likely to occur in the urban Las Vegas areas and in the smaller communities of the Moapa Valley in Clark County and in Alamo, Ash Springs, and Hiko in Lincoln County.

While direct effects can sometimes be mitigated through resource avoidance, indirect impacts are more difficult to mitigate. Data recovery, reduced population incursion, restricted access to sensitive areas, protective measures, and increased public education of preservation ethics are measures which can serve to reduce these effects. In contrast to direct impacts which are of shorter duration and coincide with the construction effort, the indirect impacts are of long-term duration and will increase in proportion to the increase in population and the increase in accessibility. Both direct and indirect effects will result in the irretrievable loss of non-renewable cultural resources.

Milford OB Impacts

The 1980 regional sample survey did not include sampling in the vicinity of the OB. An intensive field survey has recently been constructed in the Milford suitability zone (EDAW, 1981). In combination with existing site data it is apparent that habitation sites are numerous along the entire Beaver River drainage and, apparently occur with somewhat greater frequency to the north of Milford, while limited activity sites tend to occur most often on the gently sloping areas of the upper and lower bajada in Pinyon-Juniper associations. These latter sites comprise nearly 80 percent of the known sites in the region.

The survey in the vicinity of Milford covered two alternative siting location: Central Milford and Southern Milford (EDAW 1981). Survey results indicate a generally low frequency of prehistoric sites in the foothills in Cold Desert Shrub associations while historic sites and isolates appear to be as frequent but located throughout the region. The results of EDAW's survey yields projections of 40.8 estimated sites to be impacted by a second base, including DTN construction.

Because the lower bajada (part of the "Other Valley" stratum) has been shown to evidence the lowest density figures, it is likely that fewer impacts will occur to cultural resources if the residential areas can be moved south or east on the lower bajada.

Indirect impacts are likely to be far greater than direct impacts to cultural resources form OB construction. M-X-related population growth, coupled with increased accessibility will increased indirect impacts of vandalism and recreational pursuits. National Register sites subject to potential indirect impacts include the Wildhorse Canyon Obsidian Quarry and Parowan Gap Petroglyphs. Other highly sensitive areas include the Beaver River drainage, Fremont sites in the Parowan Valley and other valleys to the south and east, and the National Forest areas to the east and south.

Growth-related impacts in nearby communities of Milford, Minersville, Beaver, and other smaller communities will be substantial. Potential impacts include neglect and decline of architecturally and historically significant properties, non-conforming new construction, and demolition of significant structures.

Alternative 1

DDA Impacts

The DDA impacts are the same as under the Proposed Action.

Operating Base (OB) Impacts

Figures 2.5.3-2 and 2.5.3-4 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring Valley, Nevada and Beryl, Utah. Table 2.5.3-5 indicates those valleys subject to direct and indirect effects from construction of Alternative 1.

Coyote Spring Valley OB Impacts

The OB impacts are the same as those for the Proposed Action.

Beryl OB Impacts

Data from a recent survey (EDAW 1981) in the Beryl vicinity in combination with existing data, suggest that the locations of water sources and Pinyon-Juniper associations in the upper bajada (foothill) zone tend to be the most sensitive areas. Survey data yield site densities of nearly 23 sites per sq mi in the Pinyon-Juniper zone and an overall site density of 5.3 sites per sq mi for the Beryl siting area as a whole (cf. EDAW 1981).

These figures suggest that a second OB at Beryl would impact an estimated 123 sites. No direct impacts are expected to occur to three known limited activity sites in the airstrip vicinity. Moving the upper residential area down to the "Other Valley" stratum or to the valley floor near Beryl is likely to reduce the total number of sites to be directly impacted.

Other sensitive areas of known sites include the Parowan Valley, the Dixie National Forest to the south and east, and the Virgin River drainage to the south.

Population growth and increased accessibility provided by the M-X road network, will cause a substantial increase in indirect impacts. Growth-related impacts to historical and architectural properties are likely to be greatest in Beryl, Modena, Cedar City, Enterprise, and possibly Parowan in Iron County; Milford, Minersville and Beaver in Beaver County; and Caliente, Pioche and Panaca in Lincoln County.

Alternative 2

DDA Impacts

The DDA impacts will be the same as for the Proposed Action.

Operating Base (OB) Impacts

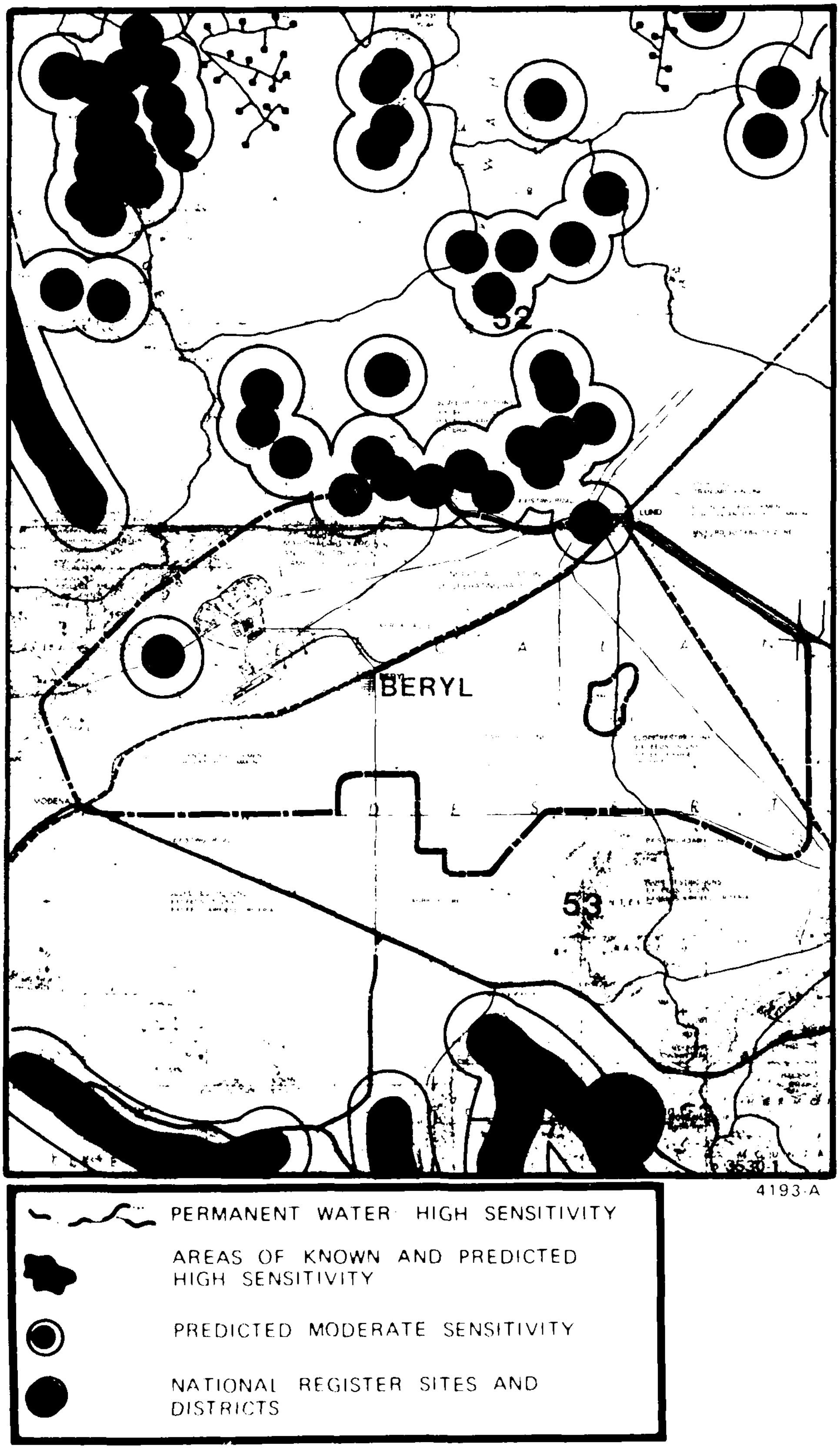

Figure 2.5.3-4. Areas of potential archaeological and historical sensitivity in the vicinity of Beryl, Utah.

Table 2.5.3-5. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 1, Coyote Spring/Beryl.

No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	6.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	123.1	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0.0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Koben, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Garden, Nev.[3]	15.9	***	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	-	2 NRS
179	Steptoe, Nev.	0	-	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	40.0	*****	Obsidian, 2 NRS
	Totals	1,171.7		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
* = 0-10 low
*** = 10.1-30 moderate
***** = 30+ high

[3]Potential location of construction camp.

Figures 2.5.3-2 and 2.5.3-5 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring, Nevada and Delta, Utah. Valleys subject to direct and indirect impacts from construction of Alternative 2 are presented in Table 2.5.3-6.

Coyote Spring Valley OB Impacts

OB impacts are the same as those discussed for the Proposed Action.

Delta OB Impacts

Numerous archaeological and historical sites occur along the Sevier and Beaver river channels, and four National Register properties occur in the OB vicinity including Fort Deseret, the Gunnison Massacre site, the Topaz War Relocation Camp, and the Paleo-Indian site, 42 MD 300. Surface finds and cursory testing suggest man has utilized this area continually from Paleo-Indian times.

As depicted, the various OB facilities located in the lower bajada appear to directly impact potentially 11 sites based on a mean of 1.68 sites per sq mi for "Other Valley" stratum. Siting of proposed OB facilities is preferable in these unwatered bajada areas placed as distantly as possible from the Sevier and Beaver rivers. However, the railroad spur addition appears to come within one mile of the National Register Paleo-Indian site, 42 MD 300. It is highly probable that other significant cultural resources could be impacted by this railroad spur where it is proposed to cross near the Beaver and Sevier rivers. To avoid these potentially significant impacts, the railroad spur could follow the Hwy 6-50 right-of-way to the OB.

As a result of population growth, substantial indirect impacts to cultural resources are anticipated. Impacts to historical and architecturally significant properties are likely to be greatest in Delta, Hinckley, Deseret, Oak City, Lynndyl and other communities in the proximity of the Delta OB.

Alternative 3

DDA Impacts

DDA impacts are the same as those for the Proposed Action.

Operating Base (OB) Impacts

Figures 2.5.3-4 and 2.5.3-6 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability zones around Beryl, Utah and Ely, Nevada. Valleys subject to direct and indirect effects from this alternative are presented in Table 2.5.3-7.

Beryl OB Impacts

Potential direct impacts of the OB location are discussed in Alternative 1.

Construction of the OBTS in the foothills to the south of the Wah Wah Mountains and the proposed alignment of the DTN to Pine Valley to the north are

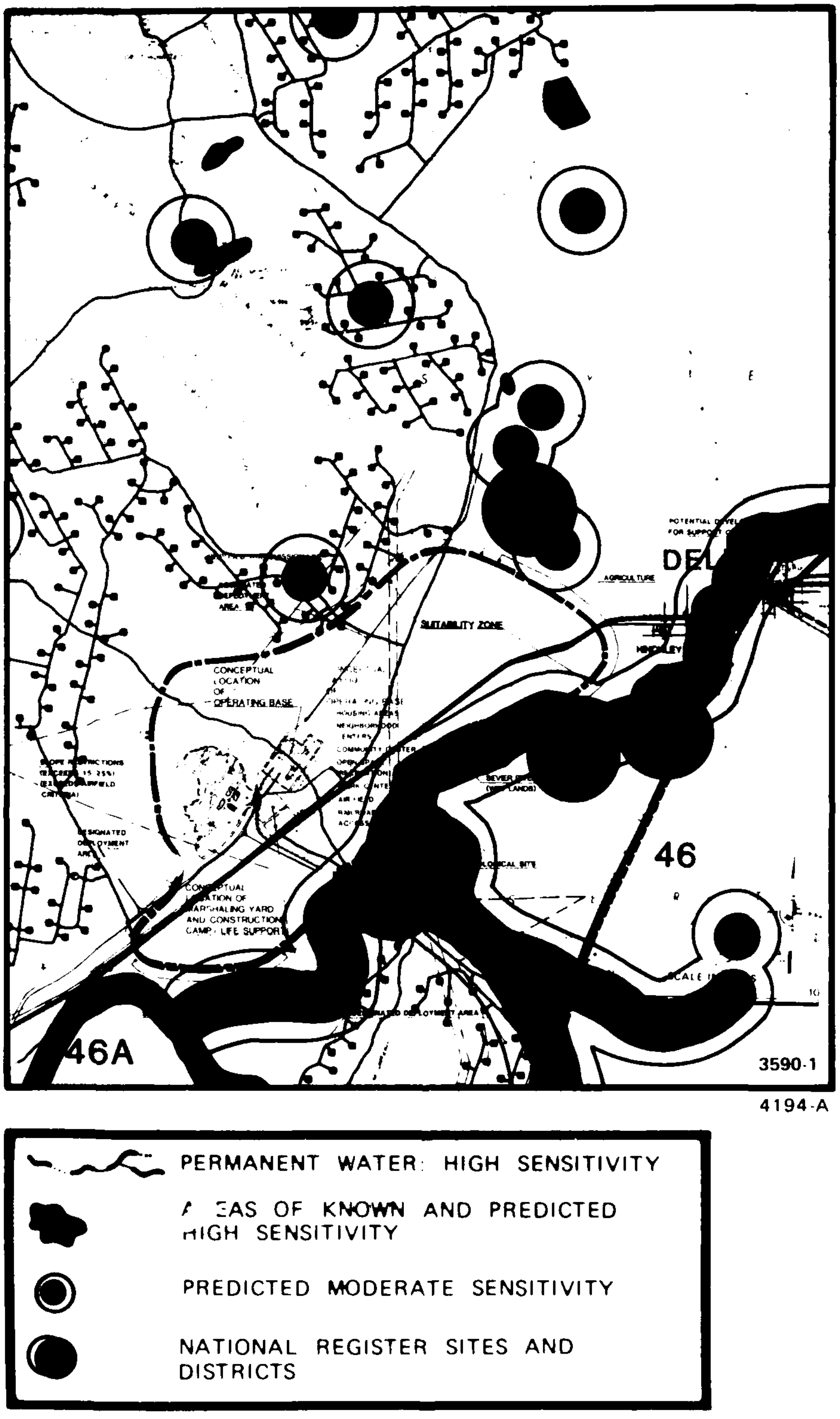

Figure 2.5.3-5. Areas of potential archaeological and historical sensitivity in the vicinity of Delta, Utah.

Table 2.5.3-6. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 2, Coyote Spring/Delta.

Hydrologic Subunit No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	*****	Quartzite nodules
6	White, Utah[3]	42.6	***	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	45.2	*****	Dunes
50	Milford, Utah	6.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	0	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad-South, Nev.[3]	15.9	***	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	***	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[4]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat. Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	40.0	***	Obsidian, 2 NRS
	Totals	1,057.1		

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[1] Isolated artifacts not included.

[2] Direct impact assessment:
- * = 0-10 low
- *** = 10.1-30 moderate
- ***** = 30+ high

[3] Potential location of construction camp.

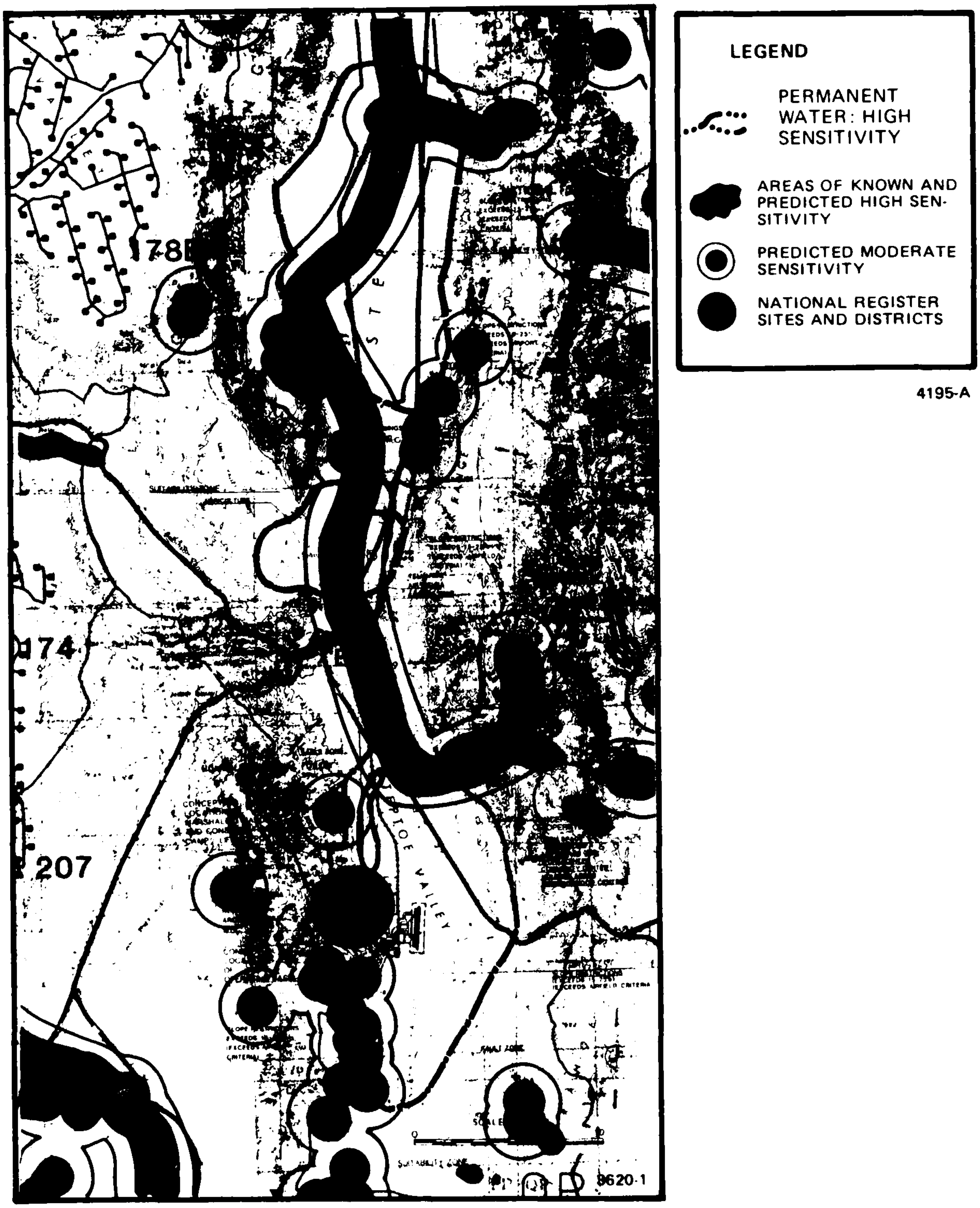

Figure 2.5.3-6. Areas of potential archaeological and historical sensitivity in the vicinity of Ely, Nevada.

Table 2.5.3-7. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 3, Beryl/Ely.

Hydrologic Subunit No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	*****	Quartzite nodules
6	White, Utah[3]	42.6	***	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	6.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	178.4	-	Obsidian, 1 NRS
54	Wah Wan, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Garden, Nev.[3]	15.9	***	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	57.9	*****	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	0	***	Obsidian, 2 NRS
	Totals	1,269.9		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
- * = 0-10 low
- *** = 10.1-30 moderate
- ***** = 30+ high

[3]Potential location of construction camp.

likely to cause impacts to a number of significant cultural resources. Three multiple activity habitation sites are recorded in the mountain pass to Pine Valley, and numerous sites are known in southern Pine Valley. The OBTS, to impact 250 acres, is situated in the strata where site densities are highest - "Pinyon-Juniper" and "Springs." Movement of the OBTS to the mid to lower bajada area would be likely to reduce direct impacts. An alternative DTN access route which avoids the pass to Pine Valley would also reduce impacts on cultural resources.

Indirect impacts from induced poulation growth and increased access are also expected to increase. In particular, portions of Hamlin Valley are prime recreation locations and, considering the expected high density of sites, indirect impacts will be substantial.

Growth-related impacts to communities can also be expected to be somewhat greater than those discussed in Alternative 1.

Ely OB Impacts

Numerous sites have been recorded in Steptoe Valley and in the vicinity of the Ely OB site. Sensitive areas include mountain foothills, the pinyon-juniper covered upper bajada or foothill zone, and all water sources regardless of topographic setting. There are at least three known limited activity sites in the immediate vicinity of the OB in addition to the Ward mining district and the Ward Charcoal Ovens National Register site.

As depicted, the Ely OB conceptual layout is estimated to impact 58 sites. It is mainly due to the proposed placement of the residential area in the Pinyon-Juniper foothills of the Egan Range in the vicinity of numerous springs. In addition, the Ward Ovens are located immediately to the north of the residential and recreational areas and are expected to receive the brunt of indirect impacts from increased visitation. Indirect impacts are also expected at the Sunshine Locality National Register District in nearby Long Valley. Placement of facilities on unwatered mid to lower bajada areas would reduce the impacts. In general, all three suitability zones in the Ely area are considered highly sensitive to direct and indirect impacts to cultural resources.

Growth-related impacts to historical and architectural properties in nearby communities are likely to be greatest in Ely, where this population growth is expected to be centered, with some impact also felt in nearby McGill and Ruth.

Alternative 4

DDA Impacts

The DDA impacts are the same as for the Proposed Action.

Operating Base Impacts

Figures 2.5.3-4 and 2.5.3-2 illustrate areas of potential impact at the Beryl OB and at the Coyote Spring OB. Valleys subject to direct and indirect impacts are indicated in Table 2.5.3-8.

Table 2.5.3-8. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 4, Beryl/Coyote Spring.

No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	6.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	178.4	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad-South, Nev.[3]	15.9	***	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	-	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	-	1 NRS
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	32.3	***	Obsidian, 2 NRS
	Totals	1,219.3		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
- * = 0-10 low
- *** = 10.1-30 moderate
- ***** = 30+ high

[3]Potential location of construction camp.

Beryl OB Impacts

Potential OB impacts are the same as those discussed in Alternative 3.

Coyote Spring Valley OB Impacts

The impacts that would result from Coyote Spring as a primary OB are discussed in the Proposed Action. With only a second OB in Coyote Spring Valley, there would be a slight reduction in the levels of direct and indirect impacts that were identified in that section. Total surface disturbance will be reduced by about one-third from the area disturbed by a primary OB, thus reducing the number of sites directly impacted.

Population increases will be lower with Coyote Spring as a secondary base, therefore indirect impact potential should be somewhat lower than that discussed in the Proposed Action.

Alternative 5

DDA Impacts

The DDA impacts are the same as for the Proposed Action.

Operating Base (OB) Impacts

Figures 2.5.3-3 and 2.5.3-6 illustrate areas of potential impact at the Milford, Utah OB and the Ely, Nevada OB. Table 2.5.3-9 presents those valleys subject to direct and indirect effects from this alternative.

Milford OB Impacts

The direct impacts of a first OB at Milford will be potentially greater than the direct impacts from construction of a secondary OB at Milford as discussed in the Proposed Action. However, indirect impacts will certainly be greater.

Indirect impacts cannot be predicted with precision, but because of a greater population increase they are expected to be greater for the primary OB. Within Beaver County the population increase in a currently sparsely populated area is expected to be major source of indirect impacts to cultural resources.

Movement of the OB support facilities to a mid or lower bajada setting would result in fewer sites impacted.

Ely OB Impacts

Impacts resulting from the Ely OB are the same as those discussed in Alternative 3.

Alternative 6

The DDA impacts are the same as for the Proposed Action. Impacts for the first OB at Milford are discussed in Alternative 5 and impacts for the second OB at

Table 2.5.3-9. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 5, Milford/Ely.

Hydrologic Subunit No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	56.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	0	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad South, Nev.[3]	15.9	***	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	57.9	***	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	0	-	Obsidian, 2 NRS
	Totals	1,116.5		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
- * = 0-10 low
- *** = 10.1-30 moderate
- ***** = 30+ high

[3]Potential location of construction camp.

Coyote Spring are discussed in Alternative 4. Table 2.5.3-10 presents those valleys subject to direct and indirect effects under Alternative 6.

Alternative 8

DDA Impacts

Figure 2.5.3-7 shows the relationship between known and predicted sensitive areas for cultural resources and the conceptual project configuration where the DDA is split between the Nevada/Utah and Texas/New Mexico regions.

Construction of half of the M-X system in each of the potential siting regions would result in somewhat greater total surface disturbance, and consequently impact more sites, but the land area disturbed within a single region would be significantly lower. The proposed layout for Nevada/Utah would not result in any direct impacts to current National Register properties, though indirect impacts would be likely at the Topaz War Relocation Center, White River Narrows Archaeological District, Tybo Charcoal Ovens, and the mining towns of Bristol Wells and Delamar. Direct impacts in Nevada/Utah are expected to be 62 percent of that expected for full basing. But the situation in Nevada and Utah is worsened due to 88 percent of the multiple activity sites being within those valleys proposed for split basing. This alternative reduces impacts on the Llano Estacado in Texas, particularly to the archaeologically sensitive draws in that area. Indirect impacts to historic and architectural resources are expected, but because of the reduced geographic extent, smaller area of disturbance in each region compared to full basing, and lower percentage of population increase, the magnitude of the impacts to historic properties would be significantly reduced. Predicted direct impacts to archaeologically and historically sensitive areas are summarized in Table 2.5.3-11. Reduction of project scale can increase the likelihood that an effective mitigation program can be planned and implemented.

Operating Base (OB) Impacts

Impacts from construction of an operating base at Coyote Spring are the same as those discussed for the Proposed Action.

IMPACTS ON HISTORIC PROPERTIES (2.5.4)

National Register of Historic Places:

A number of sites currently listed on the National Register of Historic Places within the Nevada/Utah study area, could be indirectly impacted by the M-X project.

There are no National Register sites which would be directly impacted by the project facilities. However, the project will obviously have immediate and large-scale impacts to National Register sites located adjacent to M-X project area. The Ward Charcoal Ovens in Steptoe Valley (179), Delamar District (182), and the White River Narrows Archaeological District (208) are all located within 3 miles of the proposed system. It is, therefore, reasonable to assume that the intensive construction and land modification necessary for the M-X, will significantly impact these National Register sites.

Table 2.5.3-10. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 6, Milford/Coyote Spring.

Hydrologic Subunit No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah[3]	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	24.5	***	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	0	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad-South, Nev.[3]	34.0	*****	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	***	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	32.3	*****	Obsidian, 2 NRS
	Totals	1,059.1		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
- * = 0-10 low
- *** = 10.1-30 moderate
- ***** = 30+ high

[3]Potential location of construction camp.

LEGEND

CULTURAL RESOURCE SENSITIVITY

AREAS OF KNOWN AND PREDICTED HIGH SENSITIVITY

PERMANENT WATER: HIGH SENSITIVITY

PLAYA MARGINS: HIGH SENSITIVITY

PREDICTED MODERATE SENSITIVITY

NATIONAL REGISTER SITES AND DISTRICTS

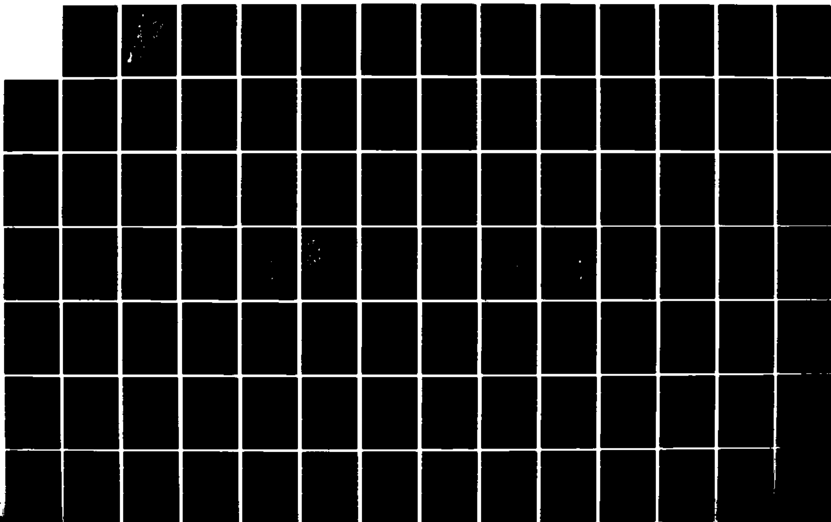
PONY EXPRESS ROUTE AND STATIONS

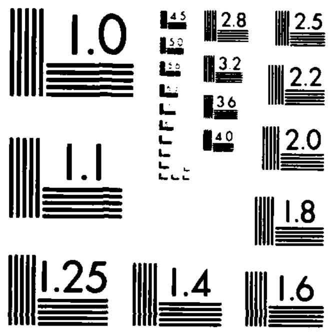
4675-D


EUREKA
LANDER
NYE
ESMERALDA
LINCOLN
ELY
CALIFORNIA

AD-A149 914 DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ACQUISITION M-X/MPS (M-X/MU..(U) HENNINGSON DURHAM AND RICHARDSON SANTA BARBARA CA 02 OCT 81 3/5

UNCLASSIFIED M-X-ETR-23 F/G 5/6 NL





MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS 1963 A

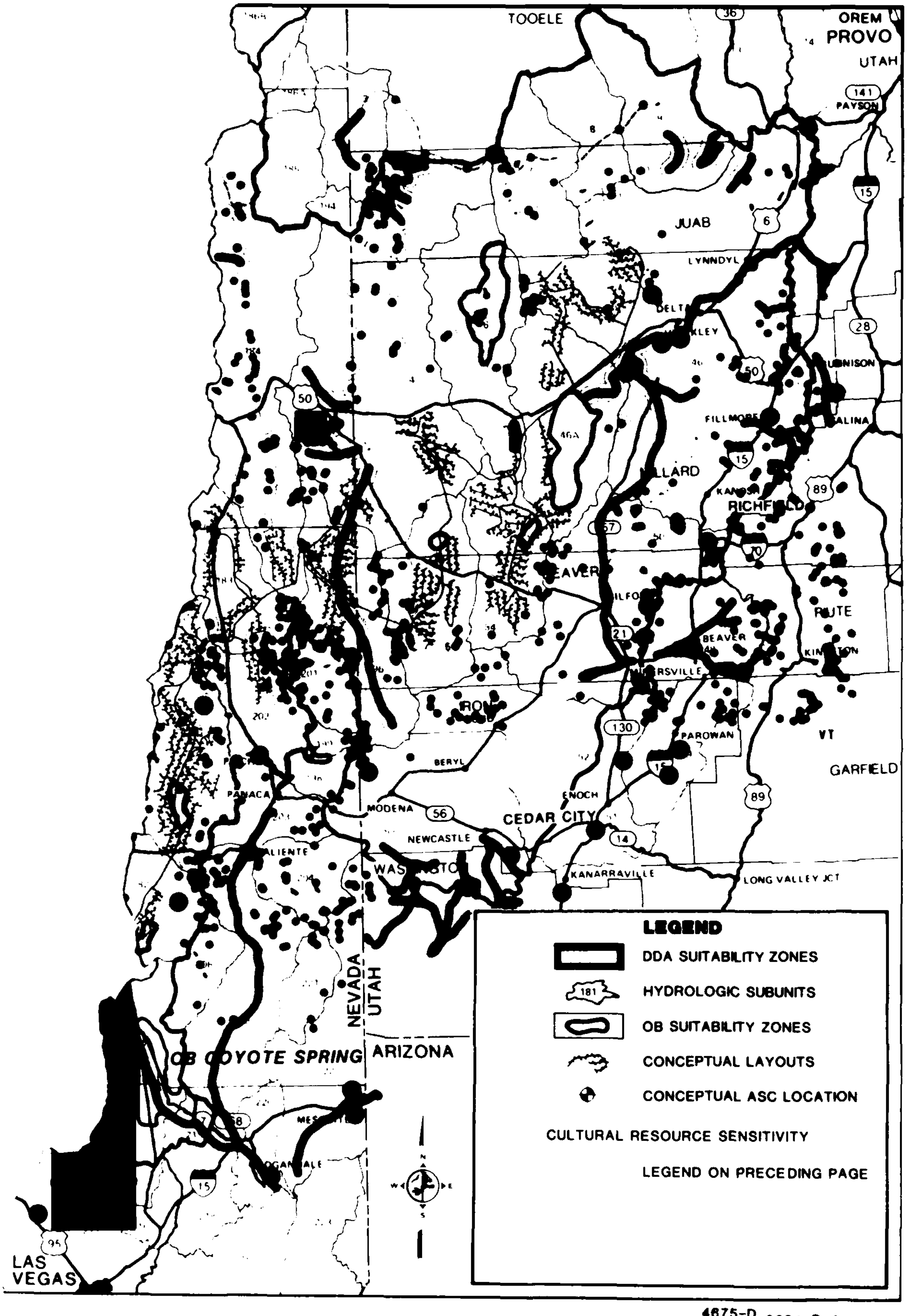


Figure 2.5.3-7. Predicted archaeological and historical sensitivity zones and the conceptual project layout for Nevada/Utah split basing.

Table 2.5.3-11. Potential direct impacts to archaeological and historical resources from operating bases (OBs) and designated deployment area (DDA) for Alternative 8, Coyote Spring/Clovis.

No.	Hydrologic Subunit Name	Direct Impacts No. of Sites[1]	Direct Impact Assessment[2]	Special Resources and Number of Listed and Pending National Register Sites and Districts (NRS)
	Subunits with M-X Clusters and DTN			
4	Snake, Nev./Utah[3]	71.5	*****	2 NRS
5	Pine, Utah[3]	22.5	***	Quartzite nodules
6	White, Utah[3]	42.6	*****	Dunes, rockshelters
7	Fish Springs, Utah	27.8	***	Large marsh, caves, and rockshelters, 2 NRS
8	Dugway, Utah	8.6	*	Obsidian
9	Government Creek, Utah	4.0	*	
46	Sevier Desert, Utah[3]	38.0	*****	Dunes, lakes, and marshes, 5 NRS
46A	Sevier Desert-Dry Lake, Utah[3]	36.7	*****	Dunes
50	Milford, Utah	6.3	*****	Obsidian, 2 NRS
52	Lund District, Utah	0	-	
53	Beryl-Enterprise District, Utah	0	-	Obsidian, 1 NRS
54	Wah Wah, Utah[3]	39.7	*****	Dunes, rhyolite deposits
56	Upper Reese River, Nev.	0	-	
134	Smith Creek, Nev.	1.5	*	
135	Ione, Nev.	0	-	1 NRS
137A	Big Smoky-Tonopah Flat, Nev.	18.5	***	
137B	Big Smoky-North, Nev.	0	-	
138	Grass, Nev.	0	-	
139	Kobeh, Nev.[3]	26.3	***	
140A	Monitor-North, Nev.[3]	21.3	***	
140B	Monitor-South, Nev.	3.7	*	1 NRS
141	Ralston, Nev.	36.0	*****	3 NRS
142	Alkali Spring, Nev.	24.6	***	1 NRS
148	Cactus Flat, Nev.	0.9	*	
149	Stone Cabin, Nev.[3]	24.6	***	
150	Little Fish Lake, Nev.	0	-	
151	Antelope, Nev.	17.0	***	
153	Diamond, Nev.	0	-	
154	Newark, Nev.[3]	16.4	***	
155A	Little Smoky-North, Nev.[3]	42.2	*****	Basalt outcrops
155C	Little Smoky-South, Nev.[3]	46.9	*****	Basalt outcrops
156	Hot Creek, Nev.[3]	39.0	*****	2 NRS
170	Penoyer, Nev.[3]	16.3	***	
171	Coal, Nev.[3]	27.8	***	
172	Garden, Nev.[3]	15.9	***	
173A	Railroad-South, Nev.[3]	34.0	*****	
173B	Railroad-North, Nev.[3]	49.4	*****	
174	Jakes, Nev.[3]	21.4	*	
175	Long, Nev.[3]	25.4	*	1 NRS
178B	Butte-South, Nev.[3]	13.6	***	
179	Steptoe, Nev.	0	-	2 NRS
180	Cave, Nev.	14.4	*	
181	Dry Lake, Nev.[3]	45.2	*****	1 NRS
182	Delamar, Nev.[3]	9.5	*	Marshes, 1 NRS
183	Lake, Nev.[3]	18.3	***	Marshes
184	Spring, Nev.[3]	6.7	*	Marshes
196	Hamlin, Nev./Utah[3]	36.0	*****	1 NRS
202	Patterson, Nev.	4.9	*	
207	White River, Nev.[3]	45.1	*****	Lakes, marshes, river
208	Pahroc, Nev.	8.1	*	
209	Pahranagat, Nev.	0	-	1 NRS
210	Coyote Spring, Nev.	40.0	*****	Obsidian, 2 NRS
	Totals	714.8		

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[1]Isolated artifacts not included.

[2]Direct impact assessment:
* = 0-10 low
*** = 10.1-30 moderate
***** = 30+ high

[3]Potential location of construction camp.

The importance of recognizing the potential impacts to National Register sites is illustrated by the following comments:

"Ward Charcoal Ovens Historic State Monument is not only located in the vicinity of the proposed O.B., but right in the middle."

The Nevada Governor's office also expressed concern over the possible affects to the Charcoal Ovens:

"Ward Charcoal Ovens Historic State Monument is surrounded by the Ely OB yet it is never mentioned...it is a listed property on the National Register of Historic Places. How is access to Ward Charcoal Ovens to be maintained if Ely OB is designated? Will missile bunkers be put in the valley if Ely OB is not designated? What protection will be afforded the Ward Charcoal Ovens from abuse?"

Indirect impacts to National Register sites also includes valleys which have projected shelters, roads, and operating bases. Indirect impacts will result from land modification, increased population pressures, and site vandalism. Especially vulnerable National Register sites include those in remote locations, and sites with abandoned buildings. Valleys with both National Register sites and systems were assigned high significance for indirect impacts. Sevier Desert (46), Fish Springs (7), Coyote Spring (210), Ralston (141), Snake (4), and Steptoe (179) valleys have multiple listings on the National Register of Historic Places.

National Historic Landmarks:

Fort Ruby and the Leonard Rock Shelter are listed as National Historic landmarks and are within the Nevada study area. However, as these sites are located in valleys without systems, projected impacts are minimal. Danger Cave is the only National Historic Landmark within the Utah study area. Danger Cave is in a designated valley (Snake 4), but again, impacts are expected to be minimal. Low impact was assigned because Danger Cave has been extensively excavated and subsequent structural modifications to the cave have occurred.

Historical Resources:

Direct and indirect impact assessments were identified solely on the basis of archival research conducted during 1980-81. No field work verification studies were completed. Field work is necessary to determine the site condition, integrity, significance and probable National Register eligibility. Because of this lack of field verification all sites are considered significant. Low, moderate and high significance is based upon number of reported sites per valley. Valleys which were given a low significance may reflect a lack of data, not a lack of significant sites. Further work is necessary before sites and valleys can be ranked as to significance.

Tables 2.5.4-1 through 2.5.4-7 are based upon relative density of sites per valley, and presence or absence of National Register properties. The valleys with the greatest number of sites are: Steptoe (179) with 59 sites and 2 national register properties, Meadow Wash (205) with 54 sites, and Sevier Desert (46) with 41 sites and 5 national register properties. Impacts will be severe due to OBs in Steptoe and Sevier Desert-Dry Lake. Examples of valleys with a moderate number of sites include Hot Creek with 23 sites and 2 National Register sites, Big Smoky (137a) with

Table 2.5.4-1. Potential direct and indirect impacts to historical resources in Nevada/Utah for the Proposed Action and Alternatives 1-6.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Areas Affected by Deployment of the DDA: Direct Impacts[1]	Indirect Impacts[1]
4	Snake, Nev./Utah	*****	***	*****
5	Pine, Utah	*	*	*
6	White, Utah	*	*	*
7	Fish Springs, Utah	*****	*	***
8	Dugway, Utah	*	*	*
9	Government Creek, Utah	*	*	*
46	Sevier Desert, Utah	*****	*****	*****
46A	Sevier Desert-Dry Lake, Utah	*	*	*
50	Milford, Utah	*****	*	***
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise District, Utah	*****	*	***
54	Wah Wah, Utah	*	*	*
137A	Big Smoky-Tonopah Flat, Nev.	***	*	***
139	Kobeh, Nev.	*	*	*
140A	Monitor-North, Nev.	*	*	*
140B	Monitor-South, Nev.	*****	*	*****
141	Ralston, Nev.	*****	*	***
142	Alkali Spring, Nev.	*****	*****	***
148	Cactus Flat, Nev.	*	*	*
149	Stone Cabin, Nev.	***	*	***
151	Antelope, Nev.	*	*	*
154	Newark, Nev.	*****	***	***
155A	Little Smoky-North, Nev.	*	*	*
155C	Little Smoky-South, Nev.	*	*	*
156	Hot Creek, Nev.	*****	***	*****
170	Penoyer, Nev.	*	*	*
171	Coal, Nev.	*	*	*
172	Garden, Nev.	*	*	*
173A	Railroad-South, Nev.	*	*	*
173B	Railroad-North, Nev.	***	*	***
174	Jakes, Nev.	*	*	*
175	Long, Nev.	*****	*	*****
178B	Butte-South, Nev.	*	*	*
179	Steptoe, Nev.	*****	*****	*****
180	Cave, Nev.	*	*	*
181	Dry Lake, Nev.	*****	*	***
182	Delamar, Nev.	*****	***	*****
183	Lake, Nev.	*	*	*
184	Spring, Nev.	*****	*	*****
196	Hamlin, Nev./Utah	*****	*	***
202	Patterson, Nev.	***	***	***
205	Meadow Wash, Nev.	*****	*	*****
207	White River, Nev.	***	*	***
208	Pahroc, Nev.	*****	*	***
209	Pahranagat, Nev.	*****	*	***
210	Coyote Spring, Nev.	*****	*	*****
218	California Wash, Nev.	*****	*	*****
219	Muddy River Springs, Nev.	***	***	***

T5347/9-14-81/F

[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-2. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 1.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 1 Coyote Spring/Beryl Direct Impacts[1]	Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	-	-
46A	Sevier Desert-Dry Lake, Utah	*	-	-
50	Milford, Utah	*****	-	-
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise, Utah	*****	*	***
179	Steptoe, Nev.	*****	-	-
210	Coyote Spring, Nev.	*****	*	*****
219	Muddy River Springs, Nev.	***	*	*****
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	***
5	Pine, Utah	*	-	*
46	Sevier Desert, Utah	*****	-	*****
53	Beryl-Enterprise District, Utah	*****	-	*****
169A	Tikaboo-North, Nev.	***	-	*
169B	Tikaboo-South, Nev.	*****	-	*****
170	Penoyer, Nev.	*	-	*
172	Garden, Nev.	*	-	*
180	Cave, Nev.	*	-	*
182	Delamar, Nev.	*****	-	*****
183	Lake, Nev.	*	-	*
196	Hamlin, Nev./Utah	*****	-	*****
202	Patterson, Nev.	***	-	***
205	Meadow Wash, Nev.	*****	-	*****
206	Kane Springs, Nev.	*	-	*
207	White River, Nev.	***	-	*
208	Pahroc, Nev.	*****	-	***
209	Pahranagat, Nev.	*****	-	*****
218	California Wash, Nev.	*****	-	*****
220	Lower Moapa, Nev.	*****	-	*****

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[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-3. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 2.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 2 Coyote Spring/Delta Direct Impacts[1]	Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	*****	*****
46A	Sevier Desert-Dry Lake, Utah	*	*	*
50	Milford, Utah	*****	-	-
52	Lund District, Utah	*	-	-
53	Beryl-Enterprise, Utah	*****	-	-
179	Steptoe, Nev.	*****	-	-
210	Coyote Spring, Nev.	*****	*	*****
219	Muddy River Springs, Nev.	***	*	*****
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	***
6	White, Utah	*	-	*
7	Fish Springs, Utah	*****	-	*****
9	Government Creek, Utah	*	-	*
53	Beryl-Enterprise District, Utah	*****	-	***
169A	Tikaboo-North, Nev.	***	-	*
169B	Tikaboo-South, Nev.	*****	-	*****
180	Cave, Nev.	*	-	*
182	Delamar, Nev.	*****	-	*****
183	Lake, Nev.	*	-	*
184	Spring, Nev.	*****	-	***
196	Hamlin, Nev./Utah	*****	-	*****
202	Patterson, Nev.	***	-	***
205	Meadow Wash, Nev.	*****	-	*****
206	Kane Springs, Nev.	*	-	*
208	Pahroc, Nev.	*****	-	***
209	Pahranagat, Nev.	*****	-	*****
218	California Wash, Nev.	*****	-	*****
220	Lower Moapa, Nev.	*****	-	*****

T5349/9-14-81/F

[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-4. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 3.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 3 Beryl/Ely Direct Impacts[1]	Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	-	-
46A	Sevier Desert-Dry Lake, Utah	*	-	-
50	Milford, Utah	*****	-	-
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise, Utah	*****	*	***
179	Steptoe, Nev.	*****	*****	*****
210	Coyote Spring, Nev.	*****	-	-
219	Muddy River Springs, Nev.	***	-	-
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	*****
5	Pine, Utah	*	-	*
6	White, Utah	*	-	*
46	Sevier Desert, Utah	*****	-	*****
156	Hot Creek, Nev.	*****	-	***
172	Garden, Nev.	*	-	*
174	Jakes, Nev.	*	-	*
180	Cave, Nev.	*	-	*
183	Lake, Nev.	*	-	*
184	Spring, Nev.	*****	-	*****
196	Hamlin, Nev./Utah	*****	-	***
202	Patterson, Nev.	***	-	***
205	Meadow Wash, Nev.	*****	-	***
207	White River, Nev.	***	-	*****

T5350/9-14-81/F

[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-5. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 4.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 4 Beryl/Coyote Spring Direct Impacts[1]	Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	-	-
46A	Sevier Desert-Dry Lake, Utah	*	-	-
50	Milford, Utah	*****	-	-
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise, Utah	*****	*	***
179	Steptoe, Nev.	*****	-	-
210	Coyote Spring, Nev.	*****	*	*****
219	Muddy River Springs, Nev.	***	*	*****
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	*****
5	Pine, Utah	*	-	*
6	White, Utah	*	-	*
46	Sevier Desert, Utah	*****	-	*****
169A	Tikaboo-North, Nev.	***	-	*
169B	Tikaboo-South, Nev.	*****	-	*****
170	Penoyer, Nev.	*	-	*
172	Garden, Nev.	*	-	*
180	Cave, Nev.	*	-	*
182	Delamar, Nev.	*****	-	*****
183	Lake, Nev.	*	-	*
184	Spring, Nev.	*****	-	***
196	Hamlin, Nev./Utah	*****	-	*****
202	Patterson, Nev.	***	-	***
205	Meadow Wash, Nev.	*****	-	*****
206	Kane Springs, Nev.	*	-	*
207	White River, Nev.	***	-	*
209	Pahranagat, Nev.	*****	-	*****
218	California Wash, Nev.	*****	-	*****
220	Lower Moapa, Nev.	*****	-	*****

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[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-6. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 5.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 5 Milford/Ely Direct Impacts[1]	Alternative 5 Milford/Ely Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	-	-
46A	Sevier Desert-Dry Lake, Utah	*	-	-
50	Milford, Utah	*****	*	***
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise, Utah	*****	-	-
179	Steptoe, Nev.	*****	*****	*****
210	Coyote Spring, Nev.	*****	-	-
219	Muddy River Springs, Nev.	***	-	-
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	*****
5	Pine, Utah	*	-	*
6	White, Utah	*	-	*
46	Sevier Desert, Utah	*****	-	***
46A	Sevier Desert-Dry Lake, Utah	*	-	*
54	Wah Wah, Utah	*	-	*
156	Hot Creek, Nev.	*****	-	***
172	Garden, Nev.	*	-	*
174	Jakes, Nev.	*	-	*
180	Cave, Nev.	*	-	*
183	Lake, Nev.	*	-	*
184	Spring, Nev.	*****	-	*****
196	Hamlin, Nev./Utah	*****	-	***
202	Patterson, Nev.	***	-	*
207	White River, Nev.	***	-	*

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[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

Table 2.5.4-7. Potential impact to historical resources from operating bases (OBs) for the Proposed Action and Alternative 6.

Hydrologic Subunit or County No.	Name	Relative Density of Sites	Alternative 6 Milford/Coyote Spring Direct Impacts[1]	Alternative 6 Milford/Coyote Spring Indirect Impacts[1]
	Subunits or Counties within OB Suitability Zone			
46	Sevier Desert, Utah	*****	-	-
46A	Sevier Desert-Dry Lake, Utah	*	-	-
50	Milford, Utah	*****	*	***
52	Lund District, Utah	*	*	*
53	Beryl-Enterprise, Utah	*****	-	-
179	Steptoe, Nev.	*****	-	-
210	Coyote Spring, Nev.	*****	*	*****
219	Muddy River Springs, Nev.	***	*	*****
	Other Affected Subunits or Counties			
4	Snake, Nev./Utah	*****	-	***
5	Pine, Utah	*	-	*
6	White, Utah	*	-	*
46	Sevier Desert, Utah	*****	-	*****
53	Beryl-Enterprise District, Utah	*****	-	*****
54	Wah Wah, Utah	*	-	*
180	Cave, Nev.	*	-	*
183	Lake, Nev.	*	-	*
184	Spring, Nev.	*****	-	*
196	Hamlin, Nev./Utah	*****	-	***
202	Patterson, Nev.	***	-	***
205	Meadow Wash, Nev.	*****	-	*****
206	Kane Springs, Nev.	*	-	*
207	White River, Nev.	***	-	*
209	Pahranagat, Nev.	*****	-	*****
218	California Wash, Nev.	*****	-	*****
220	Lower Moapa, Nev.	*****	-	*****

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[1] - = No impact.
* = Low impact (insufficient data for assessment, or 0-5 sites recorded).
*** = Moderate impact (moderately sensitive, or 5-20 sites recorded).
***** = High impact (high sensitivity--greater than 20 sites recorded, or a National Register property is located within hydrologic subunit).

19 sites, and Spring Valley with 28 sites. All of the above valleys have systems proposed for them, and indirect impacts are expected to be significant. Examples of valleys with low impact include Cave (180), Lake (183), and Hamlin (196). However, as stated earlier, this low impact was assigned on the basis of insufficient data and as such, illustrates not the density of historic sites but the lack of data.

3.0 TEXAS/NEW MEXICO CULTURAL RESOURCES

This section reviews current information on Texas/New Mexico cultural resources following the same general outline employed in Section 2.0. General introductory material covered in Section 1.0 applies to both Nevada/Utah and Texas/New Mexico cultural resources, and is not repeated here.

3.1 NATIONAL REGISTER PROPERTIES

In the Texas/New Mexico study area, there are a wide variety of properties on the National Register of Historic Places (Figure 3.1-1). These properties are summarized in Tables 3.1-1 and 3.1-2. The importance of the National Register is discussed in Section 2.1.

There are two main categories of Register properties: historic and prehistoric. Prehistoric properties include archaeological sites and districts. Historic properties include, but are not limited to, buildings and historic districts.

Register properties are to be found in both rural and urban areas. Historic or architecturally significant buildings are likely to be found within city limits, such as the E. B. Black House in Deaf Smith County, Texas. Archaeological sites are more commonly found in less populated areas, as exemplified by the Rocky Dell and Landergin Mesa sites in Oldham County.

3.2 ARCHAEOLOGICAL RESOURCES

This section provides an overview of current knowledge regarding the nature and distribution of archaeological resources in the Texas/New Mexico study area. Specifically, previous research is reviewed, the regional culture history is summarized, and there is a discussion of current research problems.

PREVIOUS RESEARCH (3.2.1)

<u>New Mexico</u>

Research in the New Mexico portion of the study area has generally been sporadic. Up until the 1950s, almost no work was done in the area. Adjacent areas produced evidence of human association with the extinct bison at the Folsom site (Cook, 1927). Poorly documented material which appears to date to the Archaic period, occurs along the Cimarron River (Renaud, 1930, 1937). During this time, a far greater emphasis was put on the investigation of the Puebloan cultures to the west, sites which exist close to the study area (Kidder, 1926), and the Panhandle Aspect along the Canadian and Cimarron rivers, particularly in Texas (Holden, 1930; Krieger, 1946).

During these early investigations, two important sites were excavated in the study area, both of which are best known for their Paleo-Indian remains. These are the San Jon site on the edge of the northern escarpment of the Llano Estacado (Roberts, 1942), and the Blackwater Draw site south of Clovis (Hester, 1972). Blackwater Draw is the type site for the Clovis Pleistocene mammals from its lower strata, as well as Archaic and Neo-Indian remains from higher levels.

Table 3.1-1. National Register of Historic Places, Texas study area.

Name	Type of Entry	County
E.B. Black House	Building	Deaf Smith
Rocky Dell	Rock Art Site	Oldham
Landergin Mesa[1]	Archaeological Site	Oldham
Bivins Liabrary	Building	Potter
Landergin - Harrington House	Building	Potter
McBride Ranch House	Building	Potter
Alibates Flint Quarries and Texas Panhandle Pueblo Culture National Monument.[2]	Archaeological Districts	Potter
Shelton-Houghtion House	Building	Potter
T.L. Lester House	Building	Randall

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[1]National Historic Landmark,

[2]National Historic Monument.

Table 3.1-2. National Register of Historic Places, New Mexico Study Area.

Name	Type of Entry	County
Hondo Reservoir	Reservoir	Chaves
Archaeological Sites AR 30-6-1047	Archaeological Sites	Chaves
Archaeological Sites LA 11809-LA11822	Archaeological Sites	Chaves
James Phelps White House	Building	Chaves
Fort Sumner Railroad Bridge	Object	De Baca
Fort Sumner Ruins	Buildings	De Baca
Baish Oil Well No. 1	Object	Lea
Archaeological Sites AR-30-630; AR-7-73	Archaeological Sites	Lea
Laguna Plata Archaeological District	Archaeological District	Lea
Richardson Store	Building	Quay
Anderson Basin[1] (Black Water Draw)	Archaeological District	Roosevelt
Rabbit Ears[1] (Clayton Complex)	Site	Union

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[1]National Historic Landmark.

LEGEND

NATIONAL REGISTER OF HISTORIC PLACES

OKLAHOMA

TEXAS COUNTY
7 SHORES ARCHAEOLOGICAL SITE
8 EASTERWOOD ARCHAEOLOGICAL SITE
9 NASH II CLAWSON ARCHAEOLOGICAL SITE
10 TWO SISTERS ARCHAEOLOGICAL SITE
11 OLD HARDESTY
12 STAMPER SITE
13 JOHNSON-CLRNE ARCHAEOLOGICAL SITE

CIMARRON COUNTY
1 BLACK MESA
2 CEDAR BREAKS ARCHAEOLOGICAL DISTRICT
3 BAT CAVE ARCHAEOLOGICAL SITE
4 RED GHOST CAVE ARCHAEOLOGICAL DISTRICT
5 THREE ENTRANCE CAVE ARCHAEOLOGICAL DISTRICT
6 CAMP NICHOLS

NEW MEXICO

CHAVES COUNTY
1 HONDO RESERVOIR
2 ARCHAEOLOGICAL SITE AR 30-6-1047
3 MESCALERO SANDS
4 BITTER LAKE GROUP
5 JAMES PHELPS WHITE HOUSE
DE BACA COUNTY
6 FORT SUMNER RAILROAD BRIDGE
7 FORT SUMNER RUINS
EDDY COUNTY
8 ARCHAEOLOGICAL SITE 30-6-1034*
9 MAROON CLIFFS ARCHAEOLOGICAL DISTRICT*
10 FIRST NATIONAL BANK OF EDDY*
11 CARLSBAD RECLAMATION PROJECT*

HARDING COUNTY
12 BUEYEROS SHORT GRASS PLAINS
LEA COUNTY
13 BAISH OIL WELL NUMBER ONE
14 ARCHAEOLOGICAL SITE AR-30-630 AND AR 7-73
QUAY COUNTY
15 RICHARDSON STORE
ROOSEVELT COUNTY
16 ANDERSON BASIN (BLACKWATER DRAW)
SAN MIGUEL COUNTY
17 BELL RANCH HEADQUARTERS
UNION COUNTY
18 RABBIT EARS (CLAYTON COMPLEX)

TEXAS

ARMSTRONG COUNTY
1 J A RANCH
BRISCOE COUNTY
2 LAKE THEO FOLSOM COMPLEX
3 MAYFIELD DUGOUT
BAILEY COUNTY
4 MULESHOE NATIONAL WILDLIFE REFUGE
CARSON COUNTY
5 CARSON COUNTY SQUARE HOUSE MUSEUM
DEAF SMITH COUNTY
6 E. B. BLACK HOUSE
FLOYD COUNTY
7 QUITAQUE RAILWAY TUNNEL
8 FLOYDADA COUNTRY CLUB SITE
GARZA COUNTY
9 OLD ALGERITA HOTEL*
10 OLD POST SANITARIUM*
11 COOPER'S CANYON SITE*
12 O. S. RANCH PETROGLYPHS*
13 POST-MONTGOMERY SITE*
14 POST WEST DUGOUT*

HALE COUNTY
15 PLAINVIEW SITE
HUTCHINSON COUNTY
16 ANTELOPE CREEK ARCHAEOLOGICAL DISTRICT
17 ABODE WALLS
LUBBOCK COUNTY
18 CANYON LAKES ARCHAEOLOGICAL DISTRICT
19 LUBBOCK LAKE SITE
OLDHAM COUNTY
20 ROCKY DELL
21 LANDERGIN MESA
POTTER COUNTY
22 BIVENS HOUSE
23 LANDERGIN-HARRINGTON HOUSE
24 MCBRIDE RANCHHOUSE
25 ALIBATES FLINT QUARRIES AND TEXAS PANHANDLE PUEBLO CULTURE NATIONAL MONUMENT
RANDALL COUNTY
26 L. T. LESTER HOUSE
27 HIGH PLAINS NATURAL AREA

*NOT ILLUSTRATED ON MAP

2594-B-3

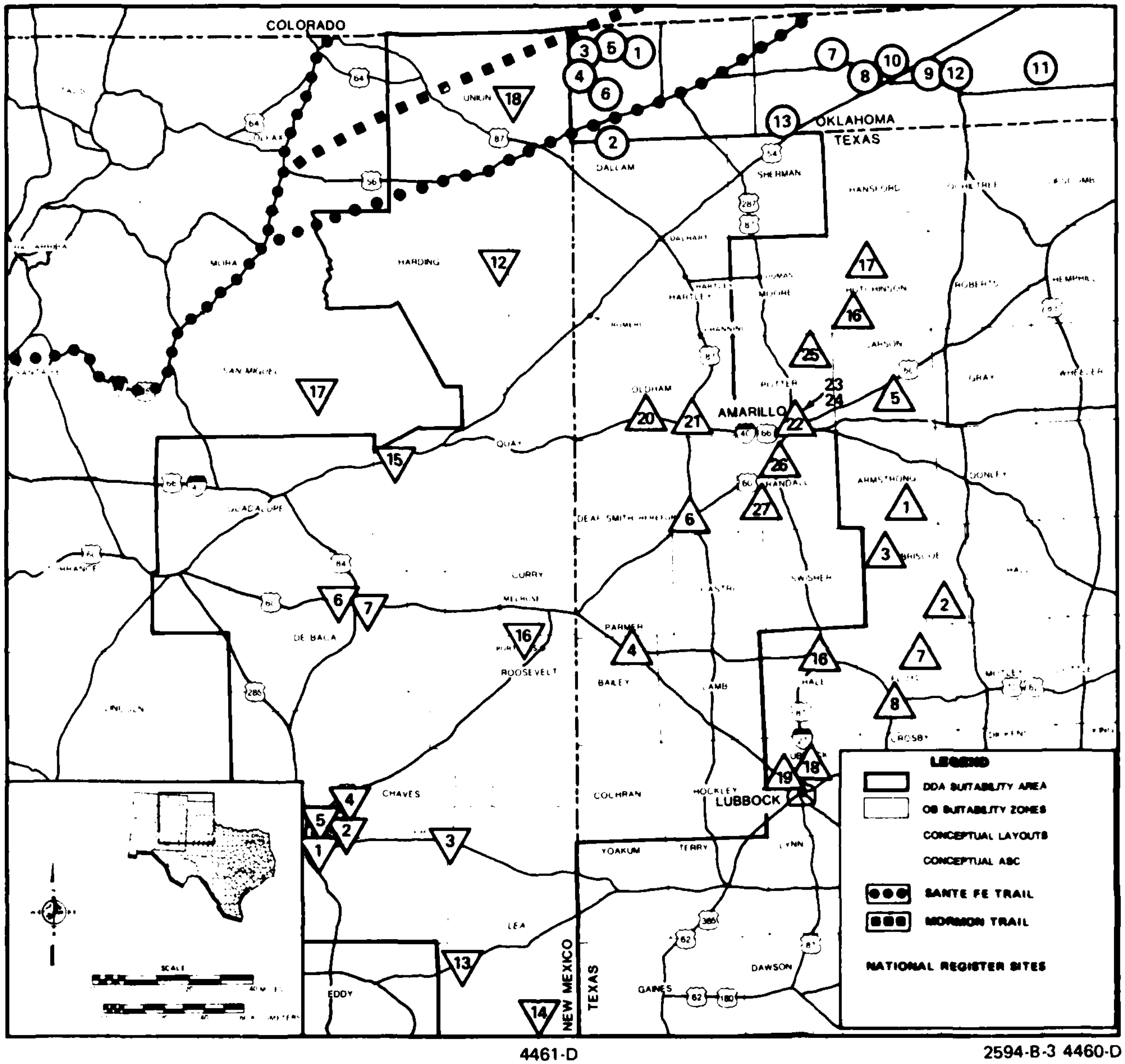

Figure 3.1-1. Properties on the National Register of Historic Places in the Texas/New Mexico study area.

Paleo-Indian remains were found at San Jon, although the oldest deposits such as those found at Blackwater Draw, are lacking at the San Jon site.

The 1950s added little to the sketchy knowledge accumulated earlier. The reputation of the South Plains as a center of Paleo-Indian research was strengthened by the synthesis of Sellards (1952) and Wormington (1957), discussing the Folsom, San Jon, and Blackwater Draw sites in addition to several more in adjacent areas of Texas. The excavation of the Milnesand Site (Sellards, 1955), a Paleo-Indian bison kill site in Roosevelt County, also added to this emphasis. The Blackwater Draw Site also yielded evidence of Archaic wells (Evans, 1951) during this period. Salvage excavations at the Pidgeon Cliffs site (Steen, 1955, 1976) documented occupation from the early Archaic period in the area north of Clayton. Gunnerson (1959) investigated Puebloan occupations near the study area. Dick (1953) excavated two Neo-Indian rock shelters near Tucumcari.

By far the most important work of the 1950s in the study area was Jelinek's program of survey and excavation in the Middle Pecos Valley, carried out mainly from 1956 to 1960 as his dissertation research (Jelinek, 1960), and later published with additional data collected in 1965 (Jelinek 1967). This survey formed the basis for the first regional synthesis in the study area, and presents a basic chronology from the Paleo-Indian through the historic period, with the greatest emphasis on the Puebloan occupation in the area. This work remains the basic reference for the Middle Pecos.

The 1960s opened with Wendorf's (1960) summary of the prehistory of the northern portion of the study area, in which he notes the paucity of work in the area. The sketchy knowledge of this region was also emphasized by Baker and Campbell (1960) who described sites and artifacts dating from the Paleo-Indian and Archaic periods from Union and Harding counties.

Several more systematic regional projects also date to the 1960s. One of the most important of these is the environmental and archaeological work on the Llano Estacado carried out by a large interdisciplinary team at the beginning of the decade (Wendorf and Hester, 1962, 1975). The thrust of this project was the reconstruction of the Late Pleistocene environments of the Llano. This research represents a major step forward for the understanding of Paleo-Indian adaptations in the area.

The construction of Ute Dam also triggered a regional survey near the confluence of Ute Creek and the Canadian River (Hammack, 1965), which mainly documented the later (Neo-Indian and Historic) occupations of the area. To the south, a similar emphasis on later occupations is apparent in the work of the Lea County Archaeological Society, particularly at the Laguna Plata and Merchant sites (Corley, 1965; Corley and Leslie, 1960; Leslie, 1965, 1968). The research of this group has documented the existence of small, permanent Puebloan villages east of the Pecos River, associated with ceramics which link them to the Jornada Mogollon culture to the west.

Several individual sites from the Paleo-Indian and Archaic periods were also reported from the area south of the Canadian River during this period. The Elida Site, a small Folsom campsite (Hester, 1962; Warnica, 1961) was found in Roosevelt County; to the south of it, the Rattlesnake Draw site (Smith, et al., 1966) produced

Paleo-Indian and later materials as well as the only Archaic wells (i.e., holes excavated to reach the water table) known for the area outside of Blackwater Draw. Other investigations of Archaic sites were reported in Roosevelt (Warnica, 1965) and Curry counties, including excavations at Billy the Kid Cave (Kunz, 1969). Studies outside of the study area but relevant to it include Campbell's (1969) work on the Apishapa Focus of the Colorado Plateau, which he considers to be the precursor of the Panhandle Aspect, and Gunnerson's (1969) work on historic aboriginal (Apache) occupation in the vicinity of Cimarron, both to the north of the area considered here.

The boom in contract archaeology in the 1970s has resulted in some increase of our knowledge of the study area, particularly of the later occupation areas, but it has not triggered any major projects. Two large surveys near the study area have been carried out in connection with the construction of Los Esteros (Henderson, 1974; Levine and Mobley, 1976; Mobley 1978) and Brantley (Bousman, 1974; Gallagher, 1976; Henderson, 1976) Reservoirs. Both of these surveys mainly located sites from Puebloan and later periods, although limited amounts of material from earlier periods were also found. Smaller projects near the study area include Hurst's (1976) work near Maroon Cliffs where Archaic and later material was found, and a survey near Laguna Plata (Haskell, 1977) which found similar remains in addition to quarry debris and included intensive reinvestigations of the Laguna Plata site. This site was excavated earlier by the Lea County Archaeological Society (Runyan, 1972; see above).

Work which is more directly relevant to the study area has concentrated on similar subjects. Thoms (1974) has published a general synthesis of the archaeology of the northern portion of this area, but other work has been very specific in scope. Paleo-Indian studies have been largely confined to reanalyses of existing data, including Broilo's (1971) analysis of projectile points and Hester and Grady's (1977) study of Llano Estacado social patterns. One radiocarbon date from Archaic deposits at Blackwater Draw has been reported (Brannon, et al., 1957), and Klausner and Johnson (1978) have reported on four lithic scatters which may also date to this period. Four other lithic scatters have been attributed to Puebloan occupation (Wiseman, 1978). Other, later period sites reported include the Neff Site, a tool manufacturing and maintenance site dating from A.D. 1000 to 1200 (Wiseman, 1971), and petroglyph sites near Olive Butte (Schaafsma, 1972).

Single isolated Paleo-Indian and Archaic points along with 50 sites dating from the Periods after A.D. 700 were found in the Mescalero Plain by Clifton (1973). This survey also has the distinction of being the only survey carried out in the Texas/New Mexico area which was based on an explicit sampling strategy.

Texas

The study area can be divided into northwestern and southwestern Panhandle portions. The following section on the northwestern Panhandle has been taken with slight modifications from Speer (1980:42-53).

The first report on Texas Panhandle archaeology was by T.L. Eyerly of the Canadian Academy, Canadian, Texas (Eyerly 1907). It deals with excavations at a group of structures called the Buried City (Handley Ruin) located in Ochiltree

County. As with most early studies, the data provided are very limited; however, Woodland cultural affiliations are suggested.

The first nationally known archaeologist to undertake systematic survey and test excavation in the Northwestern Panhandle was Dr. Warren K. Moorhead of Phillips Academy, Andover, Massachusetts. He commenced work in 1919, publishing his findings in a national periodical (Moorehead 1921), where he mentioned a lengthy report describing 70 sites, but provided no other details. In 1921, Moorehead reported results of another survey when excavations were done at the Alibates Ruins in Potter County; and Landergin Mesa and Rocky Dell (both National Register sites) were visited.

Beginning in 1929, Dr. W. C. Holden of Texas Tech University, Lubbock, surveyed, excavated, and reported on several village ruins in the region, including the Tierra Blanca Ruin in Deaf Smith County (Holden 1931). Here Holden tested one of several structures and features presumed to be Antelope Creek Focus. He ultimately concluded otherwise, but did not attempt to identify the structure. Ruins at this site are currently being reinvestigated with essentially the same results. Definition of this important site awaits analysis of the present study; however, it appears to be primarily an Apache site.

In 1930, J. A. Mason reported on the excavation of two structures located at Alibates Creek. In 1935, E. B. Sayles provided the first synthesis of Panhandle archaeology. This rare volume is unavailable for study. However, the Panhandle-Plains Historical Museum Reported Site Records cite letter correspondence between Sayles and J. Hughes briefly describing three sites in Sherman County, three sites in Oldham County, four sites in Potter County, and five sites in Deaf Smith County.

In the early 1950s, Floyd V. Studer, a dedicated amateur who had grown up in Canadian, Texas while Eyerly and Moorehead were working in the area, and had been studying the archaeology since the early 1900s, began to report results of his many years of exploration in the stream valleys of the Canadian River where he had recorded 100 major ruins (Studer 1955). There is a problem with the Studer data in that Studer was somewhat protective and perhaps deliberately misleading about the locations of many of these ruins. Moorehead's 1931 volume includes a field map of Studer's that shows supposed locations of some sites, including 12 in Oldham County, nine in Potter County, two in Moore County, and one in Randall County. This map shows Landergin in Moore County, although it is actually some distance away in Oldham County. Whether this is by accident or design is not known. The reported site records at the Panhandle-Plains Historical Museum identify an additional five Studer sites in Oldham County, 29 in Potter County, two in Moore County, four in Randall County, and one in Deaf Smith County.

In 1934, Studer published findings on partial excavation of 11 of 24 structures at the Coetas Creek Ruin in Potter County, describing architecture, artifacts, and other site components.

In 1938, A. T. Jackson published the first comprehensive study of Texas Indian rock art. It includes photographs and descriptions of Rocky Dell and an unnamed site in Oldham County, one site in Potter County, and one site in Randall County.

By the middle to late 1930s, archaeologists were beginning to record the presence of a different prehistoric group than the Panhandle villagers, namely the Paleo-Indian big-game hunters. Among important early man sites excavated in the region are: Folsom (Cook 1927), Blackwater Locality No. 1 (Howard 1935); Miami (Sellards 1938); Lipscomb (Barbour and Schult 1932); San Jon (Roberts 1942); Plainview (Sellards et al., 1947); Lubbock Lake (Sellards 1952); Domebo (Leonhardy 1966); Lake Theo (Harrison and Smith 1975); and Rex Rodgers (Willey, Harrison and Hughes 1978; Speer 1975).

In 1938, extensive excavations of two village ruins near the Canadian River were undertaken by Ele M. and Jewel A. Baker. The sites involved were the Alibates Ruins in Potter County, and the Antelope Creek Ruins in Hutchinson County, barely outside of the study area. With the aid of a Works Progress Administration crew, the Bakers excavated 52 rooms, five cists, and 14 burials at Alibates Ruin 28; one room at Ruin 28A; and eight rooms at Ruin 30. They recovered thousands of artifacts and much architectural data, both at Alibates and at Antelope Creek, which had previously been excavated by C. Stuart Johnston (1939). The Antelope Creek Ruin later became the type locality for the Antelope Creek Focus of the Panhandle Aspect Village complexes. The final field report on the Baker project was completed in 1941, but has never been made available to the scientific community at large.

During World War II, the pace of archaeological investigations slowed in the Texas Panhandle, as elsewhere. Significant contributions of this time period include the early rock art studies of Forrest Kirkland (1942), which culminated in a comprehensive and beautiful volume published 25 years later (Kirkland and Newcomb 1967). In this book, Kirkland provides descriptions of four sites in Oldham County, three in Potter County, and one in Randall County. Some of these sites had previously been reported by Jackson, although not in as much detail.

Another major study of the war era is Alex D. Krieger's Culture Complexes and Chronology in Northern Texas (1946), wherein the Panhandle Aspect and Antelope Creek Focus are defined and an attempt is made to link the village ruins of the Canadian River Valley with other village cultures where cultural sequences are better known. Krieger evaluates the Alibates Ruins and Coetas Creek Ruins in this volume, and designates Alibates a component of the Antelope Creek Focus.

The 1950s saw the beginning of a long series of reports dealing with the Alibates flint quarry, which is the only National Monument in Texas. Some publications are: Bryan (1950); Shaeffer (1958); Green and Kelley (1960); Anthony (1963); Hertner (1963, 1964); and Mewhinney (1965). None of these studies is definitive.

In 1952, Dr. Jack T. Hughes began his career as a Texas Panhandle archaeologist at the Panhandle-Plains Historical Museum in Canyon. He initiated a systematic survey and salvage program designed to examine all phases of Panhandle archaeology as thoroughly as possible, and has published numerous reports on the subject over the past 30 years. Among the most important of these may be those that deal with two near voids in the regional literature--the Archaic and early Neo-Indian cultural stages. Reports on the Archaic include: Hughes (1955, 1959, 1975, 1976); Tunnell and Hughes (1955); Hughes and Hood (1976); and Etchieson, Speer and Hughes (1978, 1979). Some dealing with early Neo-Indian sites are:

Hughes (1959, 1962, 1969); and Hughes and Willey (1978). His writings represent a synthesis of Panhandle archaeology, and none can afford to be overlooked. Many are cited elsewhere in this text.

During the 1950s and early 1960s, a number of comprehensive volumes containing information about Texas Panhandle archaeology were published. These include a survey of Oklahoma archaeology (Bell and Baerreis 1951), two reviews of Paleo-Indian occupation in North America (Sellards 1952; Wormington 1957), two handbooks of Texas archaeology (Suhm, Krieger and Jelks 1954; Suhm and Jelks 1962), two volumes of projectile point descriptions (Bell 1958, 1960), a bibliography of Texas archaeology (Campbell 1960), and a synthesis of prehistoric man on the Great Plains (Wedel 1961).

By the early 1960s, attention had begun turning toward the archaeologically significant subject of the paleoenvironment of the region. Wendorf's 1961 pioneer study of the paleocology of the Llano Estacado was followed by a climatology study of the Southern Plains (Baerreis and Bryson 1965), another Southern Plains study (Wendorf and Hester 1975), and most recently a review of the paleoenvironment of Texas (Bryant and Shafer 1977). The paleoenvironment of the region remains poorly known, and studies are continuing at the present time. They frequently are included as parts of archaeological studies.

In the early 1960s, an event took place that has had a far-reaching effect on the archaeology of the region. This was the decision to dam the Canadian River in Hutchinston County to create a large reservoir (Sanford). The reservoir is located in the heart of one of the richest archaeological regions in the Texas Panhandle and is a major recreational facility in a water-deprived region. A systematic inventory was initiated. David (1962) appraised the area, describing 28 sites in Potter County and five in Moore County. Green (1967) excavated three sites in Potter County and two in Moore County. Hughes conducted a preliminary reconnaissance, re-identifying four previously reported sites in Potter County, and recording 13 others. He also cited nine sites in Moore County previously recorded by the NPS in a 1972 reconnaissance. Many of the sites described by these authors are Panhandle Aspect village ruins, but other kinds of sites such as camps, burials, and rock art sites from other cultural stages, also are reported.

Also in 1974, Hughes surveyed a small area of the Alibates National Monument, located in Potter County, recording one previously unreported site and one possible site. In 1975, Hughes and Taylor tested these sites, neither one of which is extensive. In 1974, Bousman assessed the resources of the National Monument and of the Lake Meredith Recreation Area. For the Monument area, he listed 54 previously recorded sites, classified as follows: 11 Panhandle Aspect, 34 workshop/quarry, one camp, two historic, two petroglyph, and four other sites. For the Recreation area, he listed: 81 Panhandle Aspect, 88 quarry workshop, five Archaic, 36 camp, two petroglyph, two midden, three rockshelter, nine gathering station, eight historic, and 41 other sites.

The National Park Service and the Water and Power Resources Service both participate in an ongoing cultural resource management program in the area, and are in the process of assembling the data that have been collected over the past 15 years. Until this project is finished, complete site data for most of the hundreds of sites they have recorded will not become generally available.

The Panhandle region as a whole has benefited from the results of a number of studies implemented because of the National Environmental Policy Act of 1969. The focus of studies has been along the watercourses. However, many areas have received attention. Most work in the northern Panhandle is done at West Texas State University by Hughes and others at the Archaeological Research Laboratory.

Other significant publications of the 1970s are M. B. Collin's 1971 review of the archaeology of the Llano Estacado, and Lintz's (1973, 1974, 1975, 1978a, 1978b) publications on the Panhandle Aspect village complexes.

Several masters theses and doctoral dissertations of the last decade deal with the Panhandle region including: Duffield (1970), Lintz (1975), Speer (1975), and D. Hughes (1977). Specifically applicable to this report is Upshaw's 1972 thesis on rock art sites in Palo Duro Canyon, where two of the nine localities described are sites in Randall County.

Investigations that have been carried out since 1977 include: a 1979-1980 survey by Hughes and others where 20 sites in Potter County are recorded, and a survey by Etchieson (1980) at Lake Meredith where 17 new sites are recorded in Potter County and 22 are recorded in Moore County. Relevant to the region, but not the study area, are the following: test excavations at eight sites in the Red Deer Creek drainage (Hughes, Hood and Newman 1978); test excavations at a site at Lake Meredith in Hutchinson County (Etchieson 1979); survey of part of the North Palo Duro Creek drainage in Hansford County (Hughes 1979).

The southwestern portion of the Texas Panhandle has been studied less intensively than the northwestern portion. The following discussion has been taken with slight modifications, from Campbell and Judd (1977: 7-9).

The earliest systematic archaeological investigation in the southwestern Panhandle was at the well-known Lubbock Lake Site under the direction of Joe Ben Wheat who conducted excavations here in 1939 and 1941. The first report by Wheat was published in 1940 (Kelley, 1974:44; Wheat, 1940:4-6, 1974:16). In the 1940s and 1950s, the Texas Memorial Museum renewed excavations at Lubbock Lake. The project was conducted by E. H. Sellards, Glen Evans, and Grayson Meade (Kelley 1974:46). In 1959-1960, projects were again undertaken here, this time by Texas Tech University, under the direction of Earl Green and Jane Holden Kelley. Texas Tech Museum Director Craig Black took direction of excavations at Lubbock Lake in 1973. A symposium held in 1974 discussed discoveries made at the Lubbock Lake Site in the broader context of early man in North America (Black 1974:8). Since then, zoo-archaeological studies at this site have been summarized (Johnson 1976). The Lubbock Lake site constitutes the earliest and most intensively investigated site in the southwestern Panhandle.

Gravel quarrying in the city of Plainview in 1933 exposed a dense bison bone bed which was not excavated until 1944. A portion of the bed was excavated by E. H. Sellards, G. Evans, and others (Sellards et al., 1947). This site was later radiocarbon dated to 7100 + 160 BP (Wormington, 1957:108) and is now known as the type site for the Plainview point, a well-known late Paleo-Indian projectile point.

Points continued to be found at the site into the 1960s, but no further work was done until 1976 when E. Guffee of the Llano Estacado Museum excavated the remnants of the bone bed (Guffee, 1974). The Plainview site was placed on the National Register in 1961.

Studies of sites and materials during the '30s and '40s provided information concerned with corner-tanged artifacts, ceramics, shaft tools, flint sources, and other artifacts and sites characteristic of the southwestern Panhandle (Patterson 1936; Pearce 1936; Watts 1939; Witte 1947). In these early decades of research, interest was most concerned with the Paleo-Indian period, the earliest time in which man was known to occupy the area (Fritz and Fritz 1940; Sayles 1935).

Following World War II, interest in a broader view of area prehistory began to mount. During the 1950s, field research was undertaken near Mound Lake, Coyote Lake, Yellowhouse Canyon, and Lubbock Lake (Bryan 1953; Jennings 1952; Newcomb 1955; Wheat 1955). Field investigations increased during the 1960s. Important excavations at the Andrews Lake Site, located south of the study area, supplied significant data for Llano Estacado area prehistory (Collins 1968). Excavations and surface surveys and collections within the area provided additional important data (Brown 1968; Green 1961; Harper and Shedd 1969; Riggs 1965a, 1965b, 1966, 1968; Runkles 1964; Word 1963). In addition to the report of a burial from Yellowhouse Canyon in 1955 (Newcomb 1955) other burials were reported (Cockrum 1963; Shedd 1968), providing added details of prehistoric funerary practices. Studies of rock art and unusual incised artifacts (Riggs 1965b, 1968; Watts 1965), as well as ceramics were reported (Collins 1969; Honen, 1973; Watts 1963) for the area. However, the interests of professional archaeologists continued to be largely concerned with the Paleo-Indian period (Green 1962; Trout 1963). Only Kelley (1964) made an attempt to define later periods of occupation.

In recent years, an additional burial site has come to light (Word 1975 and Fox), and studies of bedrock mortars have been initiated (Kirkpatrick 1977). Intensive surveys have increased (Guffee and Hughes, 1974; Skinner, 1973; Thoms and Proctor, 1977), and intermittent survey and collecting continued (Hart, 1975; Parsons, 1967; Randall, 1970; Riggs, 1975). Further reports of progress at the renewed excavations at Lubbock Lake have now become available (Bamforth, 1980; Black 1974; Johnson, C. 1974; Johnson, E. 1974, 1976a, 1978, 1980; Johnson and Johnson 1975).

CULTURE HISTORY (3.2.2)

This section, taken from Speer (1980:28-41) with some modification, reviews the culture history of the Texas/New Mexico study area, beginning with the earliest, or Paleo-Indian stage and ending with the Neo-Indian historic stage.

Although modern man may have been living in the New World for as long as 30,000 years, his verifiable period of occupancy is about 12,000 years, based on radiocarbon dating of numerous archaeological sites (Haynes 1964). On the Southern Plains, three main archaeological stages of cultural development are recognized. These are the Paleo-Indian big game hunting stage of the late Ice Age, the Archaic foraging stage of the post-glacial period, and the Neo-Indian stage of developing horticulture. The stage when late Neo-Indian groups were coexisting and interacting with Euro-Americans can also be considered as part of the archaeological record, and in this report, it is so regarded.

A. Paleo-Indian Stage

The Paleo-Indian stage began about 12,000 years ago when the climate was cool and moist, and bands of hunters roamed the plains in search of wide variety of game animals including mammoth, bison, camel, horse, and peccary. It ended about 7,000 years ago with the onset of warmer and drier climatic conditions that saw the big herds dwindle to extinction.

Faunal, floral, and geological evidence indicates that most early kills took place at stream, marsh, or pond localities where vegetation was lush, and both tall and short grasses grew nearby (Leonhardy 1966; Wendorf and Hester 1975; Johnson 1976; Fullington 1978). Other popular sites were the ubiquitous playas of the uplands, which, during the Paleo-Indian period, were larger, more numerous, and probably often full of water.

Three main cultural substages are recognized within the Paleo-Indian stage. From earliest to latest, these are the Clovis, Folsom, and Plano cultural periods. The cultures are distinguished from one another on the basis of distinctly different types of projectile points and by characteristic assemblages of other lithic tools.

1. Clovis Stage

The Clovis people hunted mammoth and other large mammals using relatively large, lanceolate, fluted Clovis points. Other typical Clovis culture tools are smaller non-fluted points, flake knives, scrapers, hammers, choppers, gravers, and bone implements. The time range for Clovis culture sites is from 12,000 to 11,000 years ago. These sites are widespread in North America, having been found on both the east and west coasts, as well as in the Great Plains and southwest desert . The type locality for the Clovis culture is Blackwater Locality No. 1, located near Portales, New Mexico (Hester, 1972). Other Clovis sites adjacent to the study area include the Miami Site in Roberts County (Sellards, 1952), the Lubbock Lake Site in Lubbock County (Johnson, 1976), the Domebo Site in southwestern Oklahoma (Leonhardy, 1966) and possibly the Rex Rodgers Site in Briscoe County (Hughes and Willey, 1978).

2. Folsom Stage

The Folsom people hunted bison using relatively small, delicately made, lanceolate projectile points with flutes extending over nearly the entire surface of both blade faces. These points are typically found associated with leaf-shaped knives, knives made from channel flakes, abraders, gravers, bone tools and ornaments, and a variety of scrapers. The time range for Folsom sites is between 11,000 and 10,000 years ago, with most radiocarbon dates centering around 10,500 BP. Folsom sites are found mainly on the North American Plains. The type locality for the Folsom culture is the Folsom Site in northeastern New Mexico. Other Folsom sites in and adjacent to the study area are the Lipscomb bison quarry in Lipscomb County (Schultz, 1943), the Lake Theo Site in Briscoe County (Harrison and Smith, 1975), the Lubbock Lake Site, Blackwater Locality No. 1, and the Elida Site in Roosevelt County (Hester, 1962).

3. Plano Stage

The term "Plano" is applied to all of the post-Folsom period Paleo-Indian big-game hunting cultures of the North American Plains that are characterized by generally long, large, leaf-shaped or lanceolate projectile points. The geographical and chronological range of this group is broad, and numerous projectile point types are associated with the various subcultures. Plano points can be subdivided into two groups: Plainview and parallel-flaked. The Plainview group are unfluted points generally resembling Clovis and Folsom points in outline. The parallel-flaked group are frequently stemmed and include such types as Agate Basin, Scottsbluff, Eden, and Frederick. The associated artifact inventory is highly diverse; typical tools are choppers, hammers, perforators, several types of knives and scrapers, bone tools and ornaments, and also grinding stones. The latter may be significant, for they imply the presence of plant foods in the diet of the Plano peoples. Plano hunters were probably hunting the last of the extinct and first of the modern bison. Plano culture sites are found mainly in the Great Plains, and into the adjoining Rocky Mountains. Sites in and near the study area that are generally considered to have Plano affiliations include the Plainview Site in Hale County (Sellards et al., 1947; Guffee, 1979), the San Jon Site in eastern New Mexico (Roberts, 1942), the Lubbock Lake Site, Blackwater Locality No. 1, and the Milnesand Site in Roosevelt County (Sellards, 1955).

Evidence for Paleo-Indian occupation west of the Llano is limited to isolated finds of projectile points (Baker and Campbell, 1960; Jelinek, 1967), although a number of known camp and kill sites are relatively close to the valley and fairly extensive Paleo-Indian activity has been documented in the Rio Grande Valley to the west (Judge, 1973). There is some possibility that geological processes in the Pecos Valley have destroyed most of the Paleo-Indian sites there (Jelinek, 1967:140), but this remains to be demonstrated. At least one fairly large Paleo-Indian site, the *Rattlesnake Draw Site* (Smith, et al., 1966) has been found on the Mescalero Pediment near the Llano escarpment. The permanent water in the valley would have been a powerful attraction for hunters and gatherers at this time. Subsistence and settlement patterns during this period can be assumed to be similar to that of the adjacent parts of the study area - that is, strongly tied to areas near sources of water.

B. Archaic Stage

The Archaic stage on the Texas High Plains began about 7,000 years ago and ended early in the Christian era. Archaic Indians were hunters and gatherers who systematically exploited the resources of a particular territory as they became available with the changing seasons. Archaic cultures are characterized by a variety of types of dartpoints that probably were used with the atlatl or spear-thrower. In the early part of the Archaic stage, a warm, dry (Altithermal) climate prevailed, but apparently about 4,000 years ago, the climate began to shift toward the more moderate (Medithermal) climate that presently prevails.

The Archaic cultures of the Texas High Plains are poorly known, but seem to be separable into two subcultures, an earlier one and a later one. The earlier sites are very scarce and difficult to identify. Most are small, open camps located near reliable sources of water. These sites are characterized by a scarcity of barbed dartpoints, and by only a few kinds of other artifacts, mostly gouges, hammers, choppers, and boiling pebbles. The gouges may be diagnostic for this period in the region. Bison and other large game animals are scarce, suggesting that they were absent from the region as Dillehay (1974:181) has postulated. The Bitter Creek Site in Hall County, Texas (Hughes and Hood 1976), may be representative of the early Archaic cultures on the High Plains.

One likely reason that early Archaic sites are scarce on the uplands may be that throughout the long drought of the Altithermal, existence was marginal and based on a desert-like flora and fauna. Recent evidence suggests that during this stage, many groups may have deserted the uplands in favor of the more protected environment of the adjacent rolling plains to the east (Etchieson, Speer, and Hughes 1978, 1979). However, Archaic remains, including wells at Blackwater Draw apparently dug during the Altithermal (Evans, 1951), are known from the Llano Estacado proper (Collins, 1971; Hester, 1972; Kunz, 1969; Wheat, 1974). Reports of the presence of large numbers of gouges in the Canadian and Pecos river drainages hint at their presence in this area as well. Early Archaic foragers may also have relocated in the protected Canadian Breaks, where spring water must always have been available, and game probably collected. To date, sites with the diagnostic gouges have not been reported from this area. However, they may be due to selective field observation favoring the overridingly attractive and more conspicuous structure sites common in this region.

Sites of the late Archaic stage are numerous throughout some portions of the study area. They are small or large camps located at upland playas, along canyon and valley rims, and on the benches and terraces of stream valleys. Mortar holes are present at many camps, and slab-covered burials sometimes occur. Probably much quarry-workshop activity was carried on by late-Archaic Indians and some bison bone deposits may represent late-Archaic kills.

The later Archaic cultures are marked by quantities of corner-indented and corner-notched dartpoints, and by a large and varied artifact assemblage. This includes many ovate and trianguloid knives, thick end scrapers, small manos, thin grinding slabs, and numerous hearth stones and boiling pebbles. Bison and other large mammal remains are common, indicating that the big game animals had returned to the Southern High Plains, as Dillehay postulates. With the climate becoming more moderate, and supplies of food and water increasing, the uplands could have supported larger populations than during the Altithermal. The culture manifested at the Little Sunday Site in Randall County (Hughes 1955) may be typical of the late Archaic stage, in the Texas Panhandle.

A similar dearth of good evidence regarding Archaic occupations is present to the west. Northeastern New Mexico has produced apparently Archaic points (Baker and Campbell, 1960) from several surface sites and one excavated site (Pidgeon Cliffs - Steen, 1955) just north of the study area. Hammack (1965) suggests the presence of Archaic hunters in the vicinity of Ute Reservoir based on finds of Clear Fork gouges. To the south, the Pecos Valley appears to have been occupied throughout the Archaic period by hunters and gatherers. Jelinek (1967) suggests that the early Archaic populations in the area were more closely linked to the southwest, while the later populations were more similar to those on the Plains. little is known about the adaptations of either group. The nearby Llano Estacado may have been an important hunting area during this period, making canyons which offered relatively easy routes east, important areas.

C. Neo-Indian Stage

The Neo-Indian cultural stage on the South Plains began early in the Christian era and ended with the arrival of Coronado in 1541 A.D. The Neo-Indians were hunting and gathering people who gradually began to grow corn, beans, and squash to supplement their diet. As horticultural activities increased, these groups gradually became more sedentary, their populations expanded, and the open camps of earlier days were replaced by large permanent villages. Neo-Indian cultures are characterized by the presence of pottery and/or arrowpoints.

In Texas, these cultures can be divided into earlier cultures and later cultures. In the Great Plains, early Neo-Indian cultures are considered part of a Plains Woodland tradition, and late Neo-Indian cultures part of a Plains Village tradition (Wedel, 1961). On the Southern High Plains, the early cultures are poorly known and have not been assigned to any tradition. The later cultures are assigned to the Panhandle Aspect Village tradition.

The earlier cultures are marked by the presence of several kinds of small, barbed arrowpoints such as Scallorn points, which are corner-notched, and Deadman points, which are notched from the base and tend to have long, slender barbs. In the northern part of the region, these points are sometimes associated with thick, parallel-corded pottery like that of Woodland cultures in the Central Great Plains, and sometimes with a plain brownware similar to Alma Plain that was imported from Mogollon cultures in southern New Mexico. The Woodland pottery is tempered with coarse particles of crushed rock or bone. The Mogollon pottery is tempered with particles of crushed plagioclase feldspar (Hughes, 1979:V16-17). The Lake Creek Site in Hutchinson County is one example of an early Neo-Indian site of the northern part of the Southern High Plains (Hughes, 1962:65-84), and the term Lake Creek Culture is used to distinguish these sites from other early Neo-Indian sites.

Further south, the barbed points are usually accompanied only by the Mogollon brownware. This southern complex is present at the Deadman's Shelter in Mackenzie Reservoir where radiocarbon dating of charcoal yielded a date of 465-710 A.D. (Willey and Hughes, 1978:187). It is unreported but present at three sites in the Palo Duro Canyon area. Radiocarbon dates are: 300-680 A.D. (Canyon City Club Site), 815-1110 A.D. (Blue Springs Shelter), and 370-870 A.D. (Chalk Hollow Site). The name "Palo Duro Culture" has been proposed for this complex (Willey and Hughes, 1978:187). To date, approximately 35 sites that may be assignable to the Lake Creek or Palo Duro cultures have been identified.

One characteristic feature of the early Neo-Indian cultures that may be significant is the presence of the prairie vole (Microtus ochrogaster) in most sites. The prairie vole no longer lives on the Southern High Plains, preferring moister regions to the east. This suggests that the climate locally may have been wetter around 500 A.D. than it is today. At some sites, other faunal remains such as soft-shelled turtle, raccoon, muskrat, and spotted skunk also suggest moister conditions. Bison are present at all of the sites except the Deadman's Shelter where they are inexplicably absent.

There are probably two late Neo-Indian cultures of the Texas Panhandle. The later of these, the Antelope Creek Focus (Krieger, 1946), is comparatively well-known (see Lintz, 1978b). It is a village complex that is especially numerous in the middle part of the breaks of the Canadian River across the Texas Panhandle, and appears to have been inhabited from about 1150 to 1450 A.D. The complex is characterized by distinctive slab houses, several kinds of arrowpoints, including Washita, Harrell, and Fresno points, large oval-to-diamond-shaped (Harahey) knives, large thin-end scrapers, thick grinding slabs, large manos, cord-paddled pottery tempered mainly with crushed quartzose rock (Borger Cordmarked), a wide variety of bone tools including awls and bison scapula, hoes, turquoise, obsidian, polychrome pottery, Olivella shell beads, and other distinctive artifacts of stone, bone, and shell.

The Antelope Creek Focus villagers planted their crops in the floodplain and on low terraces of the stream valleys of the Canadian Breaks and other stream valleys of the region. The preferred location for dwellings seems to have been high terraces, knolls, and butte tops. The areas within close proximity of the Alibates quarries were particularly attractive to the late villagers, for quarrying was a thriving industry. This activity doubtless strengthened the local economic base and enriched the cultural environment, as the flint was traded far and wide, thus affecting social contact with a variety of other cultures.

The Antelope Creek Focus culture complex was influenced by the Puebloan Culture to the west of the Texas Panhandle in eastern and northern New Mexico. This is seen in the use of stone slabs for building construction, and in the presence of such imported items as turquoise, obsidian, polychrome pottery, and shell beads. It also closely resembles cultures of the Plains Village tradition in many ways, including most of its architecture features and nearly all of its chipped stone, ground stone, ceramic, bone, and shell artifacts.

What became of the Panhandle Aspect people is not known. Apparently, their thriving and numerous villages had been abandoned for some 50 to 100 years before the arrival of Coronado. Possible causes for their demise are drought and/or increasing pressure from the Apaches. They may have been forced northward where they became part of the historic Pawnee in Nebraska (Hughes, 1974).

Some of the late Neo-Indian village sites of the Texas Panhandle appear to be earlier than those of the Antelope Creek Focus, and transitional out of Woodland into Antelope Creek in a manner analogous to the transition of Custer Focus out of Woodland into Washita River Focus in western Oklahoma (Lintz, 1974). Some attributes of these earlier sites may be primitive architecture, a minimum of tradeware, and thicker pottery reminiscent of Woodland ware. Such transitional sites probably should be included within the Panhandle Aspect, but distinguished from sites of the Antelope Creek Focus by assigning them to an earlier focus.

Puebloan ceramics associated with other Plains material culture and without permanent structures have been found near Ute Reservoir which appear to date to approximately A.D. 1250 to A.D. 1325 (Hammack, 1965). No preceding cultures, other than possible Archaic occupation, could be defined by Hammack's work, although earlier remains adjacent to the Canadian River may be buried and his survey did not extend far onto the uplands (Hammack, 1965).

The ceramics, on the basis of which these sites were dated, were first identified further south in the Middle Pecos Valley (Jelinek, 1967). From approximately A.D. 800 to A.D. 1350, the Pecos Valley was occupied by increasingly sedentary agriculturalists, reaching a peak of population density between A.D. 1000 and A.D. 1250. Ceramic evidence links the earlier portion of this occupation to the Jornada Magollon to the southewest, and, later, to the central and northern Rio Grande. Evidence for western influences virtually disappears by the period represented by the ceramics from Ute Reservoir, after A.D. 1100. Permanent sites, including multiple-room surface and subsurface slab-based structures, from this sedentary period occur on promontories, flat-topped hills, and terraces near modern and prehistoric rivers. Farming was practiced in river and stream bottoms, and larger sites tend to occur adjacent to large amounts of bottomland. Despite increasing reliance on agriculture in the valley during this period, hunting remained important. Temporary camps occur near water sources on the Mescalero Pediment and up onto the Llano Estacado (Jelinek, 1967).

Very little is known of contemporary developments south of the middle Pecos Valley. However, a number of small pithouse sites, identified with an eastward extension of the Jornada branch of the Mogollon (Corley, 1965), have been found in the extreme southern part of the study area in Lea County as well as into adjacent parts of Texas and further towards the Rio Grande. These sites, including the Merchant Site (Leslie, 1965) and the Laguna Plata site (Runyan, 1972) appear to date from A.D. 950 to A.D. 1450 (Corley, 1965).

Between A.D. 1240 and A.D. 1350, agriculture was progressively deemphasized and finally abandoned. This progression is exactly the opposite of that predicted by most anthropological theory, particularly because the environmental evidence suggests that conditions became more favorable for farming at this time. The Pecos Valley inhabitants may have been taking advantage of the expansion in the size and range of the bison herds which occurred as a result of this same climatic shift. At any rate, this progression has important theoretical implications for archaeology. This development appears to have led the Pecos Valley people out onto the High Plains (Jelinek, 1967), possibly to sites such as the Salt Cedar Site (Collins, 1968). The Salt Cedar Site dates between A.D. 1000 and A.D. 1450. Pithouses appear after A.D. 1250 as well as an increase in the volume and variety of other remains present, particularly bison bone. Despite flotation and pollen analysis, no evidence of agriculture was found. Salt Cedar appears to represent full or nearly full sedentism based on bison hunting, occupied by people with strong Puebloan affiliations.

D. Historic Stage

The historic stage of Indian cultural development began with the arrival of Coronado in 1541. This stage has been extensively studied both historically and ethnographically, but has received little attention from archaeologists. Some probable Apache sites have been reported along the eastern caprock escarpment (Katz and Katz, 1976), and others from on the Texas High Plains (Holden, 1931; Johnson et al., 1977; Hughes, Hood and Newman, 1978). Some unreported sites in the Palo Duro Canyon are probable Apache sites or have Apache components. Numerous small, untested sites along Palo Duro Creek in Randall County contain polychrome pottery suggestive of Apache occupation. Some characteristics of artifacts from Apache sites seem to be well made, thin, dark, sand-tempered pottery, often with mica; glazed polychrome pottery; well-made triangular arrowpoints; and large, functional scrapers. Extensive probable Apache occupation is known to the west in Quay and Harding counties along the Canadian River and Ute Creek (Hammack, 1965).

Little is known of Comanche sites in the region. A probable Comanche camp in the eastern caprock escarpment is reported by Willey, Harrison and Hughes (1978:223-254). A rich Comanche burial site is reported from Floyd County on the Southern High Plains (Word and Fox, 1975:1-63). Part of a somewhat similar burial site was recently recovered in Briscoe County, but has not been reported. A possible Comanche site is reported from Hansford County near the study area (Hughes, 1979:V58).

The probable Comanche site in the caprock escarpment, called the Sand Pit Site, may be representative of Comanche sites in the region. The artifacts from this site are a mixture of prehistoric and Euroamerican objects. They include locally made and imported European gun flints, flint and metal arrowpoints, flint and metal knives, flint and metal scrapers (or flashers), and glass beads. Particularly significant may be some small, thin, tabular, sandstone whetstones with worn edges. These are unlike other whetstones from the region, and probably were used for sharpening metal objects. Also unique are small, shallow "dinner plate size" fireplaces or ash lenses. The term "Sand Pit Culture" is proposed for these very late Neo-Indian sites.

The latest aboriginal occupation in New Mexico appears to take the form of tipi ring sites, found along the Canadian River and Ute Creek. These sites could represent camps of a number of tribes. Military reports from this period specifically mention Comanche encampments in this area (Hammack, 1965). Unfortunately, the almost complete absence of artifacts associated with these rings makes specific ethnic identifications extremely tenuous. The Pecos River Valley to the south appears to have been unpopulated during this period (Jelinek, 1967).

CURRENT RESEARCH PROBLEMS (3.2.3)

The following discussion has been taken from Speer (1980:54-52) with some modifications.

Despite the number of investigations that have been done to date, the cultural history of the region remains largely unknown. While the broad outlines of the main cultural stages and substages have been sketched, the painstaking process of filling in the gaps dealing with the nature and number of these substages is in its infancy, with progress very slow. Among the basic unknowns operating through both time and space are these: the nature of the physical environment; the cultural affiliations and basic chronological relationships of the various artifact types (projectile points, ground stone, pottery, etc.); and the origin and ultimate fate of most groups. More complex problems relevant to all periods and portions of the study area include the determination of social organization, regional trade networks, subsistence/settlement systems, and extra-regional contacts. It cannot be stressed too strongly that the amount of systematic regional study which has been carried out is so small that virtually any research problem which can be successfully addressed would add significantly to our knowledge.

A. Paleo-Indian Stage

Some cultural stages of the region are better understood than others. One of these is the Paleo-Indian period. While interest in this period has always been high, the fairly recent development of sophisticated techniques for studying them has revitalized efforts, and the frequently common practice now is to adopt a multidisciplinary approach. This frequently includes geological, paleobotanical, microvertebrate, microinvertebrate, lithic tehcnological, and/or computerized osteological analyses. Examples of such studies are Frison (1970, 1974); Wheat (1972, 1979); Johnson (1976); and Agenbroad (1978).

Studies of this kind are directed toward clarifying such specific problems as changes through time and space on climate, morphological development in bison, lithic technology, and tool use. Among controversial problems are: the number of species of extinct bison hunted by early man and their ranges, the bone tools in common use, the evolutionary sequence out of Clovis of the various later projectile point types, the earliest dates for early man on the continent, the bison procurement techniques utilized by various groups, and the nature of the paleoenvironment. The study area is located in a region where answers to some of these questions may be forthcoming.

B. Archaic Stage

The regional Archaic stage is poorly understood, and the early stage (or stages) so little known that almost any information that can be gained will make a significant contribution to a better understanding of it. Basic to the problem are the questions. What (if any) groups of foragers were in the study area. Where were they, and when? What were their origins and their destiny? What was their lifestyle? These broad questions and the numerous others they imply are among the most important to be answered before the cultural history of the region can be synthesized.

Later Archaic cultures are better known by virture of being better represented. By using radiocarbon dating, projectile point typologies, and artifact assemblages, and other techniques, it is possible to address such questions as: Were these groups mainly descendents of indigenous populations or were they newcomers that entered the area after food resources increased. Were they the first farmers, or did horticulturalists, already farming in regions to the northeast and southwest begin to move into the Panhandle, causing the foragers to either leave the region or be assimilated into the farming population?

C. Neo-Indian Stage

Since it is just now beginning to be recognized that there may be more than one or two Neo-Indian cultures distinguishable in the study area, the basic questions asked for Archaic groups apply equally well to the Neo-Indian stage. The diagnostic attributes of the earliest groups have not been clearly established, but some research problems can be identified. For instance, did these groups evolve out of a local Archaic tradition, and if so, what was the nature of their associations with Southwest, Plains Woodland, and Puebloan groups? Were they practicing horticulture?

With the late Neo-Indian villagers of the Texas Panhandle, problems lie mainly with the earlier groups, or pre-Panhandle Aspect people, who are essentially unknown. The later Antelope Creek Focus villagers are better known, having been investigated over many years. Specific questions relating to them are continuously being answered and replaced by others as Lintz's (1974, 1978b) studies evolve.

The most pressing problems in areas other than establishing an explicit chronology include: detailing the changes in adaptation of the inhabitants of the Pecos River Valley after A.D. 1200 and determining the area(s) to which they migrated; establishing the nature of the occupation represented by sites on the Llano Estacado containing Puebloan ceramics; and the fate of the group represented by these sites.

D. Historic Stage

The focus in research of this period has been the problem of linking archaeological collections to specific tribal groups. There is abundant documentation of the lifeways of these groups, but archaeological data could fill in gaps in our knowledge of migration routes, tribal boundaries, and contacts with other areas. Less concrete questions which have been addressed elsewhere with data from contact between Anglos and aboriginal cultures, include documentation of economic and social changes such contact causes.

3.3 HISTORICAL AND ARCHITECTURAL RESOURCES

TEXAS/NEW MEXICO

Despite a large number of recorded nonaboriginal historic sites on the South Plains (Hughes, personal communication) and fairly extensive historic records for the area, very little is known about the resources there. There has been virtually no systematic investigation of non-Indian material remaining in the area. A recent summary of Llano Estacado research (Hughes and Willey, 1978) was able to catalog only five investigations of historic Euro-American sites. Therefore it is difficult to make concrete statements regarding site types or densities of sites in particular regions.

The Historic period on the South Plains began in 1541 with the arrival of Coronado's expedition from Pecos (Winship, 1896). European presence in the area was largely limited to trading and exploring parties, and occasional missionary expeditions until 1786 (Collins, 1971; Guffee, 1978; Hughes and Willey, 1978; Rathjen, 1973). Indian-white relations during this period were marked by mutual hostility and frequent raids on the part of both groups. European presence in the area during this period of sufficient intensity to leave recognizable archaeological evidence is unlikely (Collins, 1971). A treaty between the Comanche and the Spanish in New Mexico in 1786, however, brought Spanish Ciboleros (bison hunters) onto the Llano. By the 1800s, these hunters were accompanied by traders known as Comancheros specializing in a lucrative trade with the Comanche in horses, mules, slaves, rifles, knives, and iron (Guffee, 1978; Rathjen, 1973; Grinnel, 1923; Haley, 1935). Later Spanish occupants of the area included sheepherders, particularly in the western areas along and adjacent to the Canadian River, although also in the east, who were driven out by Anglo ranchers in the late 1800s (Guffee, 1978; Rathjen, 1973). One of the very few historic excavations on the South Plains was conducted in a Cibolero-Comanchero-sheepherder village in a re-entrant canyon on the east Caprock escarpment (Guffee, 1978). Other such sites undoubtedly exist. There are also settlements from this period along the Canadian River (Hughes and Willey, 1978).

The buffalo were exterminated and the Indians put onto reservations by the late 1870s. During the early 1880s the South Plains were largely free grazing lands for cattle and sheep. Settlements were few, and occurred along permanent water. Total population in 1880 in the 11 northernmost counties in the Texas portion of the study area was less than 800, approximately three-fourths of them Spanish, concentrated in Oldham, Hartley, and Deaf Smith counties (Rathjen, 1973). By 1890, cattlemen had almost entirely replaced sheepherders, frequently by force, and large ranches replaced the free range. Soon after this, the large ranches were broken up and sold, largely for farms. In addition, a railroad was completed from Fort Worth to Denver, through Amarillo into Potter, Oldham, Hartley, and Dallam counties, by 1888. Population aggregated around this railroad as well (Collins, 1971; Hughes and Willey, 1978; Rathjen, 1973).

The nature of the historic resources on the South Plains is suggested by the nature of the historic sites on the National Register (Figure 3.1-1). Most of these sites are homes, stores, or governmental buildings in existing towns. These buildings date to the later period of Anglo dominance in the area. The register also includes ranch houses which probably date to the initial period of Ang dominance, and isolated dugouts which could belong to the Spanish or later periods. However, small early Anglo villages are also known, particularly in or near re-entrant canyons along the edges of the Llano Estacado (Hughes and Willey, 1978).

The extremely limited data available precludes firm statements of sensitive areas. In general, many of the areas of aboriginal sensitivity are also of historic sensitivity. This includes areas adjacent to sources of permanent water, which can be expected to contain ranch houses, farm houses, ranching and farming outposts, specialized equipment such as watering troughs and windmills, and remains of trading or hunting camps from the earliest periods.

Because of the continuing desiccation of the area, some modern playas, particularly large ones, and now ephemeral streams may have been good water sources in the recent past. The areas adjacent to these are also sensitive.

Re-entrant canyons can also be expected to contain approximately the same variety of resources and may be the most sensitive areas for sites from the Spanish and early Anglo periods. However, the ability to drill for water in the latest periods of historic occupation of the South Plains lessened the inhabitants' absolute reliance on surface water. Many historic sites may exist in areas determined by ranching or farming needs rather than by surface geographic features. In addition, fence lines and roads may exist anywhere.

Some historical resources are primarily significant for architectural reasons. Although no comprehensive survey of this category of resources in the Texas/New Mexico region currently exists, several incomplete lists are available. These include the Texas and New Mexico State Registers of Historic Places and the Texas Tech University Historic Engineering Sites Inventory. The New Mexico State Register contains very few properties in the study area (Appendix C). However, the other two listings are extensive enough to provide a general description of the types of properties which might be determined to be architecturally significant.

Excluding sites with primarily archaeological or historical significance (such as the Altibates Flint Quarries in Potter County), the Texas Tech Historical

Engineering Site Inventory (HESI) recorded 93 properties in the M-X study area (see Appendix C). Although this inventory is not exhaustive, it does define the general kinds of structures which may be significant from the perspective of engineering and the kinds of areas in which they occur. Table 3.3-1 lists the frequencies of the various categories of structures and their association with relevant environmental features. The majority of these structures fall into categories relating to water control (irrigation systems, dams) and transportation (bridges, railroads). The high frequency of occurrence of these structures in association with rivers or streams is obviously primarily determined by the nature of these two categories.

The majority of these structures also fall roughly into three groups based on date of construction (see Figure 3.3-1): 1880 to 1890, 1900 to 1920, and 1920 to 1940. These groups correspond to major periods in the history of the area, the first being "the era of the cattlemen" (Rathjen, 1973:243). The second period was a period of agricultural boom (Kraenzel, 1955:144-145) marked in the study area by the appearance of the railroads and the development of towns along them. The third is somewhat less clear, but of the 35 structures listed from this period, 25 are bridges and four are railroads. This group seems to work a major improvement in transportation systems in the area. Significant engineering properties, then, reflect both the critical concerns of the way of life in the Texas/New Mexico region in their emphasis on water control and transportation, and also the important periods in the history of that region.

Non-engineering architectural properties as compiled on the Texas State Register, can be divided into two basic categories: rural and urban. The few rural properties which have been recorded date to the early ranching period, from approximately 1875 to 1905. Although the paucity of sites in this category is partly a function of the low intensity of historic occupation in this area, it is also a reflection of the lack of effort made to locate such properties. Other such sites undoubtedly exist.

The far more numerous urban properties all date to periods before 1930, primarily before 1920. Thirty-five of the 45 properties in the state register are in Amarillo, pointing out the effect of concentrated population on both the probability of significant properties existing and the probability of those properties being recorded. Several patterns are obvious in these data. The first is that although there is no apparent difference in the range of ages of the properties between properties in and away from Amarillo, a somewhat higher proportion of the former properties date to the period from 1901 to 1929 (30 of 35, compared to 6 of 10). However, the bulk of the buildings named to the register from both kinds of communities represent exotic architectural styles associated with some degree of affluence. This is particularly true of private dwellings on the register, which are most frequently Victorian or Classic Revival style. There are also slight differences between the kinds of architecturally significant properties in the two areas. Seven of the 10 buildings not in Amarillo are community structures such as churches or courthouses. Only 6 of the 35 properties in Amarillo are of this type. Furthermore, both of the early period stone venacular structures on the Texas register are in small communities.

These patterns appear to reflect the pattern of economic and political development in the Texas Panhandle. Prior to the arrival of the railroads, centers of population in the Panhandle were relatively dispersed, and ranching was the

Table 3.3-1. Associations of classes of significant engineering sites with environmental features.[1]

	RIVER OR STREAM	LAKE	RAILROAD	POPULATION CENTER	LOAD	NONE
Irrigation	14	-	-	4	-	-
Bridge	25	-	3	-	-	-
Dam	5	-	-	-	-	-
Railroad depot	-	-	-	2	-	-
Windmill	-	1	-	-	-	2
Air field	-	-	-	3	-	-
Water works	-	-	-	2	-	-
Ice plant	-	-	-	2	-	1
Electric station	-	-	-	2	-	-
Artificial lake	-	-	-	2	-	-
Rail line	-	-	-	-	-	12
Other[2]	2	-	-	3	1	7
	46	1	3	20	1	22

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[1]Includes all sites in HESI in counties in study area with the exception of prehistoric sites and sites whose significance is primarily historical (i.e., 19th century stone walls).

[2]Includes all those categories with only one representative in HESI.

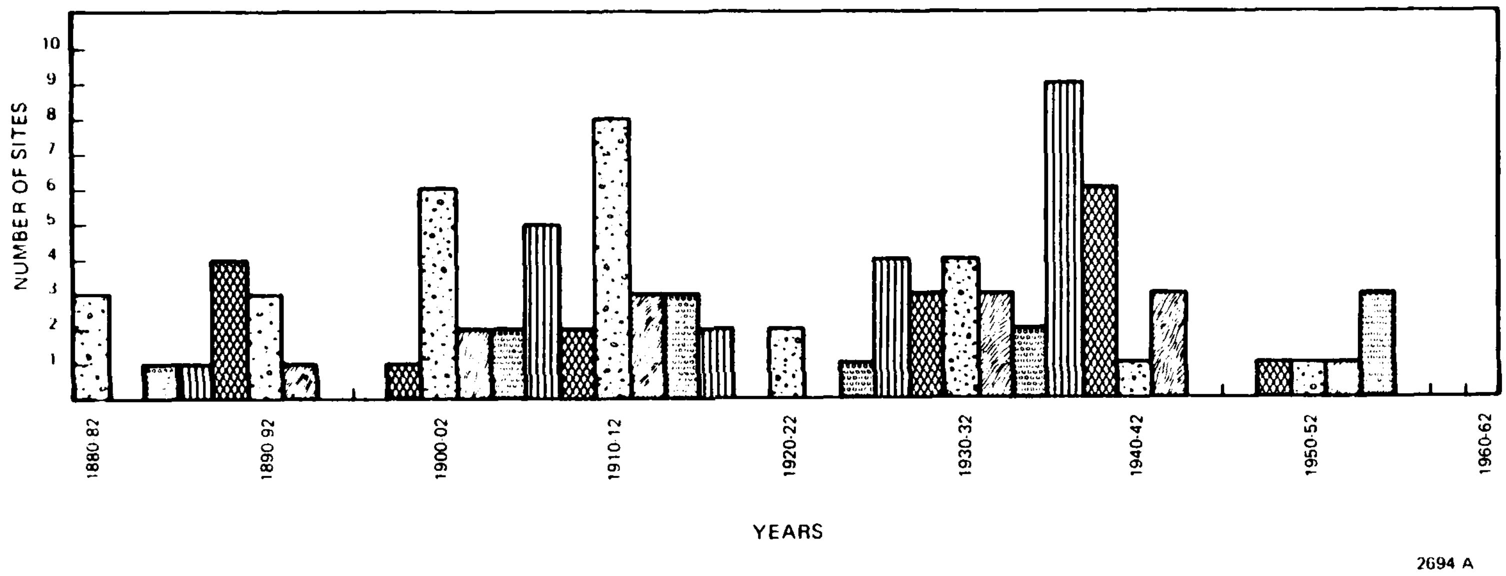

Figure 3.3-1. Frequency of entries in the HESI in the Texas/New Mexico study area by year.

primary economic activity. Overall population was low, and most of the inhabitants of the area were ranchhands or sheepherders, whose houses were unlikely to be sturdy or remarkable enough to be preserved. Significant structures from this period are limited to public buildings, such as courthouses, and major ranch structures. However, the success of the ranches in the area led to increased investment there and ultimately to the building of the railroad. By the end of the 1880s the first railroad through the Panhandle was completed. By 1910, railroad construction was over, and three major lines crossed it, intersecting at Amarillo. This intersection was a key factor in the emergence of Amarillo as the major center of the Panhandle in this period. Commercial development here led to greater affluence and consequently the construction of elite buildings (cf. Rathjen, 1973).

In general, then, available data suggest that major population centers, particularly Amarillo, contain a variety of public and private buildings which may be architecturally significant. These buildings are built in non-local styles and largely reflect the tastes of the social and political elite in the area during the early decades of the 20th century. The most common variety of structure is a well-preserved, fairly spectacular Victorian house or church. Less outstanding examples of this style of architecture such as the L. T. Lester House, a National Register Property in Randall County, may also be significant. Significant structures in local architectural styles are more likely to be present in smaller towns outside of the major areas of metropolitan development. Such structures are likely to be early period ranch buildings (which may be isolated situations rather than in a community) or public buildings, particularly municipal and religious edifices. However, the accuracy of this predicted distribution as well as the specific locations of significant structures can only be determined by systematic field inventory.

An aspect of architectural resources which has not been addressed by any listings in the study area is significance at a community level. Small communities which have not experienced extensive development may be expected to be architecturally more homogeneous than large towns, and may preserve their original style as a whole. While individual structures in such communities may not be significant in and of themselves, the community as a whole may provide an integrated example of the appearance of a town in an earlier period. The architectural style of such a community might therefore be worthy of preservation as a *district.*

3.4 IMPACT ASSESSMENT

INTRODUCTION (3.4.1)

Direct impacts are calculated by estimating site densities (excluding isolates) within specific environmental zones, calculating square miles of surface disturbance due to M-X in these zones, and then converting this area of disturbance to a number of sites.

Site density estimates based on existing data would be tentative for a number of reasons. First, and possibly most important, the surveys for which specific survey areas and site locations could be determined (Beckett, 1976; Bond, 1979; Campbell, 1975; Haskell, 1977; Laumback, 1979; Thomas and Proctor, 1977) are few in number and are mainly distributed around the southern periphery of the study area. No information is available for the Panhandle High Plains subsection of the study area, for the northern two-thirds of the Pecos River Valley, or for most of the Llano

Estacado. Furthermore, the studies available do not cover the full range of environmental zones present, even in the areas to which they are directly relevant. In particular, the unwatered uplands of the Llano Estacado and Mescalero Pediment have received only cursory systematic examination near water sources, and no figures at all are available on the frequency of sites associated with small playas on any of the areas.

These problems introduce a large element of uncertainty into density estimates based on existing data. Although results from the southern surveys could be generalized to the entire area, there is good reason to believe that this may not be justifiable. The northern portion of the study area was the core area of the Panhandle Aspect culture, a sedentary agricultural society, during the late Prehistoric Period. Social, environmental, and economic factors in this area may well have resulted in drastically different patterns of settlement than those seen in the hunter-gatherer and Puebloan areas to the south.

As a result, a sample survey was conducted in the northern portion of the study area. The goals of the survey were to collect data on the "River" and "Playa" strata and to check the accuracy of site densities for some of the other strata. This survey could not sample, in the time available, each stratum representatively which precludes assessment of representative site densities. As a result, the survey was designed to sample areas of high site probability (e.g., bluffs overlooking confluences). Site densities derived from these areas are used to provide maximum estimates of sites for each stratum surveyed and thus represents a worst case analysis. Such an analysis is federally mandated (40 CFR 1502.22) when the costs of obtaining the information are exorbitant. In the present case, time costs of performing a representative sample survey were judged prohibitive.

The surveyed areas totaled 7.5 sq mi (4,800 acres) and identified 86 sites, including 69 prehistoric, 10 historic and 7 sites with prehistoric and historic materials. In addition, 142 prehistoric and 47 historic isolates were located. These data allow site density calculation for the "River" and "Playa" strata and the upward revision of the "Draws/Streams" stratum. Limited survey in the "Sand Hills" and "Caproch Escarpment" strata encountered few sites because of poor visibility so these results are not used in the calculation of site densities.

Results from the survey were used to estimate site densities in the "Playa" stratum in all counties, and in the "Draws/Streams" and "River" strata in the northern portion of the study area including the counties of Dallam, Deaf Smith, Hartley, Oldham, Randall, Sherman, Quay, and Union. All other strata densities were derived from the existing data based described above. These densities are listed below in Table 3.4.2-1.

IMPACT ANALYSIS (3.4.2)

Site densities were derived by plotting known, intensively surveyed areas over predicted sensitive environmental zones, and determining the area examined and number of sites located within each zone. In general, these densities support the environmental stratification which has been used here. However, there are several changes which were made in them before impacts were calculated. The densities computed for the draws and lakes (very large playas) in the southern portion of the study area are surprisingly low. These densities seem unreasonable in light of the

Table 3.4.2-1. Site densities for sensitivity zones in the Texas/New Mexico study area.

Stratum	Density (Sites per sq mi)
Draws/Streams	19.20[1] 5.00[2]
Lakes (very large playas)	7.80
Sand Hills	8.80
Caprock Escarpment	5.80
Open Plains	0.23
River	19.50
Playas (small)	7.50

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[1] Density applied in northern counties listed in Section 3.4.1.

[2] Density applied to all other counties.

demonstrable importance of these zones to the aboriginal population of the Llano and, the high density of sites associated with similar environmental zones elsewhere. On the hypothesis that the width of the transects used in the surveys was affecting the density estimates, Pearson's correlation coefficient (r) was computed between these estimates and the number of transects per square mile walked in the various surveys. The correlation between these two variables is .74, suggesting that surveys using wide transects tend to locate fewer sites. As both of the environmental zones considered here were surveyed with the widest transects of any zone in the study area, the density estimates for them are probably low, not because of aboriginal settlement patterns, but because of data recovery procedures. A transect width of 30 meters was chosen to correct this problem for the density estimates for the draw category. This conversion was made on the assumption that observed site density in an area is a simple linear function of transect width. Table 3.4.2-1 shows the results of these computations. In the case of the Llano Estacado lakes, this conversion was not used. Rather, the computed value for the lakes surveyed on the Mescalero Pediment was applied to correct for the large transect width used in the Llano survey.

A total of 1,305 sites are predicted to be impacted by the full basing option using these density figures (Table 3.4.2-2). This number drops to 717 for split basing (Table 3.4.2-3). Even though split basing halves the number of shelters in Texas/New Mexico, it reduces direct impacts only by 45 percent. These impacts tend to emphasize impacts to limited activity sites, which are somewhat more frequent in association with playas, rather than multiple activity sites, which tend to occur around lakes (Table 3.4.2-4). However, multiple activity sites are also frequent along permanent streams, such as those found in Dallam, Sherman, Hartley, Union, and Harding counties in the north of the study area. The split basing option reduces overall impacts, but does not reduce them in all environmental zones. In particular, impacts on the dune belt in Chaves County remain the same as in full basing. More detailed discussions of Alternatives 7 and 8 are given below.

Alternative 7

Current knowledge about archaeological and historical resources in the Texas/New Mexico study area is limited. For the present, only existing data from intensive and extensive surveys are used to derive estimates of site densities and, concomitantly, predicted impacts. Figure 3.4.2-1 shows the relationship between known and predicted areas of high archaeological and historical sensitivity and the conceptual project configuration. Both direct and indirect effects on archaeological and historical resources are expected to result from project implementation. Direct effects will result primarily from land disturbance activities during the construction phase, while indirect effects will be caused principally by large-scale population increase. Indirect effects will occur during both the construction and operations phases. In Texas/New Mexico, unlike Nevada/Utah, these effects are difficult to quantify with any degree of accuracy because most of the area subject to indirect impacts (e.g., ORV activities) is privately owned. This suggests that indirect impacts would be minimized by local landowners. Unfortunately, local archaeologists indicate that private control is not effective in minimizing existing ORV recreation, the most destructive of all indirect impact activities. Since ORV's concentrate within drainage channels, the stratum with the highest predicted site density, increases in population and road mileage due to the M-X project will exacerbate an already serious problem (Beck, 1981).

Table 3.4.2-2. Total predicted sites and full basing direct impacts in Texas/New Mexico study area.[1] (Page 1 of 2).

County	Environmental Zones							
	Playa Margin		Lake Margin		Stream/draw Margin		Sand Dunes	
	Total	Impacted	Total	Impacted	Total	Impacted	Total	Impacted
Bailey	818.18	24.29	460.2	--	450.00	10.28	844.8	--
Castro	1,940.25	31.88	--	--	737.50	5.83	--	--
Cochran	298.05	15.62	--	--	362.50	4.38	--	--
Dallam	648.92	4.92	--	--	3,840.00	149.184	--	--
Deaf Smith	1,127.92	42.07	15.6	--	3,744.00	145.65	--	--
Hartley	438.31	9.07	--	--	1,797.12	79.29	--	--
Hockley	1,396.75	6.37	234.0	.23	500.00	1.73	--	--
Lamb	765.58	4.83	210.6	--	475.00	--	1,126.4	--
Oldham	210.38	6.81	--	--	2,016.00	12.40	--	--
Parmer	1,274.02	29.39	--	--	862.5	12.28	--	--
Randall	1,040.25	7.05	148.2	.16	3,024.00	9.79	--	--
Sherman	819.69	1.26	--	--	2,976.00	11.32	--	--
Swisher	4,122.07	15.89	--	--	687.50	.53	--	--
Chaves	473.37	12.66	661.1	--	1,525.00	5.78	8,712.0	167.28
Curry	925.32	63.00	--	--	937.50	9.55	844.8	--
DeBaca	40.90	7.05	--	--	475.00	11.12	--	--
Harding	40.90	1.48	--	--	550.00	8.50	--	--
Lea	578.57	2.51	230.1	--	112.50	--	--	--
Quay	438.33	11.70	--	--	3,840.00	95.73	--	--
Roosevelt	748.05	77.18	475.8	.16	937.50	24.88	554.4	--
Union	111.03	5.62	2,435.6	.55	5,088.00	92.92	--	--
Total	18,256.84	370.62		1.1	34,937.62	691.14	12,082.4	167.28

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Table 3.4.2-2. Total predicted sites and full basing direct impacts in Texas/New Mexico study area.[1] (Page 2 of 2).

County	Environmental Zones							
	River Margin		Escarpment		Other		Total	
	Total	Impacted	Total	Impacted	Total	Impacted	Total	Impacted
Bailey	--	--	--	--	115.92	1.33	2,689.10	35.90
Castro	--	--	--	--	119.83	1.30	2,797.58	39.01
Cochran	--	--	--	--	161.10	.35	821.65	20.35
Dallam	--	--	--	--	273.47	8.71	4,762.39	162.81
Deaf Smith	--	--	--	--	226.78	6.69	5,114.30	194.41
Hartley	--	--	--	--	283.13	5.19	2,518.56	93.55
Hockley	--	--	--	--	173.42	.27	2,304.17	8.60
Lamb	--	--	--	--	158.70	.61	2,736.28	5.44
Oldham	345.6	--	--	--	34.73	.66	2,606.71	19.87
Parmer	--	--	--	--	112.47	1.24	2,248.99	42.91
Randall	--	--	--	--	128.11	.59	4,340.56	17.59
Sherman	--	--	--	--	155.25	.78	3,950.94	13.36
Swisher	--	--	--	--	125.58	.24	4,935.15	16.66
Chaves	1,612.8	--	1,044.0	1.96	194.12	3.62	14,222.39	191.30
Curry	--	--	--	--	185.38	2.61	2,893.00	65.13
DeBaca	1,075.2	--	290.0	3.71	146.28	.60	2,027.38	22.48
Harding	--	--	--	--	309.12	3.20	900.02	13.18
Lea	--	--	63.0	2.75	342.24	.13	1,326.41	5.39
Quay	806.4	12.09	81.2	--	443.90	5.87	5,609.83	125.39
Roosevelt	--	--	359.6	2.09	331.43	5.88	3,406.78	110.19
Union	--	--	--	--	59.80	2.54	2,606.48	101.63
Total	3,840	12.09	1,837.80	10.51	4,080.76	52.41	74,818.67	1,305.15

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[1]The "total" number of sites within specific environmental zones in a county includes only those portions of the county which fall into the direct impact area in the cases of Union, Harding, Oldham, Quay, DeBaca, and Chaves counties, and includes only the northern half of Lea county.

Table 3.4.2-3. Split basing direct impacts in Texas/New Mexico study area.

County	Playa Margin	Lake Margin	Stream/Draw Margin	Sand Dunes	River Margin	Escarpment	Other	Total
Bailey	2.25	--	0.94	--	--	--	0.12	2.22
Cochran	13.44	--	3.77	--	--	--	0.30	10.97
Dallam	1.87	--	56.67	--	--	--	3.30	19.03
Deaf Smith	17.25	--	59.71	--	--	--	2.74	27.15
Hartley	5.80	--	50.76	--	--	--	3.32	19.52
Hockley	6.37	0.23	1.73	--	--	--	0.27	5.5
Lamb	0.87	--	--	--	--	--	0.11	0.55
Oldham	2.92	--	5.33	--	--	--	0.28	3.17
Chaves	12.66	--	5.78	167.28	--	1.96	3.62	185.14
Curry	40.99[1]	--	2.39	--	--	--	0.65	5.09
DeBaca	7.01	--	11.12	--	--	3.71	0.60	19.03
Harding	1.44	--	8.50	--	--	--	3.20	12.44
Lea	2.51	--	--	--	--	2.75	0.13	4.17
Quay	8.08	--	66.05	--	8.33	--	4.05	30.53
Roosevelt	26.24	0.05	8.46	--	--	0.71	2.00	24.69
Union	4.28	--	70.61	--	--	--	1.93	22.52
Grand Total	153.98	0.28	351.82	167.28	8.33	9.13	26.62	717.16

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[1]Partially based on the results of a recent survey of Cannon AFB OB expansion (EDAW, 1981c).

Table 3.4.2-4. Frequency of sites by site type and type of water.

	Type of Water						
Site Type	River	Permanent Stream	Ephemeral Stream	Spring	Playa	Lake	Total
Multiple	56	114	62	152	48	35	467
Special	4	14	7	17	1	1	44
Limited	82	147	277	123	207	102	938
Isolate	4	5	25	6	7	1	48
	146	280	371	298	263	139	1,497

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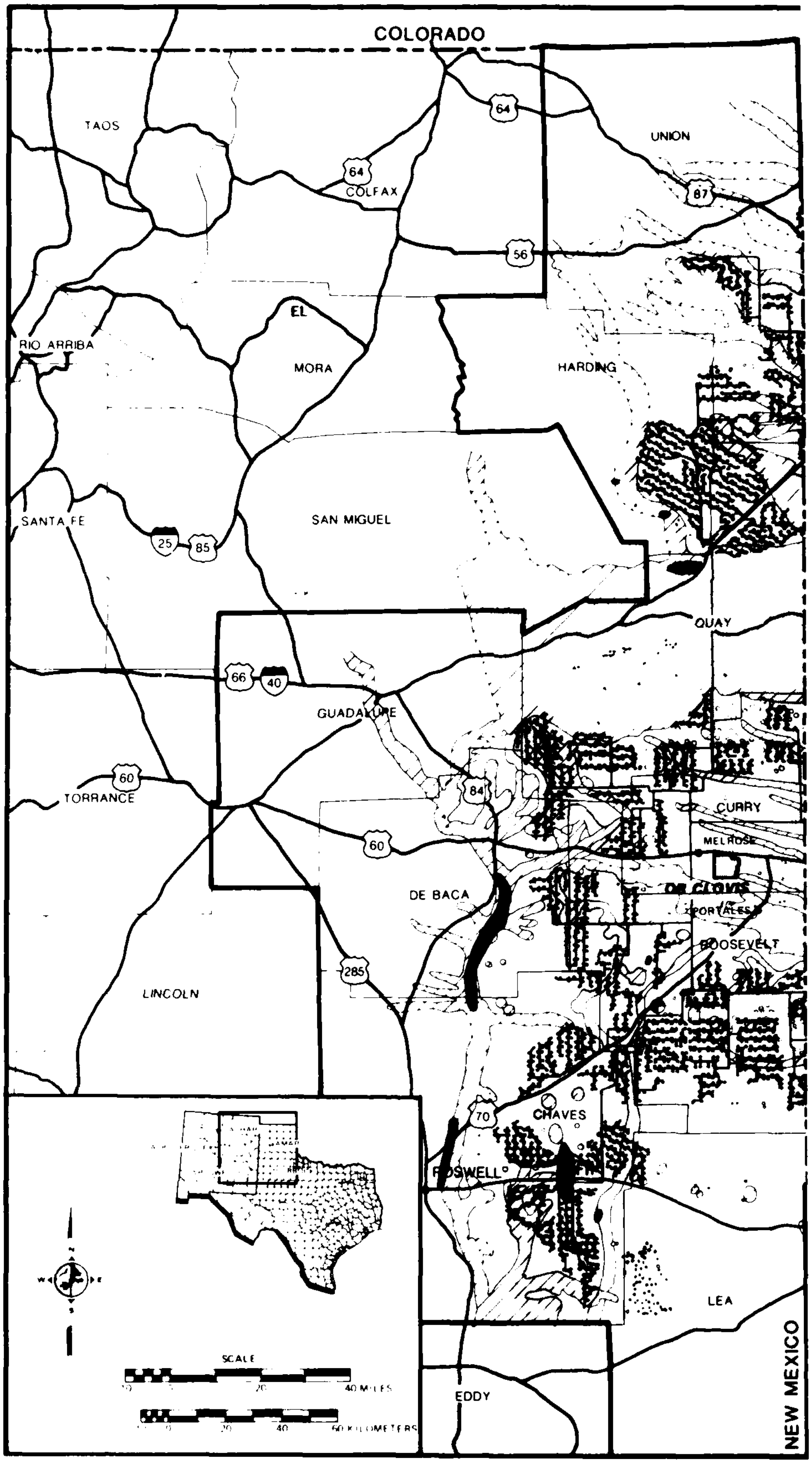

COLORADO
TAOS
UNION
64
COLFAX
87
56
EL
MORA
RIO ARRIBA
HARDING
SANTA FE
SAN MIGUEL
25
85
QUAY
66
40
GUADALUPE
60
TORRANCE
84
CURRY
MELROSE
DE BACA
CLOVIS
PORTALES
ROOSEVELT
285
LINCOLN
70
CHAVES
ROSWELL
LEA
SCALE
40 MILES
60 KILOMETERS
EDDY
NEW MEXICO

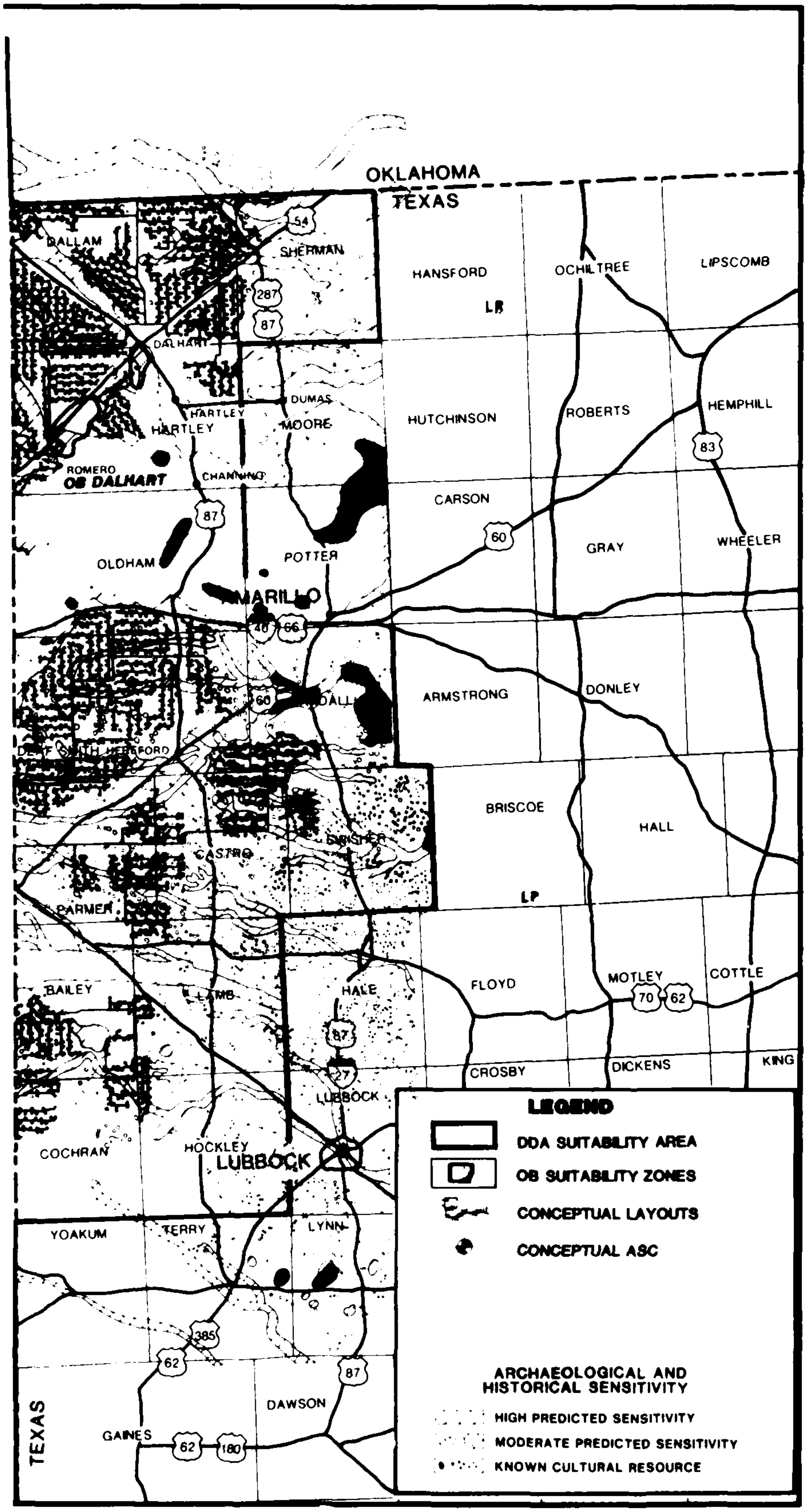

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Figure 3.4.2-1. Relationship between areas of high archaeological sensitivity, Alternative 7.

No other projects currently planned are expected to result in levels of surface disturbance or population growth that would necessitate consideration of their cumulative effects in relation to the M-X project.

DDA Impacts

Archaeological and historical resources frequently occur on, or buried slightly below, the present ground surface. Thus they are highly sensitive to any disturbance of the present ground surface by land modification such as construction of M-X facilities and transportation corridors. While intensive agricultural activities throughout the Texas/New Mexico region have disturbed many surface sites, studies have shown that intra-site integrity is not destroyed. Potential M-X impacts are most likely to occur when project elements are located along undisturbed draws on the Llano Estacado, along the margins of lakes or playas, or along river and stream edges in the Pecos and Canadian river valleys and the Panhandle High Plains. In some of these settings, especially within draws in the Llano Estacado, deeply stratified archaeological deposits are known to occur and may be subject to direct impacts.

Direct impacts to current National Register properties are avoided by the conceptual layout. (It should be noted that although the conceptual layout suggests impacts to the Mescalero Sands Archaeological District, a National Register listing, this is incorrect. The layout is solely conceptual. Should Texas/New Mexico be chosen as a siting region, the District will be totally avoided by the final layout design.) However, indirect impacts to the Landergin Mesa, Rocky Dell and Anderson Basin (Blackwater Draw) National Register Archaeological sites may occur. Many of the known archaeological, historical, and architectural resources clearly have the potential for being eligible for the National Register, and additional field and archival investigations would lend to the identification of many more such properties. Therefore, as a preliminary method of assessing potential impacts to resources that are eligible to the National Register, project disturbance to areas of known and predicted cultural resources sensitivity has been measured. These figures are presented in Table 3.4.2-5, which also summarizes the impact level expected for each county. Counties which show a high potential for disturbance of archaeological and historical resources are: Dallam, Deaf Smith, and Hartley counties in Texas, and Chaves, Curry, Quay and Roosevelt counties in New Mexico.

Operating Base (OB) Impacts

Figures 3.4.2-2 and 3.4.2-3 show the relationship between known and predicted areas of archaeological and historical sensitivity and the OB suitability areas around Clovis, New Mexico and Dalhart, Texas.

Clovis OB Impacts

The proposed Clovis OB would impact ten playa lakes which, based on existing data, have a predicted site density of 3.85 sites per sq mi (excluding isolates). These playas are scattered around the periphery of the proposed base location in such a manner that any single point in the siting area is within 1½ mi of a playa margin. For this reason the density figures for playas are applied to the entire OB siting area without regard for further stratification. This approach results in an estimated 37 sites excluding isolates to be impacted. Additional survey of the siting area has

Table 3.4.2-5. Potential direct impacts to archaeological resources from operating bases (OBs) and designated deployment area (DDA) for Alternatives 7 and 8 in Texas/New Mexico.

County	Total No. Sites	Alternative 7: Direct Impacts No. of Sites[1,2]	Alternative 7: Direct Impact Assessment[2]	Alternative 8: Direct Impacts No. of Sites[1,2]	Alternative 8: Direct Impact Assessment[2]
Counties with M-X Clusters and DTN					
Bailey, Tex.	2,689.1	35.9	*****	3.3	*
Castro, Tex.	2,797.6	39.0	*****	-	-
Cochran, Tex.	821.7	20.4	*	17.5	***
Dallam, Tex.	4,762.4	162.8	*****	61.8	*****
Deaf Smith, Tex.	5,114.3	194.4	*****	79.7	*****
Hartley, Tex.	2,518.6	93.6	*****	59.8	*****
Hockley, Tex.	2,304.2	8.6	*	8.6	*
Lamb, Tex.	2,736.3	5.4	*	.98	*
Oldham, Tex.	2,606.7	19.9	***	8.5	*
Parmer, Tex.	2,249.01	42.9	*****	-	-
Randall, Tex.	4,340.6	17.6	***	-	-
Sherman, Tex.	3,950.9	13.4	***	-	-
Swisher, Tex.	4,935.15	16.7	***	-	-
Chaves, N. Mex.	14,222.4	191.3	*****	191.3	*****
Curry, N. Mex.	2,893.0	65.1	*****	44.0	*****
DeBaca, N. Mex.	2,027.4	22.5	***	22.4	***
Harding, N. Mex.	900.0	13.2	***	13.4	***
Lea, N. Mex.	1,326.4	5.4	*	5.4	*
Quay, N. Mex.	5,609.8	125.4	*****	86.5	*****
Roosevelt, N. Mex.	3,406.8	110.2	*****	37.4	*****
Union, N. Mex.	2,606.5	101.6	*****	76.8	*****
Totals	74,818.9	1,305.3		717.39	

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[1]Isolates not included.

[2]Direct impact assessment:
- `-` = - 10.0
- `*` = 0-10.0
- `***` = 10.1-30
- `*****` = 30.1+

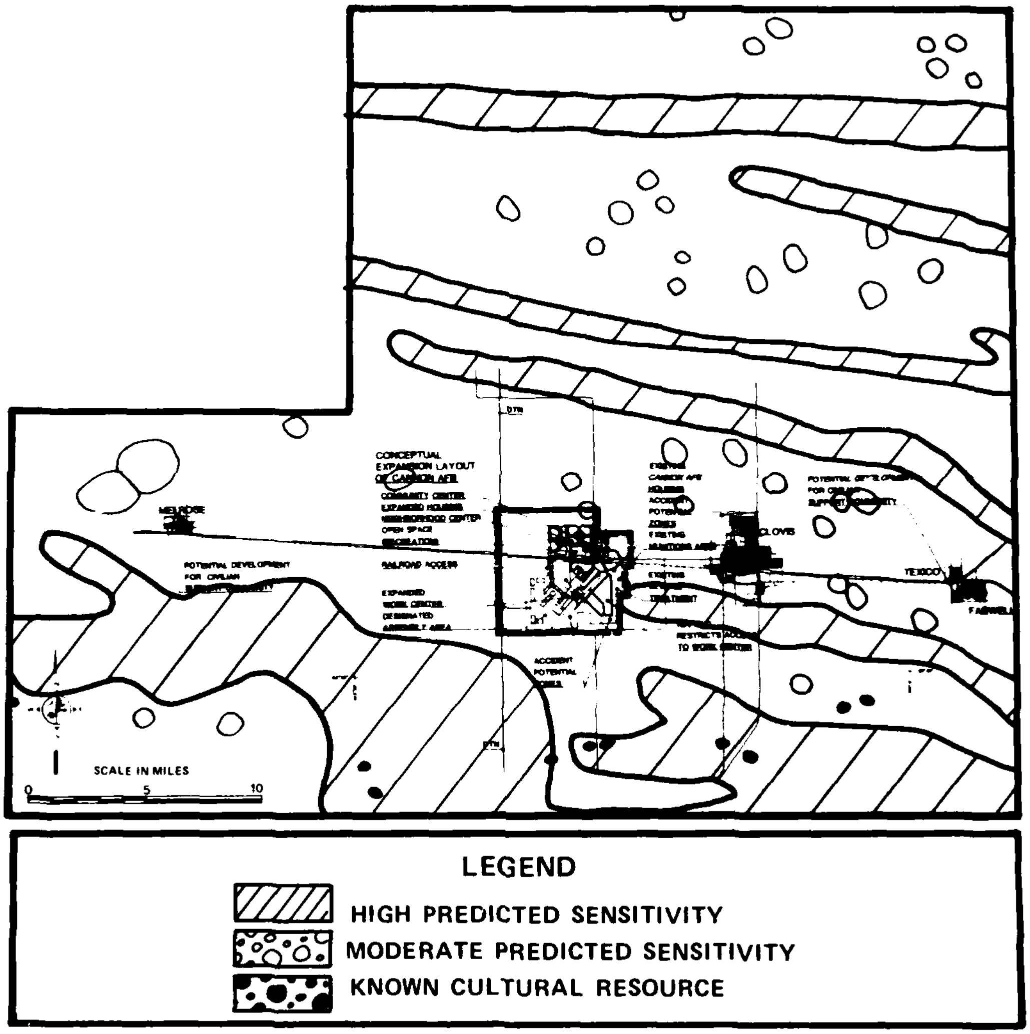

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Figure 3.4.2-2. Areas of potential archaeological and historical sensitivity in the vicinity of Clovis, New Mexico.

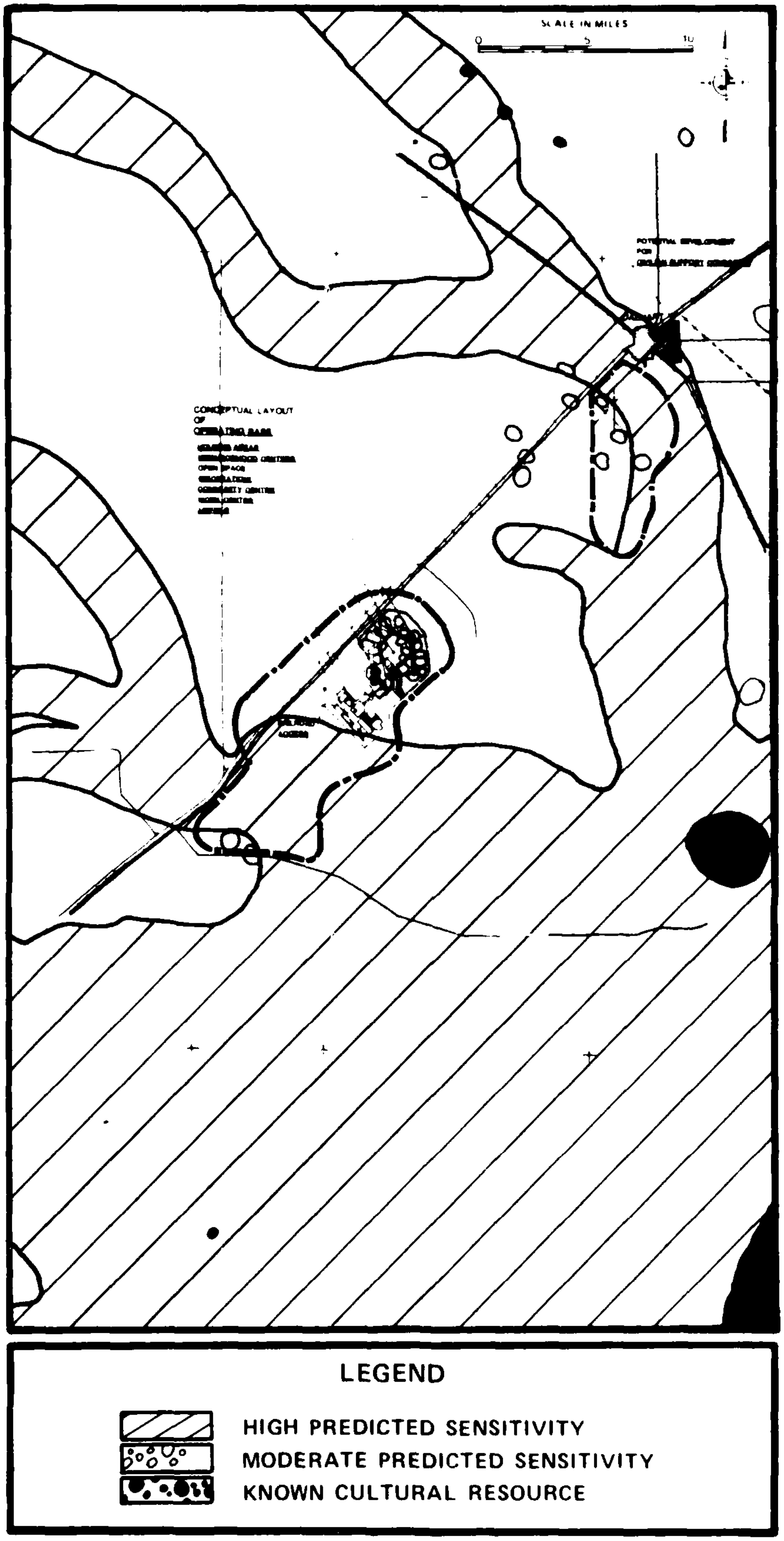


Figure 3.4.2-3. Areas of potential archaeological and historical sensitivity in the vicinity of Dalhart, Texas.

only recently been conducted (EDAW 1981c) and the results indicate that "...approximately twenty-eight prehistoric sites, five historic sites and one hundred and ninety four isolated manifestations can be expected to occur in the 12,000 acres surveyed. In terms of prehistoric sites, the original estimates are significantly lower than the estimates for any other OB. In addition to these potential impacts, a possible ancient tributary of Blackwater Draw, a high sensitivity area, immediately abuts the proposed OB.

The long-term increase in population that will result from siting an OB near Clovis will be a source of indirect impacts to cultural resources in the region. Impacts to significant architectural resources are unlikely to occur at Cannon Air Force Base; however, population increase in Clovis and Portales may cause impacts to resources there. One National Register site, Blackwater Draw/Anderson Basin, is located approximately 5 mi south of the proposed Clovis OB. This site is a privately owned known source of gravel and may be impacted by further quarrying for OB construction.

Mitigation of potential impacts to resources in the construction area could be accomplished by avoidance and preservation. However, there is little room for redesign of the Clovis OB. If resources cannot be avoided, a comprehensive program of data collection and analysis would be required. Impacts to architectural resources in Clovis and Portales may be mitigated by community preservation of significant structures.

Dalhart OB Impacts

In the northern preferred construction area there are two large playas which would be impacted by OB construction. Playas have a moderate sensitivity for archaeological and historical resources. The southern preferred construction area infringes upon the Punta de Agua Creek, an area with predicted high and moderate sensitivity.

The southern portion of the suitability zone impacts the headwater of Romero Spring Creek and a playa, with high and moderate sensitivity areas, respectively. However, the actual OB siting area is located in open plains with a predicted site density of 0.23 sites per sq mi. This density figure yields an estimated two sites, excluding isolates, that could be impacted. However, if the data were available consideration of isolated artifacts, as in the case of the Clovis OB discussed above, could yield a significantly higher figure for the Dalhart OB. In any case, the Dalhart OB as sited is likely to directly impact the smallest number of sites of any other OB location. The area on the west side of Highway 54 is apparently free of predicted areas of archaeological and historical sensitivity. Potential direct impacts are summarized in Table 3.4.2-1. Anticipated extensions of the airfield impact a moderately sensitive area around a playa. Similar areas are scattered through the southern part of the suitability zone. Its eastern edge passes through highly and moderately sensitive areas along Rita Blanca Creek.

Indirect adverse impacts to architectural resources are expected to occur in the town of Middle Water and Dalhart. Population increase in the Dalhart area will result in indirect impacts to cultural resources in the area, particularly along Rita Blanca and Punta de Agua Creeks. One National Register site, Landergin Mesa, may also be subject to indirect impacts.

Mitigation of direct impacts can be accomplished in a similar manner to those at the Clovis OB. The close proximity of Punta de Agua Creek to the construction area renders its resources sensitive to short- and long-term indirect impacts. Data recovery may be required to prevent this. Impacts to architectural resources may be mitigated by preservation, restoration, rehabilitation, adaptive reuse, design of new buildings in accordance with existing styles, and so on.

Alternative 8

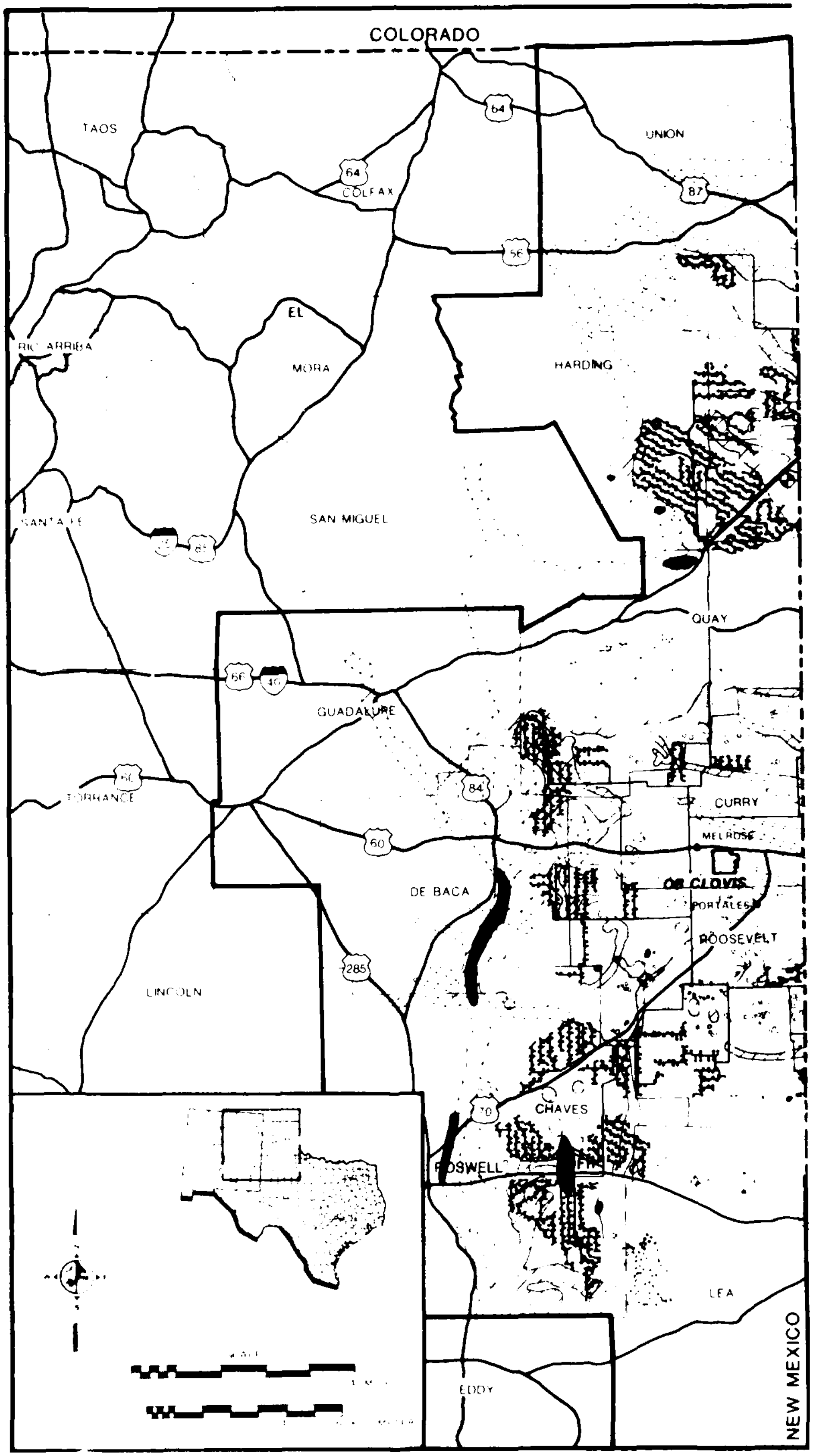
DDA Impacts

Figure 3.4.2-4 shows the relationship between known and predicted sensitive areas for cultural resources and the conceptual project configuration where the DDA is split between the Nevada/Utah and Texas/New Mexico regions.

Construction of half of the M-X system in each of the potential siting regions would result in somewhat greater total surface disturbance, and consequently impact more sites. Direct impacts in Texas/New Mexico are estimated to be 64 percent of the full basing Alternative 7. This alternative reduces impacts on the Llano Estacado in Texas, particularly to the archaeologically sensitive draws in that area. Highly sensitive areas near streams and rivers, and the caprock escarpment, hwoever, are still impacted heavily. Indirect impacts to historic and architectural resources are expected, but because of the reduced geographic extent, the smaller area of disturbance in each region compared to full basing, and the lower percentage of population increase. Thus,the magnitude of the indirect impacts to historic properties would not be significantly reduced. Predicted direct impacts to archaeologically and historically sensitive areas are summarized in Table 3.4.2-1. Reduction of project scale can increase the likelihood that an effective mitigation program can be planned and implemented.

Operating Base (OB) Impacts

Impacts from construction of an operating base at Coyote Spring are the same as those discussed for the Proposed Action. Impacts for an OB at Clovis are similar to those discussed under Alternative 7.



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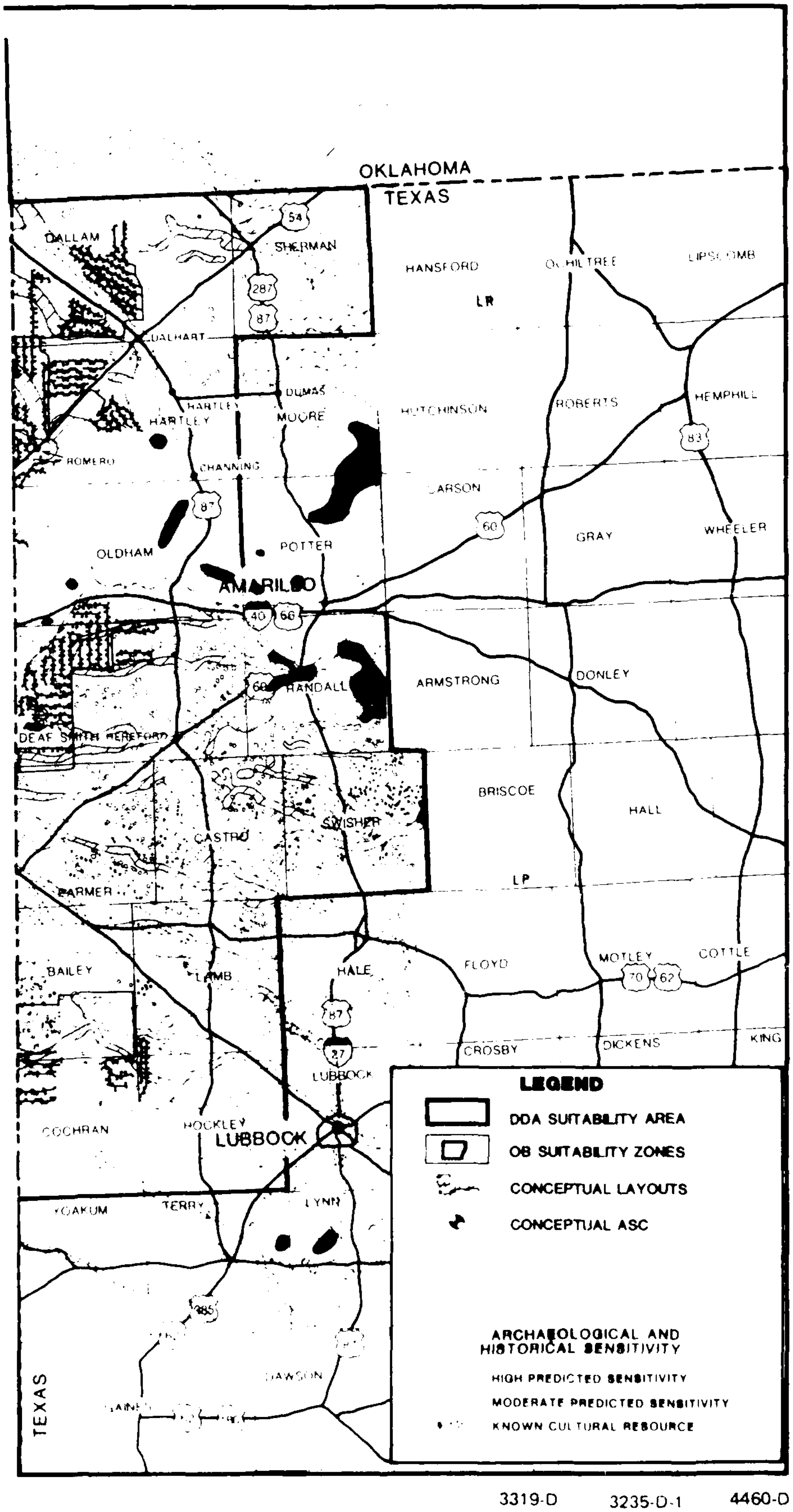

Figure 2.1.2-1. Relationship between known and predicted sensitivity areas for cultural resources and the conceptual project configuration where the DDA is split between the Nevada/Utah and Texas/New Mexico regions.

4.0 MITIGATIONS

4.1 AIR FORCE PROGRAMS

The Air Force will establish a cultural resources program in conformance with the Programatic Memorandum of Agreement (PMOS) and consistent with large government programs. The PMOA was established among the Air Force, the Bureau of Land Management (BLM) and the Advisory Council on Historic Preservation in order to protect/recover historical/cultural resources, including paleontological, through approved procedures. The full text of the PMOA is contained in Appendix A.

In accordance with the PMOA, the M-X Cultural Resource Management Program will be developed by the Air Force and COE specifically for the project in consultation with SHPO's, Advisory Council on Historic Preservation, BLM, and, where appropriate, Native Americans.

4.2 OTHER MITIGATIONS UNDER CONSIDERATION

Cultural resources are evaluated for their potential to establish reliable facts and generalizations about human behavior, particularly explanations of variability and change in societies and cultures. Generalizations and explanations require controlled comparison of relevant data concerning past human life. This includes such things as artifacts, settlements, food remains, and evidence for past environments. Scientific significance depends on the degree to which archeological resources in the project or program area contain data appropriate for answer various substantive, technical, methodological, or theoretical questions. The value of these data could best be determined in the regional context of the project or program and in relation to general antrhopological problems.

Cultural resources are also evaluated in terms of those values consisting of the direct and indirect ways in which society at large benefits from study and preservation of cultural resources. Benefits which could be described and included are: (1) the acquisition of knowledge concerning man's past and its potential use, (2) the acquisition and preservation of objects, sites, structures, etc. for public education and enjoyment, (3) education and economic benefits from archeological exhibits, and (4) practical applications of scientific findings acquired through archeological investigations.

In addition, sites of cultural significance to Native Americans are assessed for their secular or sacred value.

A regional research design is being developed by the Air Force which can provide a context within which to evaluate the scientific significance of cultural resources that will be directly and indirectly impcted by project implementation. Other studies, such as Native American regional surveys, provide essential information for assessing the cultural significance of these resources. Thus, when preconstruction studies are implemented, the cultural resources encountered will be assessed as to their National Register eligibility under the procedures outlined in the PMOA Management Plan being prepared by the Air Force.

Mitigation programs for M-X cultural resource studies should logically be designed according to whether the impacts being mitigated are direct or indirect, as each results from very different activities.

Direct Effects

A Cultural Resources Mitigation Program dealing with direct impacts would typically include:

(1) Conduct inventory of cultural resources, evaluate for significance, determine impacts, and coordinate with appropriate agencies.

(2) Avoid impacts to significant cultural resources through redesign where feasible.

(3) Develop a Memorandum of Understanding (MOU) regarding Native American involvement and operationalization of Native American concerns.

(4) Perform data recovery when resources cannot be avoided and have scientific value.

(5) Relocate resources which cannot be avoided and for which data recovery will not mitigate impact.

(6) Protect resources from indirect impacts.

(7) Develop educational and interpretive programs for M-X employees and the general public designed to aid cultural resource preservation.

(8) Monitor construction activity at select and sensitive areas (e.g., areas with potential for buried deposits).

The adverse effect of land alteration (e.g., ground scarification and earth movement) is associated with construction activities; such activities compromise site integrity and results in a reduction of scientific and cultural information. After sites are located by intensive survey they may be avoided by project design. Otherwise, it could be necessary to implement data recovery programs according to guidelines developed under the PMOA (see appendix A II.C).

The research design being developed by the Air Force can provide a regional context for assessing specific criteria for determinations of National Register eligibility and data recovery methodology guidelines. A Cultural Resource Manager with authority to make decisions could be located in each pertinent agency office. Mobile data recovery teams, with back-up lab (including flotation capabilites), analysis, and report personnel and facilities could be available to the managers. This program results in minimal adverse effect on cultural and historic properties and the timely, cost effective completion of the M-X project. In their review of the DEIS the State of Nevada expressed concern about arrangements for the curation of artiface collections and documentations obtained during M-X cultural resource mitigation programs:

"At this time it is urgent to develop specific plans to prepare for the proper curation and interpretive display of M-X-generated archeological and historical collections."

Indirect Effects

Programs for mitigating indirect effects generally consider environmental awareness education programs for the public as an approach to reducing incidental collecting in the course of more common recreational activities such as hunting hiking, wood collecting and cutting for home fuel use, and camping. However, no data exist which suggest that such programs may be effective.

Mitigation of incidental and intentional collecting of artifacts can be partially addressed with educational programs and greater policing efforts. On federal land it is illegal, but no legislation adequately protects cultural resources on private land. Possibly greater policing efforts could reduce such impacts where sanctions are enforceable, but no such effort is possible on private lands.

Through cooperation with existing local organizations, a recreation/education program could be developed for interested workers and their families, including slide shows, interpretive exhibits, demonstrations of Native American Crafts, and tours of protected sites. Interpretive programs could be developed for specific audiences, (e.g., school children, Native Americans, temporary workers). All this would be designed to increase sensitivity to preservation. Again, however, no data suggest that educational programs result in significant reductions in indirect impacts. Fences, signs, and barricades are additional methods which can potentially reduce indirect impacts.

If feasible, it may be justifiable to implement data recovery programs at sites predicted to be disturbed or destroyed as a result of M-X-induced population growth and recreation. The data recovery program should be designed according to guidelines developed under PMOA (Appendix A) and as described above for direct impacts.

Probably the most destructive source of indirect impacts to cultural resources results from uncontrolled ORV recreation (e.g. motocross) and ORV use associated with other recreational activities (e.g., hunting, wood collecting). These activities can be mitigated most appropriately by prohibiting access to sensitive areas or by designating off-road vehicle parks which have been subjected to appropriate review and mitigation.

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

APPENDIX A

PROGRAMMATIC MEMORANDUM OF AGREEMENT

WHEREAS, the U.S. Air Force, Department of Defense, proposes to deploy the M-X System (undertaking) within the States of Nevada, New Mexico, Texas, and/or Utah; and,

WHEREAS, the M-X System may be deployed on land managed by the Bureau of Land Management (BLM), and BLM and the Air Force have management responsibilities with regard to historic properties pursuant to Executive Order 11593, and the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320); and,

WHEREAS, the Air Force has assumed lead agency status and primary responsibility for compliance with the historic preservation statutes and regulations referenced herein on behalf of both itself and BLM; and,

WHEREAS, the Air Force, in consultation with the State Historic Preservation Officers (SHPOs), has determined that the proposed undertaking could have effects upon historic and cultural properties included in or eligible for inclusion in the National Register of Historic Places (Register); and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966, Section 2(b) of Executive Order 11593, and Section 800.4 of the regulations of the Advisory Council on Historic Preservation (Council), "Protection of Historic and Cultural Properties" (36 CFR Part 800), the Air Force has requested the comments of the Council; and,

WHEREAS, pursuant to 36 CFR Sec. 800.8(a) of the Council's regulations, the Air Force has requested development of a Programmatic Memorandum of Agreement (Agreement); and,

WHEREAS, the Air Force, the Council, BLM, and the SHPOs of Nevada, New Mexico, Texas, and Utah have consulted and will continue to consult and review the undertaking to consider feasible and prudent alternatives to avoid, minimize, or satisfactorily mitigate adverse effects,

NOW, THEREFORE, it is mutually agreed that implementation of the undertaking in accordance with the following stipulations will avoid or satisfactorily mitigate its adverse effects on historic and cultural properties.

Stipulations

The Air Force will insure that the following measures are carried out.

I. General

A. The Air Force will establish a Review Committee to assist in oversight of all historic preservation related M-X activities to insure that such activities meet high standards of professional methodology. The committee will report to the Executive Director of the Council and to the Air Force, and will act and be funded in accordance with Attachment 1.

B. The Air Force will afford the appropriate SHPOs, and the State offices of BLM, opportunity to review and comment on all scopes of work, and significant revisions of such scopes, relating to historic preservation; and the opportunity to review and comment on the historic preservation reports or products generated under this Agreement. Informational copies of these documents will be provided to the Council.

C. The Air Force will provide data generated under this Agreement to the appropriate SHPOs and State offices of BLM.

D. The Air Force, in consultation with appropriate SHPOs, will notify the public of intended significant actions under this Agreement, will provide timely notice to news media, and will afford the public the opportunity to comment to the Air Force, the SHPOs, or the Council regarding these actions.

E. The Air Force, in consultation with the appropriate SHPOs, will ensure that all historic preservation activities are carried out by or under the supervision of, qualified persons as prescribed in 36 CFR Sec. 1201.5.

F. The Air Force will ensure that all stipulations of this Agreement are met by its contractors as well as by all participating units of the Air Force.

G. The Air Force, in consultation with the appropriate SHPOs, will ensure that its contractors and Air Force personnel and resident dependents are advised against illegal collection of historic and prehistoric materials, will encourage those with interests in such materials to participate in nondestructive activities, and will cooperate with BLM to insure enforcement of the Archeological Resources Protection Act of 1979.

H. Pursuant to 36 CFR Sec. 800.8 of the Council's regulations, the Air Force will submit an annual report to the Council, the SHPOs, and to Interagency Archeological Services (Heritage Conservation and Recreation Service, Department of the Interior) on all actions taken pursuant to this Agreement.

I. The Air Force will provide data to assist the SHPO's in identifying and documenting the budgetary and staff impacts arising from this undertaking.

II. <u>Identifying and Mitigating Adverse Effects of Construction and Operation</u>

A. In consultation with BLM and the appropriate SHPOs, and in accordance with the guidelines in Attachment II, the Air Force will locate and identify historic properties in the potential impact area, determine their significance, and assess the undertaking's impact upon them by:

1. development of an initial study plan, including but not limited to:

(a) definition of preliminary study goals

(b) establishment of study methods

(c) indication of predicted types of historic and cultural properties

(d) establishment of study team composition

(e) establishment of programs for data storage, management, and use which are, to the extent feasible, compatible with existing State and BLM systems,

(f) development of a calendar of tasks (see Attachment II);

2. conducting preliminary studies based on the study plan, including background data and field inspection of sample areas during initial environmental analyses of the potential impact areas, to predict where adverse effects upon historic and cultural properties are likely to occur;

3. development and implementation of a plan for intensive field survey of all locations where adverse effects upon historic and cultural properties are likely to occur in the vicinity of potential MX permanent and temporary facilities such as base sites, access and utility corridors, borrow sources, and other MX support facilities. This plan will include:

(a) description of historic and cultural property types expected

(b) predicted distributions of historic and cultural properties

(c) study questions to be addressed

(d) study methods; including methods of field inspection, testing, and analysis

(e) study team composition

(f) data storage and management program.

B. Where prudent and feasible, in consultation with the SHPOs and BLM, the Air Force will avoid adverse effects on historic and cultural properties through design of M-X facilities, by relocation of existing facilities, or by other means.

C. In consultation with the SHPOs and BLM, the Air Force will develop guidelines for documentation or data recovery from historic and cultural properties that cannot be avoided or protected. The guidelines will take into account:

1. the data generated by the preliminary and intensive studies

2. the concerns of local communities and social and ethnic groups

3. the Native American Religious Freedom Act

4. 36 CFR Part 66 and its appendices published by the Department of the Interior on January 28, 1978 (42 FR 5374-82)

5. the standards of the Society of Professional Archeologists

6. other applicable Federal regulations, standards, and guidelines.

D. The Air Force will in a timely manner deliver copies of the initial study plans (II.A.1) and guidelines for data recovery (II.C) to the Review Committee, the State BLM offices, and the appropriate SHPO and afford them 15 working days after receipt, to review them. The Review Committee, SHPO, and BLM will provide written notice of receipt and indicate their objections, if any, within 15 working days. Should the Review Committee, SHPO, or BLM object, the Air Force will arrange a meeting to resolve differences before proceeding with the action to which the Review Committee, SHPO, or BLM has objected. If the differences cannot be resolved, the Air Force will take the comments to the Committee, SHPO, and BLM into account in deciding whether to and how to proceed.

E. When it is not prudent or feasible to avoid adverse effects upon a historic or cultural property, the Air Force will follow 36 CFR Part 1204 to determine whether the property is eligible for inclusion in the Register, and consult with the appropriate SHPO and BLM as appropriate, ard,

1. if the affected property meets criteria for listing in the Register primarily because it may yield information important in prehistory or history, the Air Force will institute a documentation or data recovery program in accordance with the Guidelines established under Stipulation II.C. Prior to initiating any documentation or data recovery program, the Air Force will notify the Review Committee, BLM, SHPOs, and any concerned local communities, or social and ethnic groups. Should an objection be raised, the Air Force will consult with the objecting party to resolve the objection. If no agreement can be reached among the Air Force, the SHPO, and BLM on the documentation or data recovery program, the Air Force will request the comments of the Council pursuant to 36 CFR Sec. 800.6;

2. if the affected property is determined eligible for listing in the Register for reasons other than, or in addition to, its information potential, the Air Force will consult with the appropriate SHPO to determine the nature of the undertaking's effect on the property and, pursuant to 36 CFR Sec. 800.4(d), request Council comments.

F. Pursuant to the American Indian Religious Freedom Act of 1978 (P.L. 95-341), the Air Force will consult with groups that have cultural ties to the study area in order to identify locations and issues of concern to them and to work with these groups and the parties to this Agreement in resolving conflicts. The Air Force will take the concerns of these groups into consideration during the design and construction of the undertaking, and during implementation of this Agreement.

G. During the implementation of any portion of the undertaking, should previously unknown historic or cultural properties be discovered, the Air Force will comply with 36 CFR Sec. 800.7 and/or the data recovery guidelines developed under paragraph C above.

H. Before M-X construction is complete, the Air Force will consult with the SHPOs and the BLM to establish preservation mechanisms to accompany operation and maintenance of the facilities. Operation and maintenance will also be covered under this Agreement.

III. The Air Force and the Council will work together as members of the Economic Adjustment Committee in an effort to ensure that Federal Government activities to accommodate population and infrastructure growth resulting from M-X deployment are sensitive to the historic and cultural values of the deployment areas. The parties agree in principle that the Federal Government should assist affected States and communities in the development and implementation of programs that will contribute to protection of the historic and cultural character of communities subject to short-or-long term growth as the direct or indirect results of the undertaking. Such programs should be commensurate in scope with the level of projected impact of the undertaking on each affected community, and include but not be limited to:

A. identification of districts, sites, buildings, structures, and objects included in or eligible for inclusion in the Register within each community;

B. development and implementation of measures to minimize destruction and maximize preservation and reuse of historic sites, buildings, structures, districts, and objects in Federal construction and assistance projects within each affected community;

C. establishment of design guidelines to make new construction as compatible as possible with the historic environment of each community; and,

E. establishment of measures to foster successful integration of new facilities into the existing cultural and architectural fabric of each community.

IV. Avoiding Inadvertent Damage During Pre-Construction Studies

A. The Air Force will ensure that proper coordination occurs between its personnel and contractors responsible for historic preservation and its personnel and contractors responsible for environmental, geological, engineering, and other studies, to minimize the danger posed to historic properties by geological testing, survey teams, and other activities and personnel. Intensive surveys will be conducted in advance of any land-modifying activity. Geological test sites and other locations of land-modifying activity will be designed to avoid damage to historic properties.

B. If test excavations are necessary to obtain data needed for the evaluation of historic properties under Stipulations II.A.2 and II.A.3 above, the excavations will not be allowed to exceed the scope necessary for basic evaluation, will not utilize mechanized equipment without the approval of the appropriate SHPO and BLM, and will be carried out in accordance with strict archeological controls.

V. Definitions

As used in this Agreement:

A. Air Force means the U.S. Air Force acting by itself or through agents or contractors.

B. Historic and Cultural Properties means properties included in or likely to meet the criteria for inclusion in the National Register of Historic Places.

C. Historic preservation includes, but is not limited to, the identification, evaluation, protection, rehabilitation, reuse, recording of, and salvage of historic properties.

D. Potential Impact Area means the area in which the undertaking may reasonably be thought to have potential positive or adverse, direct or indirect effects upon historic properties.

Aug 29, 1980 (date)
Executive Director
Advisory Council on Historic Preservation

3 OCT 1980
(date)
U.S. Air Force

Feb 5, 1981
(date)
Bureau of Land Management

(date)
Nevada State Historic Preservation Officer

(date) 5-6-81
Texas State Historic Preservation Officer

(date) 4-13-81
Utah State Historic Preservation Officer

(date)
New Mexico State Historic Preservation Officer

(date) 6-5-81
Chairman
Advisory Council on Historic Preservation

ATTACHMENT 1

Review Committee Guidelines

A. Responsibilities

1. To monitor progress of the M-X Historic Preservation Program and advise the Air Force and Council of any actions needed to ensure maintenance of high professional standards.

2. To review guidelines, scopes of work, research designs, survey reports, and other documents developed by the Air Force and to advise the Air Force and the Council of any changes appropriate to ensure maintenance of high professional standards.

3. To assist in the resolution of disputes that may arise over the quality or appropriateness of particular historic preservation related activities, or of the M-X Historic Preservation Program in general.

B. Organization:

1. Membership will consist of:

   a. the Executive Director of the Council and the Secretary of the Air Force or their designees, who will co-chair the committee;

   b. the Director of BLM or his designee;

   c. the following non-Federal members who will be appointed by the Executive Director and the Secretary of the Air Force:

      1) one professional archeologist knowledgeable in the archeology of each general basing region (e.g., Texas, New Mexico, Utah/Nevada)

      2) one professional historian, preferably one with a knowledge of architectural history who is also knowledgeable in the history of each general basing region

      4) other members as the Secretary of the Air Force and Executive Director may determine to be necessary.

2. Procedures:

   a. the committee will meet at the call of the co-chairmen;

   b. the committee may assign tasks to subcommittees or individual members;

   c. the Air Force will provide staff support; and,

d. the committee will forward any meeting announcements, minutes, and other documents afforded to committee members to the SHPOs.

3. Funding: The Air Force will fund:

a. costs of travel and per diem;

b. stipend not to exceed $100 per day for non-Federal committee members engaged in committee business;

c. postage and telephone.

ATTACHMENT 2

Guidelines: Calendar of Tasks

Task I.

A. Initial study plan (II.A.1)

B. Establish review committee (I.A.;Atch.1)

Task II.

A. Conduct preliminary studies (II.A.2)

B. Develop plan for intensive field survey (II.A.3)

C. Develop guidelines for documentation and data recovery (II.C)

Task III.

A. Conduct intensive field survey (II.A.3)

B. Redesign to avoid historic properties where feasible and prudent (II.B)

Task IV.

A. Determine eligibility and effect, and mitigate adverse effects (II.E).

Consultation occurs, and comments are considered, at the beginning and completion of each task.

APPENDIX B
HISTORICAL AND ARCHITECTURAL PROPERTIES, TRANSPORTATION ROUTES, AND RAILROADS IN THE NEVADA/UTAH STUDY AREA

The following lists are divided by state and county. Within the county each entry is listed alphabetically by each known alias (aka). Every entry was assigned a major name, to which, each alias is referenced.

CHURCHILL COUNTY

SITE NAME	SITE NUMBER
Carson Sink (aka Sink of the Carson; Sink Station; Stillwater)	H-361
Castle Rock (aka New Pass Station West)	H-570
Cold Springs Station of 1858 - 1860	H-368
Cold Springs Station of 1861 (aka Rock Creek)	H-379
Cold Springs Telegraph Station	H-594
Edwards Creek	H-369
Fairview	H-366
Fallon	H-592
Hazen	H-590
Laeterville (aka Ragtown)	H-591
Middlegate (aka Middle Creek)	H-367
Mountain Well (aka Sand Springs)	H-364
New Pass	H-484
New Pass Station East	H-573
New Pass Station West (aka Castle Rock; Overton)	H-570
Overton (aka New Pass Station West)	H-570
Ragtown (aka Laeterville)	H-591
Rock Creek (aka Cold Springs Station of 1861)	H-379
Saint Clair	H-793
Sand Springs (aka Mountain Well)	H-364
Sink of the Carson (aka Carson Sink)	H-361
Sink Station (aka Carson Sink)	H-361
Stillwater (aka Carson Sink)	H-361
Toy	H-659
U.S. Naval Ammunition Depot	H-596
Wadsworth	H-983

CLARK COUNTY

SITE NAME	SITE NUMBER
Action Railroad Siding	H-864
Adda and Edith Zinc Claims	H-1043
Allen, George - House	H-522
Amber Mountain (aka Angel Peak)	H-1073
Amber Railroad Siding	H-965
American Borax Company Mines	H-1088
Angel Peak (aka Amber Mountain)	H-1073
Apex Railroad Siding	H-963
Arrow Canyon Dam	H-925
Arrowhead (aka Arrowhead Spur)	H-891
Arrowhead Spur (aka Arrowhead)	H-891
Arrowhead Railroad Siding	H-962
Asara Ranch	H-1016
Baldwin Ranch	H-987
Baldwin Ranch	H-989
Barn	H-894
Bauer	H-42
Big Cliff Salt Mine	H-1028
Big Thing Mine (aka Ole Mine)	H-1097
Bitter Springs	H-935
Black Canyon	H-721
Black Salt Mine	H-1091
Bleak, Mark - Ranch	H-1000
Blodell Homestead	H-988
Blue Diamond	H-975
Blue Point Spring	H-1055
Bonelli's Ferry (aka Junction City)	H-716
Bonelli Salt Mine	H-930
Boulder Canyon (aka Hoover Dam)	H-724
Boulder City (aka Boulder Junction)	H-718
Boulder Dam (aka Hoover Dam)	H-724
Boulder Junction (aka Boulder City)	H-718
Bowman Reservoir	H-929
Bringhurst, New Mexico (aka Las Vegas Mormon Fort)	H-149
Brown's House	H-861
Buck's Spring	H-1063
Buffington Pockets	H-1046
Bunkerville	H-584
Bureau of Reclamation Testing Laboratory (aka Las Vegas Mormon Fort)	H-149
Byron	H-883
Cadalapa Ranch	H-1015
Calico Salt Mine	H-1029
California Crossing (aka Old California Crossing)	H-889
Call's Landing (aka Callville)	H-130
Callville (aka Call's Landing; Old Callville)	H-130

SITE NAME	SITE NUMBER
Camp Eldorado	H-515
Camp Vida	H-1007
Cane Springs Ranch	H-723
Cane Spring	H-961
Cemetary	H-880
Chloride	H-973
Clark's Sawmill	H-1020
Clark's Sawmill	H-1038
Coburn's Warm Springs (aka Muddy Springs)	H-866
Cold Creek Field Station	H-1041
Cold Creek Ranch	H-1019
Cold Springs	H-928
Colorick Quarry	H-1047
Copper City	H-720
Copper King Mining District	H-1008
Corn Creek	H-702
Corn Creek Railroad Siding	H-858
Corn Creek Well	H-1022
Cotton Gin and Flour Mill	H-854
Cottonwood Spring	H-951
Cottonwood Springs Ranch	H-1005
Crystal Railroad Siding	H-1014
Crystal Springs	H-954
Darling Ranch North	H-877
Darling Ranch South	H-878
Deek Creek Spring	H-1103
Dike Railroad Siding	H-1084
Doty Homestead	H-984
Dry Lake Railroad Siding	H-855
Dry Lake Reservoir	H-921
Dugout Ranch	H-1077
Dugout Ranch	H-1106
East Las Vegas (aka Whitney)	H-737
Elderberry Springs (aka Willow Springs)	H-957
El Dorado Canyon	H-937
El Dorado Ferry	H-940
Etna Cement and Plaster Company	H-1004
Fairview Salt Mine	H-1094
Farrier Railroad Siding	H-852
Flickerville	H-879
Flin's House and Ranch	H-1056
Forlorn Hope Springs	H-941
Fort Baker (aka Las Vegas Mormon Fort)	H-149
Fox's Mine	H-1052
Fryes Camp	H-1108
Garnett Railroad Siding	H-960
Gass Ranch (aka Las Vegas Mormon Fort)	H-149
Gass Spring	H-1030
Gaubler House	H-1087
Gentry Ranch	H-1031

SITE NAME	SITE NUMBER
Glassand Railroad Siding	H-967
Glendale	H-577
Gold Butte	H-1058
Gold Butte	H-719
Gold Butte Mine	H-1059
Good Springs (aka Goode Springs)	H-947
Goode Springs (aka Good Springs)	H-947
Grapevine Spring	H-917
Great Eastern Mine	H-1009
Gregg's Ferry (aka Scanlon Ferry)	H-976
Griffith Mine	H-1068
Griffith Resort	H-1074
Grist Mill	H-976
Harlands Well	H-946
Henderson	H-738
Hidden Forest	H-885
High Springs (aka Home Ranch Springs)	H-862
Hogan Spring	H-881
Home Ranch (aka Home Ranch Springs)	H-862
Home Ranch Springs (aka High Springs; Home Ranch)	H-862
Hoover Dam (aka Boulder Canyon Project; Boulder Dam)	H-724
Hornet Springs	H-1062
Hornet Springs (aka Wheeler Springs; Wheeler Well)	H-958
Horse Spring	H-934
Horse Spring Mine	H-1064
Hug Home	H-1045
Huntsman Ranch	H-995
Hupton (aka Huppton)	H-942
Huppton (aka Hupton)	H-942
Indian Forts	H-863
Indian Springs	H-599
Indian Springs Ranch	H-1011
Indian Springs Resort	H-1012
Jackman Siding (aka Jackson Siding)	H-998
Jackson Siding (aka Jackman Siding)	H-998
Jacob's Ranch	H-1023
Jonah Spring	H-939
Juanita Springs	H-1006
Junction City (aka Old Bonelli Ferry; Rioville; Stone Ferry)	H-716
June Bug Mine	H-1104
Kaiser Livestock Company	H-1042
Kaolin	H-711
Key West Mine	H-717
Kiel Spring	H-1070
Kyle's Cabin	H-1071
Kyle Sawmill	H-1072
Lake Mead	H-586

SITE NAME	SITE NUMBER
Last Chance Salt Mine	H-1093
Las Vegas (aka Las Vegas Mormon Fort)	H-149
Las Vegas Mission (aka Las Vegas Mormon Fort)	H-149
Las Vegas Mormon Fort (aka Bringhurst, New Mexico; Bureau of Reclamation Testing Laboratory; Fort Baker; Gass Ranch; Las Vegas; Las Vegas Mission; Las Vegas Ranch; Las Vegas Rancho; Stewart Ranch)	H-149
Las Vegas Ranch (aka Las Vegas Mormon Fort)	H-149
Lavarey Ranch	H-1039
Lead King Mine	H-1086
Lee Canyon Sawmill	H-740
Lincoln Mine	H-1060
Logan (aka St. Joseph)	H-146
Logandale (aka St. Joseph)	H-146
Logan Experimental Farms	H-1001
Logan's Ranch (aka St. Joseph)	H-146
Lost City	H-1018
Lost Sheep Mining Camp	H-1075
Los Vegas Rancho (aka Las Vegas Mormon Fort)	H-149
Lucky Boy Salt Mine	H-1051
Lucky Boy Salt Mine	H-1092
Lucky Strike Mine	H-1044
Lucky Strike Mine	H-1076
Lucky Strike Mine	H-1097
Marsh Ranch	H-1037
Martin's McKay, Rolin - Homestead	H-985
Mead Lake Railroad Siding	H-968
Meadow Valley Wash	H-725
Mesquite	H-726
Mill Point (aka St. Joseph)	H-146
Mill Point (aka Simonsville)	H-699
Miners Spring (aka Trough Springs)	H-956
Miners Spring	H-938
Moapa	H-127
Moapa Fruit Lands Co. Land	H-1002
Moapa Indian Reservation	H-727
Moapa Indian Reservation Agent's House	
Mormon Well	H-884
Mormon Well Corral	H-741
Mountain Springs	H-952
Muddy River Bridge	H-742
Muddy Springs (aka Coburn's Warm Springs)	H-866
Mud Springs	H-1032
Mud Well	H-1033
Mule Springs	H-955
Muller Ranch	H-1105
Mullin House	H-1050
McClanahan Springs	H-1096

SITE NAME	SITE NUMBER
McFarland's Homestead House	H-897
McGiff Ranch	H-1080
McKay-Rolin Homestead	H-985
McWilliams Campground	H-1065
McWilliams Ranch	H-1066
Narrow's Dam	H-856
New St. Joseph Fort (aka St. Joseph Fort)	H-705
Old Bonelli Ferry (aka Junction City)	H-716
Old California Crossing (aka California Crossing)	H-889
Old Callville (aka Callville)	H-130
Old Overton (aka Simonsville)	H-699
Ole Mine (aka Big Thing Mine)	H-1097
Overton (aka Patterson Ranch; St. Joseph)	H-145
Owens	H-703
Patterson Ranch (aka Overton)	H-145
Pete West Waterwheel	H-743
Pickett Ranch (aka West Point)	H-698
Potosi	H-900
Potosi Mine	H-953
Pueblo Railroad Siding	H-996
Quartette Mill	H-943
Quartette Mill Company Railroad	H-944
Ranch House	H-893
Recluse Salt Mine	H-1089
Recluse Salt Mine	H-1096
Red Bluff Springs	H-933
Red Rock Canyon	H-729
Rioville (aka Junction City)	H-716
Riverside	H-585
Roger's Spring	H-1053
St. Joe (aka St. Joseph)	H-146
St. Joseph (aka Logan; Logandale; Logan's Ranch; Mill Point; St. Joe)	H-146
St. Joseph (aka Overton)	H-145
St. Joseph (aka Sandbench)	H-700
St. Joseph (aka New St. Joseph Fort)	H-705
St. Thomas	H-147
St. Thomas Gap	H-1034
Salt Cave	H-730
Salt Cave #3 (aka Virgin Queen Salt Mine)	H-731
Salt Mine	H-1026
Salt Quarry	H-1049
Salvation Salt Mine	H-1027
Sandbeach (aka St. Joseph; Sandbeach; Sandtown; Sandy)	H-700
Sandtown (aka Sandbench)	H-700
Sandy (aka Sandbench)	H-700
Sandy	H-948
Sandy, Albert - House	H-1013

SITE NAME	SITE NUMBER
San Pedro, Los Angeles, and Salt Lake Railroad Pipeline	H-745
Sawmill Canyon	H-882
Scanlon Ferry (aka Gregg's Ferry)	H-932
Searchlight	H-148
Searles Ranch	H-918
Simonsville (aka Mill Point; Old Overton; Simon's Well)	H-699
Simon's Well (aka Simonsville)	H-699
Slough	H-978
Smith's Ranch	H-1021
Snow Spring	H-1107
Southwestern Mining Co. Claim	H-1054
Spring	H-890
Stewart Ranch (aka Las Vegas Mormon Fort)	H-149
Stillwell Spring	H-1081
Stone Ferry (aka Junction City)	H-716
Stump Spring	H-949
Sypus Ranch	H-1090
Tecopa Charcoal Ovens (aka Wheeler Wash Charcoal Kilns)	H-735
The Narrows	H-1003
Tokyo Railroad Siding	H-1017
Toner House	H-892
Tramp Mine	H-1057
Trough Springs (aka Miners Spring)	H-956
Tule Springs	H-1078
Tule Springs Ranch	H-1079
Unidentified Dam	H-1048
Unidentified Mine	H-920
Unidentified Mine	H-922
Unidentified Quarry	H-919
Unidentified Ranch	H-923
Unidentified Salt Well	H-931
Unidentified Well	H-869
Unidentified Well	H-936
Unknown Cabin	H-1069
Ute Railroad Siding	H-959
Valley of Fire State Park	H-587
Valley Railroad Siding	H-1083
Virgin Railroad Siding	H-966
Warm Springs	H-860
Warm Springs School	H-974
Water Canyon	H-926
Weather Station	H-895
Webster Mine	H-1098
Weiser Ranch	H-899
Weller House	H-1024
Weller Spring	H-1025
West End Mining Camp	H-733
West Point(aka Pickett Ranch)	H-698

SITE NAME	SITE NUMBER
West Point Cemetary	H-865
Wheeler Pass Charcoal Kilns (aka Wheeler Wash Charcoal Kilns)	H-735
Wheeler Springs (aka Hornet Springs)	H-958
Wheeler Pass Charcoal Kilns (aka Tecopa Charcoal Ovens; Wheeler Wash Charcoal Kilns)	H-735
Wheeler Well (aka Hornet Springs)	H-958
White Hill	H-972
White Star	H-736
Whitney (aka East Las Vegas)	H-737
Williams Ranch (aka Younts Ranch)	H-1099
Willow Springs (aka Elderberry Springs)	H-957
Wilson House and Well	H-1010
Younts Ranch (aka Williams Ranch)	H-1099

ELKO COUNTY

SITE NAME	SITE NUMBER
Becky's Springs	H-622
Bradley Outfit and Mary's River Operation	H-441
Bruneau Sheep Company	H-722
Bullion City (aka Railroad City)	H-498
Camp Elko (aka Elko)	H-55
Carlin	H-500
Cave Creek	H-571
Clover City (aka Tobar)	H-511
Clover Valley Land and Livestock Company	H-143
Cobre	H-249
Currie	H-514
Dan Murphy Outfit	H-757
Deeth	H-501
Dolly Varden	H-502
Dry Creek (aka Jiggs)	H-506
Elko (aka Camp Elko)	H-55
Ferguson's Springs	H-620
Flowery Lake	H-556
Fort Halleck	H-503
Good Hope	H-497
Goshute Valley	H-555
Halleck	H-504
Highland	H-505
Humboldt Valley (aka Wells)	H-135
Hunter Ranch	H-734
Hylton (aka Jiggs)	H-506
Hylton, J.J.-Ranch	H-739
IL Ranch	H-744
Jiggs (aka Dry Creek; Hylton; Mound Valley; Skelton)	H-506
Kingsley	H-513
Lamoille	H-569
Medicine Spring	H-507
Mound Valley (aka Jiggs)	H-506
McBride, J.A. and A.G.-Ranch	H-748
McIntyre Ranch	H-750
Oasis	H-557
Overland Ranch	H-572
Pequop Summit	H-559
Pilot Peak	H-553
"71" Ranch	H-780
Railroad City (aka Bullion City)	H-498
Ruby City	H-508
Ruby Valley Indian Reservation	H-173
Russell, George - Ranch	H-779
Shafter	H-618
Shepard's Station	H-516

SITE NAME	SITE NUMBER
Silver Zone Pass	H-554
Skelton (aka Jiggs)	H-506
South Fork Indian Reservation (aka Te-Moak Indian Reservation)	H-509
Southern Pacific Railroad Humboldt River Crossing	H-518
Southern Pacific Railroad Humboldt River Crossing	H-517
Southern Pacific Railroad Humboldt River Crossing	H-519
Southern Pacific Tunnel	H-520
Spruce City (aka Sprucemont)	H-510
Sprucemont (aka Spruce City; Spruce Mount)	H-510
Spruce Mount (aka Sprucemont)	H-510
Stewart and Gaillard Ranch	H-786
Te-Moak Indian Reservation (aka South Fork Indian Reservation)	H-509
Toano	H-510
Tobar (aka Clover City)	H-511
Transcontinental Telephone Completion Point	H-926
Victoria	H-512
Wells (aka Humboldt Valley)	H-135
Wells Power Company Hydroelectric Plant	H-521
White Horse Pass	H-621

ESMERALDA COUNTY

SITE NAME	SITE NUMBER
Alkali Spring	H-754
Barton's Arrastra	H-832
Black Mammoth 50-Ton Mill (aka Vollmar)	H-834
Black Mammoth 100-Ton Mill (aka Vollmar Mill)	H-833
Blair	H-824
Blair Junction	H-648
Blair Mill Pipeline	H-835
Blair Reservoir and Pipeline	H-836
Borax City (aka Fish Lake)	H-829
Calmville	H-828
Coaldale	H-365
Coaldale Coalfields	H-838
Coaldale Junction	H-837
Columbia (aka Stimler)	H-651
Columbus	H-827
Cord Mill Pipeline	H-859
Crow Spring	H-822
Cuprite	H-820
Deep Wells	H-649
Desert Silver Dam and Pipeline	H-839
Desert Wells (aka Millers)	H-389
Diamondfield	H-819
Divide (aka Gold Mountain; Sigold)	H-751
Fish Lake (aka Borax City)	H-829
Fish Lake Camp	H-523
Gilbert Junction (aka McLean's)	H-650
Goldfield (aka Grandpa)	H-454
Goldfield Junction	H-656
Goldfield to Lida Pipeline	H-840
Goldfield - Silver Peak Mining Co. Mill	H-841
Gold Hitt	H-830
Gold Mountain (aka Stateline)	H-831
Gold Reef	H-752
Gordon - Brodie Mill	H-842
Gordon - Brodie Mill Pipeline	H-843
Grandpa (aka Goldfield)	H-454
Huges Brothers Mill	H-857
Klondike (aka Southern Klondike)	H-753
Last Chance Mine	H-581/26ES201
Mary Mine	H-826
Mary Mine Pipeline	H-844
Millers (aka Desert Wells)	H-389
Montezuma	H-756
Montezuma Lime Kilns	H-845
McLean's (aka Gilbert Junction)	H-650
McSweeney Junction	H-652

SITE NAME	SITE NUMBER
Nivloc (aka Nivlock)	H-825
Nivloc Dam and Pipeline	H-846
Nivlock (aka Nivloc)	H-825
Old Junction	H-655
Phillipsburg	H-755
Rock Hill	H-647
Sigold (aka Divide)	H-751
Silver Peak	H-370
Soda Springs (aka Sodaville)	H-362
Sodaville (aka Soda Springs)	H-362
Southern Klondike (aka Klondike)	H-753
Stateline (aka Gold Mountain)	H-831
Stimler (aka Columbus)	H-651
Tonopah Tent Town	H-583/26ES304
Valcalda Mill Pipeline	H-847
Vollmar (aka Black Mammoth 50-Ton Mill)	H-834
Vollmar Mill (aka Black Mammoth 100-Ton Mill)	H-833
Weepah	H-823
Weepah Nevada Mining Company Pipeline	H-848
26ES200	H-580/26ES200
26ES202	H-582/26ES202
26ES203	H-695/26ES203
26ES314	H-749/26ES314

EUREKA COUNTY

SITE NAME	SITE NUMBER
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Beowawe	H-230
Blackburn	H-228
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Camp Station (aka Grubb's Well)	H-236
Columbia	H-225
Consolidated Cortez Silver Mine and Mill	H-853
Diamond City	H-234
Diamond Springs	H-233
Dormer	H-232
Dunphy	H-563
Dunphy Overpass	H-530
Emigrant Pass	H-560
Eureka	H-141
Eureka Waterworks	H-531
Evans	H-610
Floyd (aka Roberts Creek)	H-222
Garden Pass	H-604
Geddes (aka Vanderbilt)	H-227
Goodwins (aka Sulphur Spring)	H-224
Gravelly Ford	H-235
Grubb's Well (aka Camp Station)	H-236
Hay Ranch	H-609
Horseshoe Ranch	H-728
Mineral	H-608
Mineral Hill	H-237
Oak	H-606
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Pine	H-607
Prospect	H-226
Raines	H-611
Roberts Creek (aka Floyd; Sheakit; Willow Creek)	H-222
Ruby Hill	H-223
Safford (aka Barth Iron Mine)	H-494
Sheakit (aka Roberts Creek)	H-222
Southern Pacific Railroad Humboldt River Crossing No. 6	H-536
Southern Pacific Railroad Humboldt River Crossing No. 8	H-537
Southern Pacific Railroad Humboldt River Crossing No. 14	H-533
Southern Pacific Railroad Humboldt River Crossing No. 15	H-534
Southern Pacific Railroad Humboldt River Crossing No. 16	H-535
Southern Pacific Railroad Humboldt River Crossing No. 24	H-532
Southern Pacific Tunnel No. 1	H-538
Sulphur Spring(s) (aka Goodwins)	H-224
Summit	H-605
Twin Summit	H-561

SITE NAME	SITE NUMBER
Union (aka Union Mines)	H-239
Union Mines (aka Union)	H-239
Vanderbilt (aka Geddes)	H-227
Western Pacific Railroad Bridge at Palisade, No. 1	H-539
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26EU37	H-668/26EU37

HUMBOLDT COUNTY

SITE NAME	SITE NUMBER
French Bridge (aka Winnemucca)	H-378
French Ford (aka Winnemucca)	H-378
Golconda	H-376
Golconda Summit	H-374
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Thousand Springs Valley	H-558
Valmy	H-887
Winnemucca (aka French Bridge; French Ford)	H-378

LANDER COUNTY

SITE NAME	SITE NUMBER
Ackerman Spring (aka Hickinson Summit)	H-551/26LA009
Amador	H-344
Argenta	H-347
Austin	H-138
Austin City Waterworks	H-486
Bailey's	H-636
Bannock	H-397
Battle Mountain	H-400
Battle Mountain and Lewis Railroad	H-434
Betty O'Neal	H-436
Big Creek (aka Canyon City)	H-478
Big Smoky Valley	H-792
Bridges	H-638
Bullion	H-437
Bunker Hill	H-438
Canyon City (aka Big Creek)	H-478
Cape Horn	H-381
Carroll	H-483
Clifton	H-393
Clinton	H-485
Cole Springs	H-375
Copper Basin	H-445
Copper Canyon	H-487
Coral City	H-346
Cortez	H-442
Curtis	H-641
Dean (aka Upper Lewis)	H-447
Dillon	H-635
Dry Creek	H-382
Dry Wells	H-380
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Eagle Mine	H-646
Galena	H-448
Geneva	H-449
Gold Acres	H-450
Gold Park	H-482
Guadalajara (aka Santa Fe)	H-451
Gweenah	H-488
Hickerson (aka Hickinson Summit)	H-551/26LA009
Hickinson (aka Hickinson Summit)	H-551/26LA009
Hickingson Summit (aka Ackerman Spring; Hickerson; Hickinson)	H-551/26LA009
Highland Chief Mill	H-634
Hilltop (aka Kimberley; Marble City)	H-452
Jacob's Spring (aka Jacobsville)	H-132
Jacob's Station (aka Jacobsville)	H-132

SITE NAME	SITE NUMBER
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Kingston	H-456
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Lander City	H-463
Ledlie	H-476
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Lewis Station (aka Lewis)	H-465
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Peterson's Mill	H-549/26LA30
Pittsburg	H-467
Ravenswood	H-475
Reese River Station	H-383
Safford (aka Old Battle Mountain)	H-404
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Santa Fe (aka Guadalajara)	H-451
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Simpson's Park (aka Willow Creek Ranch)	H-377
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Smith Creek	H-372
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Starr Grove Mill	H-644
Starr Grove Mine	H-643
Tenabo	H-468
Thomas Nelson Ranch	H-759
Upper Lewis (aka Dean)	H-447
Vaughn's	H-640
Walters	H-639
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Watts	H-637
Willow Creek Mines of Nevada Mill	H-489
Willow Creek Ranch (aka Simpson Park)	H-377
Yandleville (aka Yankee Blade)	H-474
Yankee Blade (aka Yandleville)	H-474

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SITE NAME	SITE NUMBER
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Acklin Ranch (aka Acklin Canyon)	H-36
Acoma	H-37
Alamo (aka Wright's Ranch)	H-6
Angle City (aka Pockets)	H-96
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Averett Spring (aka Averett Reservoir; Hidden Spring)	H-40
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Barclay (aka Badger Valley)	H-41
Beaver Dam State Park	H-43
Bennets Spring (aka Bennett Spring)	H-44
Bennett Pass (aka Bennett Spring)	H-44
Bennett Spring (aka Bennets Spring; Bennett Pass; Bennett Springs Mountain)	H-44
Bennett Springs Mountain (aka Bennett Spring)	H-44
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Boyd	H-46
Bradshaw Ranch	H-69
Bristol City (aka Bristol Silver Mines)	H-8
Bristol Silver Mines (aka Bristol City; National City; Tempest)	H-8
Bristol Wells	H-32/26LN1507
Brown	H-47
Buck Ranch	H-134
Bull Valley	H-48
Bullionville (aka Ely City; Elyville)	H-9
Butler Ranch	H-927
Caliente (aka Calientes Hot Springs; Clover; Cloverdale; Clover Junction; Culverwell Ranch)	H-10
Caliente (aka Culverwell Ranch)	H-11
Calientes Hot Springs (aka Caliente)	H-10
Cana (aka Stine)	H-110
Cana	H-49
Carp (aka Carpsdale; Cliffdale)	H-50
Carpsdale (aka Carp)	H-50
Caselton	H-12
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SITE NAME	SITE NUMBER
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Clover (aka Culverwell Ranch)	H-11
Cloverdale (aka Caliente)	H-10
Cloverdale (aka Culverwell Ranch)	H-11
Clover Junction (aka Caliente)	H-10
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Clover Valley Settlement (aka Clover Valley)	H-816
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Crescent City (aka Crescent)	H-26
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Culverwell Ranch (aka Caliente)	H-10
Culverwell Ranch (aka Caliente; Clover; Cloverdale; Clover Junction)	H-11
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Delamar - Meadow Valley Wash Pipeline	H-119
Delume (s) Station	H-62
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Dry Valley	H-63
Dula Ranch	H-64
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Dutch Flat Ranch	H-65
Eagle Valley (aka Ursine)	H-114
Eagle Valley (aka Spring Valley)	H-5
Easter Mine (aka Taylor Mine)	H-113
Eccles	H-68
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Elgin (aka Bradshaw Ranch)	H-69
Ely City (aka Bullionville)	H-9
Ely Valley Mines	H-271/26LN1683
Etna	H-70
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SITE NAME	SITE NUMBER
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Fay	H-15
Ferguson (aka Golden City)	H-17
Fifteen Mile Well (aka Pony Spring)	H-71
Findlay Station	H-72
Five Mile Station	H-73
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Forlorn Hope Mine	H-103
Four Mile Well	H-74
Freiburg (aka Freyburg)	H-29
Freyburg (aka Freiburg; Frieburg)	H-29
Frieburg (aka Freyberg)	H-29
Galt (aka Gault)	H-78
Gault (aka Galt)	H-78
Gleeson Canyon Kilns (aka Panaca Coke Ovens)	H-3
Golden City (aka Golden Wrench Mine; Ferguson)	H-17
Golden Wrench Mine (aka Golden City)	H-17
Grapevine Canyon (aka Rainbow Canyon)	H-99
Grassy Spring	H-79
Groom	H-30
Gunnery Range (aka Nellis Air Force Base)	H-123
Hackberry Spring	H-913
Ham Light Station	H-80
Hatfield's Spring	H-129
Helene	H-18
Hell's Half Acre	H-543/26LN246
Hicko (aka Hiko)	H-21
Hico (aka Hiko)	H-21
Hidden Spring (aka Averett Spring)	H-40
Highland	H-19
Hiko (aka Hicko, Hico, Lawrence)	H-21
Hiko Kiln	H-120
Hoya	H-82
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Hyd Ranch	H-318/26LN1745
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Kierman Ranch	H-912
Kyle	H-85
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SITE NAME	SITE NUMBER
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Leith	H-86
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Logan City (aka Logan)	H-24
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Meadow Valley Wash (aka Meadow Valley)	H-117
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Panaca City (aka Panaca)	H-1
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Penyoer Springs	H-903
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SITE NAME	SITE NUMBER
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Princeton (aka Prince)	H-97
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Rabbit Springs	H-98
Rainbow Canyon (aka Grapevine Canyon)	H-99
Rappelje (aka Cloud)	H-57
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Robber's Roost	H-101
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Rose Millsite (aka Taylor Canyon)	H-112
Rose Valley (aka Ursine Valley)	H-106
Rose Valley	H-316/26LN120
Rox	H-107
Royal City (aka Jackrabbit)	H-22
St. George (aka Cloud)	H-57
Sawmill Canyon	H-108
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Sheep Spring Corral	H-109
Sheep Springs (aka Dow Springs)	H-898
Shoal Creek	H-979
Silver Canon (aka Silver Canyon)	H-25
Silver Canyon (aka Silver Canon)	H-25
Silverhorn	H-33
Silver King Pass	H-126
Simon Springs	H-242
Sixmile Well	H-75
Spring Valley	H-31
Spring Valley (aka Eagle Valley)	H-5
Springville (aka Patterson)	H-35
Steward's Ranch	H-285
Stine (aka Cana; Kershaw)	H-110
Sunset Mine	H-111
Sussman Cabin	H-284/26LN1682
Taylor Canyon (aka Rose Millsite)	H-112
Taylor Mine (aka Easter Mine)	H-113
Tempest (aka Bristol Silver Mines)	H-8
Tempiute	H-28
The Kiln (aka Nesbitt Ranch)	H-544/26LN205
Tickaboo Spring (aka Old Tickaboo Spring)	H-902
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SITE NAME	SITE NUMBER
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Wildhorse Spring (aka Wildhorse Bill Spring)	H-275/26LN374
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26LN1740	H-319/26LN1740
26LN413B	H-320/26LN413B
26LN1584	H-276/26LN1584
26LN367	H-283/26LN367
26LN1638	H-540/26LN1638
26LN425	H-541/26LN425
26LN237	H-548/26LN237
26LN1563	H-693/26LN1563
26LN363	H-696/26LN363
26LN240	H-694/26LN240

LYON COUNTY

SITE NAME	SITE NUMBER
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Desert Station (aka Hooten Wells)	H-363
Fernley	H-589
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Hooten Wells (aka Desert Station)	H-363
N.H.A. Mason Ranch	H-747
Wabuska	H-630

MINERAL COUNTY

SITE NAME	SITE NUMBER
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Candelaris (aka Candelaria)	H-136
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Luning (aka Deep Wells)	H-174
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NYE COUNTY

SITE NAME	SITE NUMBER
Amargosa (aka Armagosa)	H-428
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Ammonia Springs (aka Ammonia Tanks)	H-287
Ammonia Tanks (aka Ammonia Springs)	H-287
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Antelope Spring	H-322
Armagosa (aka Amargosa; Johnnie Station)	H-428
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Ash Meadows	H-291
Atwood	H-292
Barcelona	H-293
Barrett	H-982
Bartlett (aka Northumberland)	H-345
Bassit Spring	H-686/26NY786
Baumann's (aka Minnium Station)	H-457
Baxter Spring (aka Cedar Springs)	H-294
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Bellehelen	H-296
Belmont	H-54
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Berlin - Ichthyosaur State Park	H-331
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Bonanza	H-411
Bonnie Clair (see Bonnie Clare)	H-299
Bonnie Claire (see Bonnie Clare)	H-299
Bonnie Clare (see Bonnie Clair; Bonnie Claire; Thorp; Thorp's Well; Mountain Station)	H-299
Brooklyn (aka Round Mountain)	H-412
Bullfrog	H-409
Butler City (aka Tonopah)	H-418
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Canon (aka Canon Station)	H-706
Canon Station (aka Canon)	H-706
Carrara	H-300
Carrolton (aka Hot Creek)	H-328
Cedar City (aka Upper Weston)	H-313
Cedar Springs (aka Baxter Spring)	H-294
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Chloride (aka Chlorine)	H-707
Chlorine (aka Chloride)	H-707
Clark's Station (aka Five Mile Station)	H-613
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SITE NAME	SITE NUMBER
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Cloverdale	H-462/26NY596
Currant (aka Current)	H-603
Current (aka Callaway Ranch; Currant)	H-603
Danville	H-307
Darrough Hot Springs	H-453
Downeyville	H-308
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Duluth	H-395
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Ellendale	H-310
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Forty Mile Canyon	H-312
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Gold Crater	H-321
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Grant City	H-433
Grantsville	H-326
Hannapah	H-327
Helena (aka Clifford)	H-306
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Ione City (aka Ione)	H-332
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SITE NAME	SITE NUMBER
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Lodi (aka Marble)	H-337
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Manse Ranch (aka Manse, Charlie - Ranch; Yount's Ranch)	H-340
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Morey	H-343
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Pahrump	H-950
Pahrump Valley	H-390
Pajute Mesa	H-391
Palo Alto	H-302
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AD-A149 914 DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ACQUISITION M-X/MPS (M-X/MU..(U) HENNINGSON DURHAM AND RICHARDSON SANTA BARBARA CA 02 OCT 81 4/5

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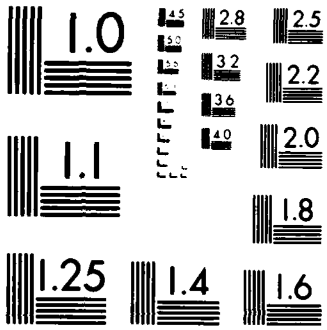

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

SITE NAME	SITE NUMBER
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Phonolite	H-394
Pine Creek	H-444
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Pueblo	H-398
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Rainier Mesa	H-402
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Ray	H-439
Redrock	H-715
Reese River Valley	H-403
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San Antonio Stage Station (aka San Antonio)	H-413
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Tybo Charcoal Ovens	H-421

SITE NAME	SITE NUMBER
U.S. Army Heliograph Station	H-528
Union	H-460
Upper Weston (aka Cedar City)	H-313
Wagner	H-713
Wahmonie	H-422
Warm Springs	H-612
Washington	H-423
West Union Canyon	H-424
Whiterock Spring	H-425
Willow Springs	H-676/26NY613
Willow Springs	H-690/26NY629
Yomba Indian Reservation (aka Antelope Spring)	H-405
Young's Sawmill (aka Yount's Sawmill)	H-341
Yount's Ranch (aka Manse Ranch)	H-340
Yount's Sawmill (aka Young's Sawmill)	H-341
26NY23	H-598/26NY23
26NY263	H-624/26NY263
26NY575	H-697/26NY575
26NY587	H-689/26NY587
26NY594	H-672/26NY594
26NY603	H-550/26NY603
26NY614	H-677/26NY614
26NY615	H-678/26NY615
26NY617	H-679/26NY617
26NY619	H-680/26NY619
26NY664	H-552/26NY664
26NY715	H-682/26NY715
26NY717	H-687/26NY717
26NY719	H-684/26NY719
26NY779	H-685/26NY779
26NY1130	H-687/26NY1130

PERSHING COUNTY

SITE NAME	SITE NUMBER
Lovelock	H-387
Mill City	H-529
Oreana	H-660
Star City	H-564
Unionville	H-565
W. T. Jenkins Ranch	H-746

STOREY COUNTY

SITE NAME	SITE NUMBER
Sparks	H-567
Union Land and Cattle Company and Union Wool Company	H-794
Wadsworth	H-658

WASHOE COUNTY

SITE NAME	SITE NUMBER
Gerlack	H-666
Reno	H-568

WHITE PINE COUNTY

SITE NAME	SITE NUMBER
Anderson's Ranch	H-851
Antelope Springs	H-388
Antelope Valley	H-152
"Aunt Martha's" Ranch	H-799
Aurum (aka Silver Canyon)	H-153
Babylon	H-199
Baker	H-154
Baker Ranch	H-787
Ballinger Ranch (aka Currie Ranch)	H-255
Basque Canyon	H-278/26WP803
Bassett Ranch	H-763
Bateman Ranch (aka Gallagher Ranch)	H-268
Beck Ranch	H-801
Berry Ranch	H-267
Bews Brothers Ranch	H-776
Bird Ranch	H-266
Black Hawk Station	H-185
Black Horse	H-155
Blaine	H-192
Buck Station	H-204
Burchert Ranch	H-257
Burke Ranch	H-760
Butte Station	H-156
Cameron Ranch	H-766
Camp Ruby (aka Fort Ruby)	H-139
Camp Ruby (aka Ruby Valley)	H-384
Carnahan Ranch	H-785
Cave City (aka Hamilton)	H-125
Cedar Wells	H-385
Centerville (aka Siegel)	H-194
Cherry Creek	H-157
Cherry Creek Station	H-212
Cleveland Ranch	H-768
Comin's Sawmill	H-805
Conner's Pass	H-574
Conover Ranch	H-796
Copper Flat	H-245
Corn Creek	H-139
Cowger Ranch	H-269
Currant Creek	H-810
Currie Ranch (aka Ballinger Ranch)	H-255
D-Bar Ranch (aka Mike Urrutia Well)	H-282/26WP871
D-W Campbell Ranch (aka Perley Ranch)	H-260
Deep Creek Reservation (aka Goshute Indian Reservation)	H-172
Doutre Brothers Ranch	H-775
Dutch Jake Ranch	H-811

SITE NAME	SITE NUMBER
E.C. Murphy Senior - Ranch	H-758
East Ely (aka Ely)	H-161
Eberhardt	H-158
Egan Canyon (aka Egan Station)	H-159
Egan Station (aka Egan Canyon)	H-159
Eight Mile Station (aka Prairie Gate)	H-160
Ellison Ranch	H-814
Ely (aka East Ely; Ely City; Murray Creek)	H-161
Ely City (aka Ely)	H-161
Ely-Sunnyside Telephone Line	H-213
Emigrant Spring (aka Sunnyside)	H-201
Fort Pierce	H-616/26WP641
Fort Ruby (aka Camp Ruby; Ruby Ranch)	H-139
Fort Schellbourne (aka Shell Creek)	H-186
Freehill Ranch	H-262
Gallagher Ranch (aka Bateman Ranch)	H-268
Georgetown	H-818
Geyser Ranch	H-566
Glencoe (aka Tungstonia)	H-193
Gold Canyon	H-386
Gonder Ranch (aka Corn Creek)	H-789
Goshute Indian Reservation (aka Deep Creek Reservation)	H-172
Green Ranch	H-783
Green Ranch	H-243
Greens	H-619
Greenville	H-200
Gregory Ranch (aka Upper Ranch)	H-790
Guptil Ranch (aka Mosier Ranch)	H-252
Hamilton (aka Cave City)	H-125
Hamilton Water Supply System	H-214
Hankins Ranch	H-798
Hercules Gap	H-247
Hilp Ranch (aka Mosier Ranch)	H-252
Horsetrap Spring Corral	H-317/26WP680
Hotspring's Ranch	H-259
Hunter	H-131
Illipah (aka Little Antelope Summit)	H-628
Illipah (aka Moorman Ranch)	H-627
Illipah Ranch (aka Moorman Ranch)	H-627
Jacob's Well	H-176
Joy	H-177
Keegan Ranch	H-774
Keelan and Flanagan Ranch	H-761
Kelly Ranch	H-256
Kent Ranch	H-265
Keogh Ranch	H-782
Keystone	H-244
Kimberley	H-166

SITE NAME	SITE NUMBER
Lane City (aka Mineral City)	H-162
Lanter Ranch	H-813
Leadville (aka Seligman)	H-203
Lehman Caves	H-178
Lehman Orchard and Aqueduct	H-215
Little Antelope Summit (aka Illipah)	H-628
Lowery Ranch (aka Shallenberger Ranch)	H-253
Lund	H-602
Mammoth City	H-137
Matthews Ranch	H-254
Menken	H-202
Midway Well	H-542/26WP900
Mike Urrutia Well (aka D-Bar Ranch)	H-282/26WP871
Mineral City (aka Cave City; Robinson Canyon)	H-162
Minerva (aka Tungsten Mines)	H-210
Mitchell and Lyons Ranch (aka Ole Hanson's Ranch)	H-261
Monitor Mill	H-281/26WP922
Monte Cristo	H-179
Monte Neva Warm Springs	H-623
Moorman Ranch (aka Illipah; Illipah Ranch)	H-627
Mosier (aka Guptil Ranch; Hilp Ranch)	H-252
Mountain Springs	H-180
Muncy (aka Muncy Creek; Muney)	H-195
Muncy Creek (aka Muncy)	H-195
Muney (aka Muncy)	H-195
Murray Creek (aka Ely)	H-161
McCormick Sawmill	H-807
McCurdy Ranch	H-767
McCurdy Ranch	H-777
McDonald Sawmill (aka Wearne Sawmill)	H-815
McDougall Ranch	H-802
McGill (aka McGill Ranch; Smelter)	H-163
McGill Ranch (aka McGill)	H-163
McKernan Ranch	H-817
McQuitty Ranch	H-809
Nat Luce Ranch	H-251
Nelson Ranch	H-250
Nevada Northern "Helene" Double Tracked Trestle	H-216
Nevada Northern Railway Curved Tunnel	H-217
Newark	H-181
Newark Mill	H-803
New Ruth (aka Ruth)	H-164
Odger's Ranch	H-762
Ole Hanson Ranch (aka Mitchell and Lyons Ranch)	H-261
Olmstead Ranch	H-769
O'Neill Ranch	H-765
Osceola	H-182
Osceola Ditch	H-218

SITE NAME	SITE NUMBER
Overland Pass	H-183
Pancake	H-206
Perley Ranch (aka D.W. Campbell Ranch)	H-260
Picotillo (aka Picotillo Flat)	H-198
Picotillo Flat (aka Picotillo)	H-198
Piermont	H-196
Pilot Knob	H-246
Pinto (aka Silverado)	H-184
Pinto Creek Station	H-209
Pogue's Station	H-208
Prairie Gate (aka Eight Mile Station)	H-160
Preston	H-601
Ragdump (aka Ragtown)	H-171
Ragtown (aka Ragdump)	H-171
Rawlins Ranch	H-258
Reifetown (aka Riepetown)	H-167
Reipetown (aka Riepetown)	H-167
Reisch Ranch	H-264
Riepetown (aka Reifetown; Reipetown)	H-167
Riodan Ranch (aka Sunnyside)	H-201
Rosebud Spring	H-280/26WP867
Round Spring	H-197
Ruby (aka Ruby Hill)	H-133
Ruby Hill (aka Ruby; Rubyville)	H-133
Ruby Ranch (aka Fort Ruby)	H-139
Ruby Valley (aka Camp Ruby)	H-384
Rubyville (aka Ruby Hill)	H-133
Ruth (aka New Ruth)	H-164
Rutherford Ranch	H-770
Sacramento Pass	H-600
Salty Williams	H-205
Sampson Ranch	H-772
Schellbourne (aka Shell Creek)	H-186
Schell Creek (aka Shell Creek)	H-186
Seligman (aka Leadville)	H-203
Shallenberger Ranch (aka Lowery Ranch)	H-253
Shekel's Ranch	H-241
Shell Creek (aka Fort Schellbourne; Schellbourne; Schell Creek)	H-186
Shermantown (aka Silver Springs)	H-151
Shoshone	H-211
Siegel (aka Centerville)	H-194
Silverado (aka Pinto)	H-184
Silver Canyon (aka Aurum)	H-153
Silver Springs (aka Shermantown)	H-151
Simonson Ranch	H-797
Simonson Ranch	H-778
Smelter (aka McGill)	H-163

SITE NAME	SITE NUMBER
Smelterville	H-168
Smith Ranch	H-800
Spring Valley (aka Spring Valley Station)	H-187
Spring Valley Station (aka Spring Valley)	H-187
Steptoe (aka Steptoe Ranch)	H-170
Steptoe City	H-169
Steptoe City (aka Steptoe Ranch)	H-170
Steptoe Creek Cave	H-277
Steptoe Lake Mill	H-795
Steptoe Ranch (aka Steptoe; Steptoe City)	H-170
Sunnyside (aka Emigrant Spring; Riordan Ranch)	H-201
Swallow Ranch	H-771
Swansea	H-188
Tamberlain	H-219
Tamerlane	H-248
Taylor	H-189
Telegraph Canyon Mill	H-804
Tippet's Ranch	H-617
Treasure City (aka Treasure Hill)	H-150
Treasure City to Eberhardt City	H-240
Treasure City Water System	H-220
Treasure Hill (aka Treasure City)	H-220
Tucker Ranch	H-808
Tungsten Mines (aka Minerva)	H-210
Tungstonia (aka Glencoe)	H-193
Upper Ranch (aka Gregory Ranch)	H-790
Uvada	H-128
Veteran	H-165
Wallack Ranch (aka Warljc Ranch)	H-263
Ward	H-190
Ward Charcoal Ovens	H-191
Warlick Sawmill	H-788
Warljc Ranch (aka Wallack Ranch)	H-263
Wearne Sawmill (aka McDonald Sawmill)	H-815
Wheeler Peak Heliograph Station	H-221
White Pine City	H-56
Williamson Sawmill	H-806
Willow Creek	H-784
Withington Ranch	H-781
Yelland Ranch	H-773
26WP752	H-279/26WP752
26WP108	H-669/26WP108
26WP674	H-673/26WP674
26WP440	H-674/26WP440
26WP653	H-691/26WP653
26WP76	H-692/26WP767

BEAVER COUNTY

SITE NAME	SITE NUMBER
Adamsville	H-2023
Beaver (aka Beaver City)	H-2006
Beaver City (aka Beaver)	H-2006
Beaver Bottoms Irrigation Project (aka Reed)	H-2197
Cactus Mine	H-2247
Cave Mine	H-2250
Clifton	H-2049
Desert Range Experiment Station	H-2163
Fort Cameron (aka Murdock Academy)	H-2122
Frisco	H-2103
Garrison	H-2164
Grampion (aka Grampton)	H-2182
Grampton (aka Grampion)	H-2182
Greenville	H-2025
Indian Creek (aka Manderfield)	H-2189
Indian Peak Reservation	H-2162
Lower Beaver(aka Minersfield)	H-2022
McGarry, James-Ranch	H-2249
Manderfield (aka Indian Creek)	H-2189
Milford	H-2054
Minersfield (aka Lower Beaver)	H-2022
Murdock Academy (aka Fort Cameron)	H-2122
Newhouse (aka Tent-Town)	H-2102
Newhouse Mill and Smelter	H-2246
Reed (aka Beaver Bottoms Irrigation Project)	H-2197
Reed Station	H-198
Smithson, D.W.-Ranch	H-2248
Tent-Town (aka Newhouse)	H-2102
42BE264	H-2141/42BE264

BOX ELDER COUNTY

SITE NAME	SITE NUMBER
Kelton	H-2209
Monument	H-2210
Promontory	H-2212
Terrace	H-2213

GARFIELD COUNTY

SITE NAME	SITE NUMBER
Cannon	H-2051

GRANDE COUNTY

SITE NAME	SITE NUMBER
Elk Mountain Mission	H-2175
Moab	H-2017

IRON COUNTY

SITE NAME	SITE NUMBER
Barton's Spring (aka Rasmussen's Big Spring)	H-2266
Buckhorn Springs	H-2086
Buckhorn Springs	H-2264
Cedar (aka Cedar City)	H-2058
Cedar City (aka Cedar)	H-2058
Circleville	H-2265
Desert Springs (aka Modena)	H-2055
Elkhorn Springs (aka Enoch)	H-2176
Enoch (aka Elkhorn Springs; Johnson's Settlement)	H-2176
Fort Sanford	H-2180
Hamilton (aka Hamilton Fort)	H-2087
Hamilton Fort (aka Hamilton; Sidon; Walker Fort)	H-2087
Head's Hill	H-2220
Iron City (aka Old Irontown)	H-2088
Iron Springs	H-2269
Joe Town	H-2267
Johnson's Settlement (aka Enoch)	H-2176
Joseph (aka Joe Town)	H-2267
Kanarra (aka Kanarrah; Kanarraville)	H-2108
Kanarrah (aka Kanarra)	H-2108
Kanarraville (aka Kanarra)	H-2108
Little Salt Lake	H-2262
Louisa (aka Parowan)	H-2008
Lund	H-2154
Milton (aka Twin Springs)	H-2010
Modena (aka Desert Springs)	H-2055
Old Irontown (aka Iron City)	H-2088
Panguilet	H-2059
Paragonah (aka Paragoonah; Red Creek)	H-2160
Paragoonah (aka Paragonah)	H-2160
Parawan (aka Parawan)	H-2008
Parowan (aka Louisa; Parawan)	H-2008
Rasmussen's Big Spring (aka Barton's Spring)	H-2266
Red Creek (aka Paragonah)	H-2160
Sidon (aka Hamilton Fort)	H-2087
Slaterville	H-2007
Stateline	H-2089
Sulphur Springs	H-2056
Summit	H-2268
Twin Springs (aka Milton)	H-2010
Uvada	H-2153
Walker Fort (aka Hamilton Fort)	H-2087

JUAB COUNTY

SITE NAME	SITE NUMBER
Black Rock (aka Black Rock Station; Desert Station)	H-2131
Black Rock Station (aka Black Rock)	H-2131
Boyd's Station (aka Butte Station; Desert Station)	H-2129
Butte (aka Black Rock)	H-2131
Butte Station (aka Boyd's Station)	H-2129
Callao (aka Willow Springs)	H-2070
Chase's Ranch	H-2221
Cheney's Place (aka Cheney's Ranch)	H-2171
Cheney's Ranch (aka Chene's Place; Cheney's Spring; Starr)	H-2171
Cheney's Spring (aka Cheney's Ranch)	H-2171
Chicken Creek	H-2218
Chicken Creek (aka Juab)	H-2085
Chicken Creek (aka Levan)	H-2187
Chicken Creek Reservoir (aka Juab Lake)	H-2263
Clover Creek (aka Mona)	H-2001
Desert Station (aka Black Rock)	H-2131
Desert Atation (aka Boyd's Station)	H-2129
Diamond	H-2078
Dugout (aka Dug Way)	H-2132
Dug Way (aka Dugout; Dugway)	H-2132
Dugway (aka Dug Way)	H-2132
Eureka	H-2073
Fresh-Springs (aka Fish Springs)	H-2130
Fish Springs (aka Fresh Springs; Smith Springs)	H-2130
Goshen	H-2239
Homansville	H-2080
Ibex	H-2110
Ironton	H-2107
Joy	H-2091
Juab (aka Chicken Creek)	H-2085
Juab Lake (aka Chicken Creek Reservoir)	H-2263
Knightsville	H-2081
Levan (aka Chicken Creek; Le Van)	H-2187
Le Van (aka Levan)	H-2187
Lowertown (aka Mammoth)	H-2076
Little Salt Creek	H-2223
Mangelson Ranch	H-2217
Mammoth (aka Lowertown; Middletown; Uppertown)	H-2228
Mammoth City	H-2228
Middletown (aka Mammoth)	H-2076
Middletown (aka Robinson)	H-2077
Mills (aka Mills Station)	H-2206
Mills Station (aka Mills)	H-2206
Mona (aka Clover Creek; Willow Creek)	H-2001
Mt. Nebo	H-2260

SITE NAME	SITE NUMBER
Murray	H-2238
Nephi (aka Salt Creek)	H-2002
Nortonville	H-2224
Payson	H-2242
Pleasant Valley (aka Uvada)	H-2243
Robinson (aka Middletown; Uppertown)	H-2077
Roseville	H-2240
Salt Creek (aka Nephi)	H-2002
Sevier Bridge, Dam and Reservoir (aka Uba Dam)	H-2259
Silver (aka Silver City)	H-2075
Silver City (aka Silver)	H-2075
Smith Springs (aka Fish Springs)	H-2130
Starr (aka Cheney's Ranch)	H-2171
Sucker-Town (aka Wellington)	H-2205
Tintic Mills	H-2079
Uba Dam (aka Sevier Bridge, Dam, and Reservoir)	H-2259
Uppertown (aka Mammoth)	H-2076
Uppertown (aka Robinson)	H-2077
Uvada (aka Pleasant Valley)	H-2243
Ward Mine	H-2114
Warm Springs	H-2147
Wellington (aka Sucker-Town)	H-2205
West Tintic	H-2207
Willow Creek (aka Mona)	H-2001
Willow Springs (aka Calloao)	H-2070
York	H-2084

MILLARD COUNTY

SITE NAME	SITE NUMBER
Abraham	H-2165
Albin	H-2050
Alfalfa (aka Lucerne)	H-2092
Alfalfa (aka Sugarville)	H-2200
Antelope Springs	H-2118
Black Rock	H-2099
Broadhead Ranch (aka Fourmile Creek; Perjury Farm)	H-2219
Burbank	H-2241
Burtner (aka Delta)	H-2174
Burtner Dam Ruins	H-2124
Buttermilk Fort (aka Holden)	H-2003
Camp Creek (aka Fillmore)	H-2004
Cedar Springs (aka Holden)	H-2003
Chalk Creek (aka Fillmore)	H-2004
Clear Lake	H-2100
Corn Creek (aka Hatton)	H-2098
Corn Creek Reservation	H-2126
Cove Fort (aka Wilden Fort)	H-2057
Crafton (aka Laketon)	H-2096
Crystal (aka Flowell)	H-2177
Cummings Ranch	H-2230
Delta (aka Burtner; Millville)	H-2174
Deseret	H-2015
Fillmore (aka Camp Creek; Chalk Creek)	H-2004
Flowell (aka Crystal)	H-2177
Fort Deseret	H-2090
Fourmile Ranch (aka Broadhead Ranch)	H-2119
Gandy (Ranch)(aka Warm Creek)	H-2217
Greenwood	H-2183
Graball (aka Scipio)	H-2018
Gunnison Bend Dam and Reservoir	H-2125
Gunnison Massacre Site	H-2111
Hatton (aka Corn Creek; Petersburg)	H-2098
Hinckley	H-2184
Holden (aka Buttermilk Fort; Cedar Springs)	H-2003
Ibex	H-2101
Kanosh (aka Kenosh)	H-2024
Kenosh (aka Kanosh)	H-2024
Laketon (aka Crafton)	H-2096
Leamington	H-2047
Lucerne (aka Alfalfa)	H-2092
Lynndyl	H-2156
Meadow	H-2005
Millville (aka Delta)	H-2174
Moody Waters	H-2211

SITE NAME	SITE NUMBER
McCornick	H-2097
North Track	H-2235
Oak City	H-2016
Oasis	H-2191
Omaha (aka Sugarville)	H-2200
Petersburg (aka Hatton)	H-2098
Robinson Ranch	H-2218
Round Valley (aka Scipio)	H-2018
Scipio (aka Graball; Round Valley)	H-2018
Smithson Ranch (aka Smithville)	H-2219
Smithville (aka Smithson Ranch)	H-2219
South Tract	H-2261
Sugarville (aka Alfalfa; Omaha)	H-2200
Sunflower	H-2093
Sutherland	H-2201
Topaz	H-2095
U.S. Railroad Bridge Across Sevier River	H-2119
Warm Creek (aka Gandy (Ranch))	H-2217
Wilden Fort (aka Cove Fort)	H-2057
Woodrow	H-2094

SALT LAKE COUNTY

SITE NAME	SITE NUMBER
Camp Douglas	H-2037
Fort Douglas	H-2178
Fort Rockwell (aka Rockwell's Station)	H-2138
Rockwell's Station (aka Fort Rockwell)	H-2138
Salt Lake City House	H-2140
Trader's Rest (aka Traveler's Rest)	H-2139
Traveler's Rest (aka Trader's Rest)	H-2139

TOOELE COUNTY

SITE NAME	SITE NUMBER
Ajax (aka Center)	H-2066
Bates Ranch (aka Batesville)	H-2116
Batesville (aka Bates Ranch; Erda; Rose Spring Fort; Tule Springs)	H-2116
Benmore	H-2167
Benson, E.T. - Mill	H-2253
Bonneville Salt Flats Race Track	H-2123
Buchanan Place (aka German Village)	H-2258
Burmeister	H-2169
Burnout Station (aka Burnt Canyon)	H-2128
Burnt Canyon (aka Burnout Station; Canyon Station)	H-2128
Camp Conness	H-2038
Camp Relief	H-2036
Canyon Station (aka Round Station)	H-2149
Canyon Station (aka Burnt Canyon)	H-2128
Center (aka Ajax)	H-2066
Clifton	H-2072
Clover (aka Johnson's Settlement; Johnston's Settlement)	H-2052
Davis Station (aka Government Creek)	H-2146
Deep Creek (aka Egan's; Gold Hill; Ibapah)	H-2127
Deep Creek Indian Mission	H-2192
"Doc" Faust (aka Rush Valley)	H-2135
E T City (aka Lake Point)	H-2150
Eastline (aka Wendover)	H-2152
East Rush Valley (aka Five Mile Pass; Johnson's Pass; Pass Station)	H-2136
Egan's (aka Deep Creek)	H-2127
Egan's Springs (aka Simpson's Springs)	H-2133
Erda (aka Batesville)	H-2116
Faust Station (aka Rush Valley)	H-2135
Five Mile Pass (aka East Rush Valley)	H-2136
Francklyn Smelter	H-2251
German Village (aka Buchanan Place)	H-2258
Gisborn	H-2062
Gold Hill	H-2071
Gold Hill (aka Deep Creek)	H-2127
Government Creek (aka Davis Station; Government Springs; Government Well)	H-2146
Government Springs (aka Government Creek)	H-2146
Government Well (aka Government Springs)	H-2146
Grantsville	H-2143
Ibapah (aka Deep Creek)	H-2127
Iosepa (aka Knowlton Ranch; Quincy; Quincy Ranch; "The Dells")	H-2069
Jackson's Station (aka Point Lookout)	H-2145

SITE NAME	SITE NUMBER
Jacob City	H-2061
Johnson's Pass (aka East Rush Valley)	H-2136
Johnson's Settlement (aka Clover)	H-2052
Johnston's Settlement (aka Clover)	H-2052
Knowlton Ranch (aka Iosepa)	H-2069
Lake Point (aka E T City)	H-2150
Leavitt Ranch	H-2231
Lewiston (aka Mercur)	H-2063
Lincoln Highway Bridge	H-2256
Lincoln Highway: Wendover Cut-off	H-2255
Lincoln Mine	H-2252
Lookout Pass (aka Point Lookout)	H-2145
Lost Springs (aka Simpson's Springs)	H-2133
Meadow Creek (aka Rush Valley)	H-2135
Mercur (aka Lewiston)	H-2063
Milltown (aka Richville)	H-2068
Milton (aka Richville)	H-2068
Ophir	H-2060
Pass Station (aka East Rush Valley)	H-2136
Paxton, Adelaide Ranch	H-2219
Perjury Farm (aka Broadhead Ranch)	H-2219
Pleasant Springs (aka Simpson's Springs)	H-2133
Point Lookout (aka Jackson's Station; Lookout Pass)	H-2145
Quincy (aka Iosepa)	H-2069
Quincy Ranch (aka Iosepa)	H-2069
Radford Ranch	H-2233
Richville (aka Milltown; Milton; "The Mill")	H-2068
River Bed	H-2134
Rose Spring Fort (aka Batesville)	H-2116
Ross Ranch	H-2234
Round Station (aka Canyon Station)	H-2149
Rush Valley (aka "Doc" Faust; Faust Station; Meadow Creek)	H-2135
Rush Valley	H-2040
Rush Valley	H-2142/42T0149
St. John's	H-2045
Scranton	H-2216
Sells	H-2196
Simpson's Springs (aka Egan's Springs; Lost Springs; Pleasant Springs)	H-2133
Sixmile Ranch (aka Willow Creek)	H-2148
Skull Valley Indian Mission	H-2046
Soldier Creek Kilns	H-2192
Steptoe Camp	H-2254
Stockton	H-2074
Sunshine	H-2065
"The Dells" (aka Iosepa)	H-2069

SITE NAME	SITE NUMBER
"The Mills" (aka Richville)	H-2068
Tooele City	H-2120
Topliff	H-2067
Tule Springs (aka Batesville)	H-2116
Vernon	H-2044
Wendover (aka Eastline; Stateline)	H-2152
Wendover Air Force Base	H-2053
West Dip (aka West Mercur)	H-2064
West Mercur (aka West Dip)	H-2064
West Mountain Valley Reserve	H-2039
Willow Creek (aka Sixmile Ranch)	H-2148

UTAH COUNTY

SITE NAME	SITE NUMBER
Bingham	H-2168
Camp Floyd (aka Fairfield)	H-2144
Camp Floyd (aka Carson's Inn; Cedar City; Fairfield; Fort Crittenden)	H-2035
Carson's Inn (aka Camp Floyd)	H-2035
Cedar City (aka Camp Floyd)	H-2035
Cedar Fort	H-2041
Dividend	H-2083
Dugout (aka Joe's Dugout)	H-2137
Fairfield (aka Camp Floyd)	H-2035
Fairfield (aka Camp Floyd; Fort Crittenden; Frogtown)	H-2144
Fort Crittenden (aka Camp Floyd)	H-2035
Fort Crittenden (aka Fairfield)	H-2144
Fort Saint Luke (aka Old Fort)	H-2159
Frogtown (aka Fairfield)	H-2144
Herriman (aka Bingham)	H-2168
Joe Butchers (aka Joe's Dugout)	H-2137
Joe Dugout's (aka Joe's Dugout)	H-2137
Joe's Dugout (aka Dugout; Joe Butcher's; Joe Dugout's)	H-2137
Lake Shore	H-2186
Lower Settlement (aka Spanish Fork)	H-2032
Mosida	H-2082
Old Palmyra (aka Palmyra)	H-2193
Palmyra (aka Old Palmyra; Palmyra Fort)	H-2193
Palmyra Fort (aka Palmyra)	H-2193
Payson	H-2157
Pond Town (aka Salem)	H-2151
Salem (aka Pond Town)	H-2151
Santaquin	H-2158
Spanish Fork (aka Lower Settlement; Upper Settlement)	H-2032
Spanish Fork Canyon	H-2033
Spanish Fork Reservation	H-2034
Upper Settlement (aka Spanish Fork)	H-2032

WASHINGTON COUTNY

SITE NAME	SITE NUMBER
Adair Springs	H-2204
Atkinville	H-2113
Bennington (aka Leed's)	H-2030
Bloomington (aka St. James)	H-2021
Bonanza City (aka Silver Creek)	H-2109
Central	H-2170
Clover	H-2013
Dalton	H-2172
Damron Valley	H-2173
Enterprise	H-2043
Fort Hamblin (aka Old Hamblin)	H-2106
Fort Harmony (aka Harmony)	H-2009
Foster's Ranch	H-2179
Grafton	H-2020
Grass Valley	H-2181
Gunlock	H-2012
Hamblin (aka Fort Hamblin; Hamblin Ranch)	H-2106
Hamblin Ranch (aka Hamblin)	H-2106
Harmony (aka Fort Harmony; Old Harmony)	H-2009
Harrisburg (aka Harrisville)	H-2028
Harrisville (aka Harrisburg)	H-2028
Heberville (aka Price)	H-2194
Hebron	H-2104
Holt's Ranch	H-2185
Horne	H-2195
Hurricane	H-2215
Joseph's Glory (aka Zion National Park)	H-2208
Leed's (aka Bennington)	H-2030
Middleton	H-2121
Mountain Dell	H-2190
Mountain Meadows	H-2042
Newcastle	H-2112
New Harmony	H-2214
Old Harmony (aka Harmony)	H-2009
Painter Creek (aka Pinto)	H-2105
Pine Valley	H-2011
Pinto (aka Painter Creek; Pinto Creek)	H-2105
Pinto Creek (aka Pinto)	H-2105
Price (aka Heberville)	H-2194
Rockville	H-2019
St. George	H-2031
St. James (aka Bloomington)	H-2021
Santa Clara	H-2116
Santa Clara Indian Mission	H-2199
Silver Reef (aka Bonanza City)	H-2109
Tonaquint	H-2202

SITE NAME	SITE NUMBER
Toquerville	H-2029
Veyo	H-2203
Virgin (aka Virgin City)	H-2027
Virgin City (aka Virgin)	H-2027
Washington	H-2014
Zion National Park (aka Joseph's Glory)	H-2208
Zion Park	H-2026

NEVADA TRAVEL ROUTES

Acoma Road - dates unknown	HR0001
Amargosa - Greenwater (1906-12) - auto stage	HR0003
Amargosa - Greenwater (1906) - toll road	HR0004
American Borax Company Road	HR0199
American Carrara Marble Company Railroad	HR0005
Arrowhead Trail	HR0198
Aurora - Manhatten Road (late 1870s) - stage line and road	HR0002
Aurora - Silver Peak (late 1860s) - stage line	HR0006
Aurora - Osceola (1904) - stage mail route	HR0007
Austin - Belmont (1880s) - mail route (tri-weekly)	HR0011
Austin -Belmont (1870s) - stage line	HR0009
Austin - Candalaria (1880s) - mail route (tri-weekly)	HR0010
Austin City Railway	HR0008
Austin - Egan Canyon (date unknown) - mail route (tri-weekly)	HR0012
Austin - Fort Ruby road (date unknown)	HR0013
Austin - Hamilton (1868) - stage route	HR0014
Austin - Reveille (1866 or 1867) - freight and stage line	HR0015
Austin - White Pine County (1870) - stage route	HR0016
Barberger Road (1901)	HR0017
Battle Mountain - Austin Railroad	HR0018
Battle Mountain - Lewis (1880) - mail route (tri-weekly)	HR0020
Battle Mountain - Lewis Railway	HR0019
Battle Mountain - White Pine County (1800s) stage route	HR0021
Belmont - Hiko (1867) - stage line	HR0022
Belmont - San Antonio (1870s) - stage line	HR0023
Belmont - Wadsworth (1880) - mail route (tri-weekly)	HR0024
Big Smokey Valley - Ophir Canyon (1864-5) - wagon road	HR0025
Blaine - Ely (1980) - stage route	HR0026
Bullfrog - Goldfield Railroad	HR0027
Caliente - Delamar (1904) - stage line	HR0028
Caliente - Pioche Railroad	HR0029
California Crossing (date unknown) - river crossing	HR0030
California - Eastern Nevada (1868) - stage route	HR0032
California - White Pine County (1800s - 1900s) - horse and wagon route	HR0031
Candelaria - Tonopah Road (1901 - 1904) stage and freight route	HR0033
Candelaria - Tonopah (1901 - 1902) - telephone lines	HR0035
Carson - Colorado Railway	HR0036
Central Nevada Railroad	HR0037
Central Pacific Railroad	HR0038
Cherry Creek - Aurum (1890) - weekly; (1904) tri-weekly - stage, mail route	HR0039
Cherry Creek - Ely (1890) - weekly) (1904 - tri-weekly) stage, mail route	HR0040
Cherry Creek - Wells (1890 - tri-weekly) (1904) stage, mail route	HR0041

Chorpenning - Woodward Route	HR0042
Cobre - White Pine County (1870s) - freight route	HR0043
Cole Creek - Eureka (1890 - weekly) - stage, mail route	HR0044
Columbus - Candelaria (1876) - stage line	HR0045
Columbus - Fish Lake Valley (1876) - stage line	HR0046
Columbus - Lida (1876) - stage line	HR0047
Columbus - Wadsworth (1876) - express stage; (1973-1882) - freight route	HR0048
Comet's Spur of the Caliente - Pioche Railroad	HR0049
Death Valley Emigrant Trail (1840s); (1849) - Death Valley Party, Manly Party	HR0050
Death Valley Route of 1849	HR0051
Deep Creek Railroad	HR0052
Deep wells - Belmont (1881) - stage line	HR0053
Deep wells - Downeyville (1881) - stage lines	HR0054
Deep wells - Grantsville (1881) - stage lines	HR0055
Delamar - Milford Road (mid-late 1880s) - road	HR0056
Diamondfield - Goldfield (1903) - toll road	HR0057
Donner Trail (1864) - wagon route	HR0058
Egan Canyon - Humboldt Wells (dates unknown) - stage line	HR0059
Egan Trail (1850 - 1860)	HR0060
Elko - Eureka (1880) - mail route	HR0061
Elko - Hamilton express stage route	HR0062
Elko - Hamilton (dates unknown) - saddle train and stage line	HR0063
Elko - Hamilton (date unknown) - Wells Fargo stage route	HR0064
Elko - Pioche (date unknown) - wagon road	HR0065
Elko - Salt Lake City (1869) - stage route	HR0066
Ellendale - Tonopah (1909) - telegraph line	HR0067
Ellsworth - Wadsworth (1860s) - freight and stage line	HR0068
Ely - Duck Creek (1904) - stage, mail route (bi-weekly)	HR0070
Ely - Eureka (1890 - 1904) - stage mail route	HR0071
Ely - Eureka (1897) - telephone line	HR0072
Ely - Frisco, Utah (1890 - bi-weekly) (1904 - tri-weekly) - stage, mail route	HR0073
Ely - Pioche stage, mail route	HR0074
Ely - Sunnyside (1890) mail route	HR0075
Ely - Sunnyside telephone line	HR0076
Esmeralda Toll Road (date unknown)	HR0077
Eureka - Belmont (1880) - mail route	HR0078
Eureka - Colorado Railroad	HR0079
Eureka - Palisade (1871) - fast freight, stage	HR0080
Eureka and Palisade Railroad	HR0081
Eureka - Pioche (1880) - mail route (tri-weekly)	HR0082
Eureka and Ruby Hill Railroad	HR0083
Goldfield Consolidated Mining Company Railroad	HR0084
Goldfield Railroad	HR0085
Goldfield - Rhyolite (1905) - stage line, express stage, mail route	HR0086
Gold Hitt - Basalt (1905 - 06) - stage line	HR0087
Goose Creek - Humboldt (date unknown) - Emigrant Trail	HR0088

Grantsville-Austin (dates unknown) - stage line	HR0089
Grantsville - Eureka (dates unknown) - stage line	HR0090
Hamilton - Carlin (dates unknown) - stage route	HR0091
Hamilton Central Pacific Railroad at Humbolt River	HR0092
Hamilton - Eberhardt (1870s) - mail route	HR0093
Hamilton - Eberhardt (1870s) - toll road	HR0094
Hamilton - Elko (1871) - stage line	HR0095
Hamilton - Elko (1870s) - stage route	HR0096
Hamilton - Ely (1904) - stage, mail route (bi-weekly)	HR0097
Hamilton to Eureka freight line	HR0098
Hamilton - Palisade stage route	HR0099
Hamilton to Stockdale (1904) - stage, mail route (bi-weekly)	HR0100
Hamilton - Tempiute Road (1870s) - road	HR0101
Hamilton - Treasure Hill (1870s) - stage route	HR0102
Hamilton - Treasure Hill mail route	HR0103
Hill Beach Road and telegraph line	HR0104
Hill Beachy Stage Route from Elko - Hamilton	HR0105
Hobson Toll Road	HR0104
Holladay Overland Route	HR0042
Hot Creek Station - Duck Water Station Road (dates unknown)	HR0034
Humboldt River Emigrant Trail	HR0042
Ivanpah - Bullfrog (dates unknown) - stage line	HR0106
Jefferson - Belmont (dates unknown) - toll road	HR0107
Johnnie - Amargosa (dates unknown) stage line	HR0108
Las Vegas - Rhyolite (1905) - stage, mail, express line	HR0109
Las Vegas and Tonopah Railroad	HR0110
Logan Springs - Crescent City (unknown date) - wagon road	HR0111
Manhatten - Round Mountain (1908) - stage lines (daily)	HR0112
Marvel - Bullfrog (early 1900s) - road	HR0113
Midland Trail (1916)	HR0114
Mineral City - Cherry Creek (date unknown) - stage line	HR0115
Mineral City - Hamilton (1870s) - stage line	HR0116
Mineral City - Toano Freight Line	HR0117
Mineral Range - Silver Peak Tramway	HR0118
Monarch - Manhatten (1906) - stage, express line	HR0119
Morey - Duckwater (1880s) - stage, mail route (weekly)	HR0120
Nelson Tollroad	HR0121
Nevada 46 (1940) - road	HR0197
Nevada Central Narrow Gauge Railroad	HR0122
Nevada Central Railroad	HR0037
Nevada Northern Railway	HR0123
Ophir Canyon - Austin (1865-6) - stage route	HR0124
Ophir Canyon Wagon Road	HR0125
Osceola - Frisco (1880) - mail route (tri-weekly)	HR0126
Osceola - Geyser (1890) - stage, mail route (weekly)	HR0127
Osceola - Pioche (1904) - stage, mail route (biweekly)	HR0128
Overland Mail and Telegraph Company (1861-9) - stations, telegraph lines, mail	HR0042
Overland stage (1860s) - stage line	HR0042
Overland Telegraph, mail, and pony express route	HR0042

Pahranagat - Austin (1866) - wagon route, stage route	HR0129
Pahranagat Mines Tramway	HR0130
Pahranagat Valley - White Pine Valley Road (date unknown)	HR0131
Palisade to Bullion (1880) - mail, stage route (tri-weekly)	HR0132
Palisade - Hamilton (1876) - stage line	HR0133
Panaca - Mount Irish (date unknown) - road	HR0134
Panaca - Muddy Valley (date unknown) - mail route	HR0135
Pioche - Belmont (late 1880s) - road	HR0136
Pioche and Bullionville Railroad	HR0037
Pioche - Eureka (late 1880s) - stage line	HR0137
Pioche - Hamilton stage line	HR0138
Pioche - Hamilton (1890s) - stage, telegraph lines	HR0139
Pioche - Hiko (1880) - mail route (bi-weekly)	HR0140
Pioche - Jackrabbit (date unknown) - telegraph line	HR0141
Pioche - Milford (1888) - wagon route	HR0142
Pioche - Mineral Park (Arizona) (1880) - mail route	HR0143
Pioche Pacific Transportation Company Railroad	HR0144
Pioche - Palisade (late 1880s) - stage line	HR0145
Pioche - Panguitch Lake (1875) - route	HR0146
Pioche - San Francisco, California (dates unknown) - stage line	HR0147
Pioche - Utah State Railroad (1880) - mail route (daily)	HR0148
Pittsburg, and Silver Peak Tramway	HR0149
Pony Express (1860) Route	HR0042
Pong Springs - Pioche Mail Express Route	HR0150
Prince Consolidated Railroad	HR0151
Prospect - Eureka Stage Line	HR0152
Ruby Hill Railroad	HR0153
Ruby Valley - Fair Play (1880) - special mail route	HR0154
Salt Lake City - Muddy Valley Route	HR0155
Salt Lake Railroad Route	HR0156
San Francisco - White Pine County - water transport route	HR0157
San Pedro, Los Angeles and Salt Lake Railroad	HR0158
Schellbourne - Aurum (1880) - special mail route	HR0159
Silverbow - Tonopah (1905) - stage line (weekly)	HR0160
Silver Peak Railroad	HR0161
Six Companies Inc. Railroad	HR0162
Smiley's Spur	HR0049
Sodaville - Tonopah (1901-2) - road	HR0164
Sodaville - Tonopah stage and freight	HR0165
Sodaville - Tonopah telephone line	HR0163
Southern Pacific and Oregon Short Line to Salt Lake	HR0166
Southern Pacific Railroad	HR0038
Spanish Trail (1829)	HR0167
Spruce Mountain -Arthur (1880) - mail route	HR0168
Toano - Deep Creek (Gold Hill) (1870s) - freight line	HR0169
Toano - Pioche (1870-73) - freight line (1870s) - wagon road	HR0170
Toano - Pioche Road	HR0171
Toano - Robinson (date unknown) freight line	HR0172
Tonopah - Clifford (1908) - stage line	HR0173

Tonopah and Goldfield Railroad	HR0036
Tonopah - Manhatten (dates unknown)- stage line	HR0174
Tonopah Railroad	HR0175
Tonopah - Round Mountain (1906) -stage, freight line	HR0176
Tonopah and Tidewater Railroad	HR0177
Tonopah - Wahmonie (1928) - auto stage	HR0178
Transvaal - Beatty (date unknown) stage line	HR0179
Treasure Hill - Eberhardt Tramway	HR0180
Tybo - Eureka (1877) - freight line	HR0181
Tybo - Eureka (1870s) - stage line	HR0182
U.S. 6 (1940) - road	HR0183
U.S. 40 (1940) - road	HR0184
U.S. 50 (1940) - road	HR0185
U.S. 91 (1940) - road	HR0186
U.S. 93 (1940) - road	HR0187
U.S. 95 (1940) - road	HR0188
U.S. Government Construction Railroad	HR0189
Union Pacific Railroad	HR0190
Union Pacific Railroad, Boulder City Branch	HR0190
Upper Sevier - Austin Route	HR0191
Warm Springs - Eureka (date unknown) - stage line	HR0192
Wells - Hamilton (1880) - mail route	HR0193
Western Pacific Railroad	HR0194
Western Union Telegraph Line	HR0195
Yellow Pine Mining Company Railroad	HR0196

UTAH TRAVEL ROUTES

Ajax Wagon Road	HR2001
Bear River - California Routes (1883)	HR2002
Beaver County - Eastern Nevada Route	HR2003
Beckwith Trail (1854)	HR2004
Bingham Canyon Railroad	HR2005
Camp Douglas - Fort Critterden (1863) - military route	HR2006
Camp Douglas - Fort Mohave (1864) - military route	HR2007
Camp Floyd - Ruby Valley (1859) - mail route	HR2008
Cave Mine - Frisco freight road	HR2009
Cedar City mail route (1859)	HR2010
Cedar City - Lund Branch of the Salt Lake Railroad	HR2011
Deep Creek Railroad	HR2012
Delta - Fillmore Branch of the Los Angeles and Salt Lake Railroad	HR2013
Denver and Rio Grande Western Railroad	HR2014
Deseret Telegraph (1871)	HR2015
Dry Canyon - Stockton Road (1876)	HR2016
Eureka Branch of the Denver and Rio Grande Western Railroad	HR2017
Eureka Spur of the Los Angeles and Salt Lake Railroad	HR2018
Fillmore Branch of the Los Angeles and Salt Lake Railroad	HR2019 HR2019
Fort Bridger - Fort Summit (1846) - wagon route	HR2020
Fort Hall - Salt Lake City (1849) - military route, surveyors road	HR2021
Frisco Branch of the Los Angeles and Salt Lake Railroad	HR2022
Frisco - Ely mail route	HR2023
Gilmer and Salisbury Stage Line (1860s)	HR2024
Gold Hill - Salt Lake City (date unknown) - mail route	HR2025
Goshen - Silver City stage and mail line	HR2026
Goshen Valley Railroad	HR2027
Great Salt Lake to California Route (1845)	HR2028
Great Salt Lake Boat and Barge Route	HR2029
Hastings Cutoff (1840s) - wagon route	HR2030
Immigrant Trail	HR2031
Iosepa Road (late 1880s - early 1910)	HR2032
Jesse Knight's Narrow Gauge Railroad	HR2033
Lewiston Canyon Road (established 1869)	HR2034
Lewiston (Mercur) stageline (1873-4)	HR2035
Lincoln Highway (early 1930s)	HR2036
Los Angeles and Salt Lake Railroad	HR2037
Mammoth - Eureka Road (date unknown) auto stage	HR2038
Mercur - Fairfield Road (late 1860s) - wagon road	HR2039
Nephi - York Road (date unknown) - wagon road	HR2040
New East Tintic Railway	HR2041
Ophir - Mercur Road (1870s) - wagon road	HR2042
Ophir Road	HR2043
Ophir Stage Line (pre-1918)	HR2044

Overland Canyon Road (1880s - 1990s) - wagon road	HR2045
Reed Trail	HR2046
Rio Grande Railraod	HR2014
Rio Grande Western Railroad	HR2014
Robinson Railroad	HR2047
Saint John and Ophir Railroad	Hr2048
Salt Lake - Cedar City - Salt Lake explorer route	HR2049
Salt Lake to Hiko Line (date unknown) - stage line	HR2050
Salt Lake - Mercur Railroad	HR2052
Salt Lake City (Deseret Company) - Pioche Line (1871) - stage line, telegraph line	HR2051
Salt Lake City to Treasure City Line (date unknown) - stage line	HR2056
Salt Lake Railroad	HR2054
Salt Lake Route	R2048
Salt Lake - Sevier Valley Railroad	HR2055
Salt Lake - Western Railroad	HR2057
Sampete Valley Railroad	HR2058
Silver City - Diamond Road (date unknown)	HR2059
Silver City - Provo (early 1870s) - stage and mail line	HR2060
Silver City Road	HR2061
Simpson Road (Salt Lake City to Carson Sink) (1859)	HR2062
Spanish Trail (1850s, 60s, 70s)	HR2063
Sunshine Road (1890s) - wagon road	HR2064
Tintic Range Railroad	HR2065
Tintic - Juab wagon road	HR2066
Tooele City - Grantsville Road	HR2067
Topaz - Topaz Mountain Road (date unknown)	HR2068
Transcontinental Railroad	HR2069
U.S. 6 (1941) - road	HR2070
U.S. 40 (1941) - road	HR2071
U.S. 50 (1941) - road	HR2072
U.S. 91 (1941) - road	HR2073
U.T. 15 (1941)	HR2074
U.T. 21 (1941)	HR2075
U.T. 36 (1941)	HR2076
Union Pacific Branch, Delta - Alfalfa	HR2077
Union Pacific Branch, Delta - Sugarville	HR2078
Union Pacific Railroad	HR2079
Utah Central Railroad	HR2080
Utah and Pacific Railroad	HR2081
Utah Southern Railroad	HR2082
Utah Western Railroad	HR2057
Weber Canyon - Sutters Fort - wagon road	HR2083
Western Pacific Railroad	HR2084

APPENDIX C

Historical and Architectural Properties in the Texas/New Mexico Study Area

This appendix lists the properties within the study area compiled in the National Register of Historic Places, the Texas Historic Sites Inventory, and the Texas Tech Univeristy Historic Engineering Sites Inventory (HESI). All of the properties listed by the HESI in the Texas portion of the study area are also in the State Historic Inventory; these properties are listed only under the HESI. This appendix does not include properties which are primarily of archaeological significance.

Property	County	Date/ Period	Style or Significance
National Register of Historic Places:			
E.B. Black House	Deaf Smith, Tx.	1909	Victorian
Mary Birins Library	Potter, Tx.	1905	Georgian Revival
Landergin-Harrington House	Potter, Tx.	1914	Classic Revival
McBride Ranch House*	Potter, Tx.	1903	Partial dugout
L. T. Lester House	Randall, Tx.	1901	Victorian (Queen Anne)
James Phelps White House	Chaves, N. Mex.		
Fort Sumner Ruins	De Baca, N. Mex Ca.	1860	Historic fort
Fort Sumner Railroad Bridge	De Baca, N. Mex.	1905	Railroad
Richardson Store	Quay, N. Mex.		
Texas Historic Sites Inventory:			
Muleshoe Ranch Cookhouse*	Bailey	1897	Ranch building
Slaughter Ranch House	Cochran	1915	Spanish Colonial
St. James Episcopal Church	Dallam	1910	Victorian (Queen Anne)
Meth. Episcopal Church	Dallam	1914	Religious structure
Deaf Smith Co. Courthouse	Deaf Smith	1910	Classic Revival
Channing Methodist Church	Hartley	1898	Victorian (Gothic Revival)

*Rural site (at present or when originally built)

Property	County	Date/ Period	Style or Significance
XIT Ranch Headquarters	Hartley	1890	Victorian
Hartley Co. Jail	Hartley	1892	Stone vernacular
Tascosa Courthouse	Oldham	1884	Stone vernacular
Farwell Bank Building	Parmer	1907	Renaissance Revival
McBride Ranchouse*	Potter	1903	Ranch building
Lee Bivens House	Potter	1901-1929	Classic Revival
A. G. Boyce House	Potter	1901-1929	Mission Revival
Capital Hotel	Potter	1901-1929	Renaissance Revival
Allen Early Second House	Potter	1901-1929	Classic Revival
First Baptist Church	Potter	1890	Victorian
Griggs House	Potter	1901	Victorian
J. L. Harrington House	Potter	1901-1929	Classic Revival
J. L. Harrington Grocery	Potter	1901-1907	Victorian Commercial
W.E. Herring House	Potter	1901-1929	Classic Revival
Houghton House	Potter	1901-1929	
Gustavus Kilbourne House	Potter	1901-1929	Victorian
Nichols House	Potter	1901-1929	Classic Revival
Rock Island Depot	Potter	1901-1929	Railroad
H. B. Sanbourne House	Potter	1901-1929	Victorian
Santa Fe Depot	Potter	1901-1929	Railroad
Lon Selers House	Potter	1901-1929	Victorian
J. D. Shuford House	Potter	1901-1929	Classic Revival
Willis D. Twitchell	Potter	1901-1929	Victorian
First Baptist Church	Potter	1890	Gothic Revival

*Rural site (at present or when originally built)

Property	County	Date/ Period	Style or Significance
1106 S. Tyler St.	Potter	1901-1929	Victorian
1119 S. Harrison St.	Potter	1901-1929	Victorian
118 S. Harrison St.	Potter	1901-1929	Classic Revival
1612 S. Polk St.	Potter	1874-1900	Victorian
1710 S. Polk St.	Potter	1901-1929	
1712 S. Polk St.	Potter	1901-1929	
1716 S. Polk St	Potter	1901-1929	Eclectic
203 S. Lincoln St.	Potter	1874-1900	Victorian
218 S. Lincoln St.	Potter	1874-1900	Victorian
2 W. 11th St.	Potter	1901-1929	Victorian
416 W. 4th St.	Potter	1901-1929	Symmetrical Victorian
706 S. Harrison St.	Potter	1901-1929	Victorian
W. R. Curtis House	Potter	1901-1929	Classic Revival
J. W. Danner House	Potter	1901-1929	Classic Revival
E. L. Dohoney House	Potter	1901-1929	Classic Revival
Frying Pan Ranch House*	Potter	1874-1881	Ranch building
L. T. Lester House	Randall	1901	Victorian (Queen Anne)
T. Anchor Ranch Headquarters*	Randall	1877	Log building

<u>Texas Tech University Historical Engineering Site Inventory:</u>

Property	County	Date/ Period	Style or Significance
Warren Ranch/Farm Irrigation Well	Bailey, Tex.	1901	Water control
Dalhart Army Airfield	Dallam, Tex.	1942	Military airfield
XIT Dam	Deaf Smith, Tex.	1917	Water control
D. L. MacDonald Frio Draw Irrigation Well	Deaf Smith, Tex.	1910	Water control

*Rural site (at present or when originally built)

Property	County	Date/ Period	Style or Significance
Tierra Blanca and Frio Draw Irrigation Project	Deaf Smith, Tex.	1910	Water control
Stant Rhen Stage Stand	Hale, Tex.	1901	Transportation
Upright Oil-burning Irrigation Engine	Hale, Tex.	1914	Water control
Plainview Water Works	Hale, Tex.	1912	Water control
Plainview Irrigation District	Hale, Tex.	1910-1915	Water control
Plainview Field	Hale, Tex.	1942	Military airfield
Lake Plainview	Hale, Tex.	Ca. 1913	Water control
Green Machine Company	Hale, Tex.	Ca. 1915	Industry
John Henry Slaton Irrigation Well	Hale, Tex.	1911	Water control
Plant X Electric Generation Station	Lamb, Tex.	1952	Energy
LFD Irrigation System	Lamb, Tex.		Water control
Rock Lime Kiln	Moore, Tex.	Ca. 1890	Early industry
XIT Ranch Electric Fence and Telephone Line	Oldham, Tex.	1888	Ranching
Salinas Lake Salt Supply	Oldham, Tex.	1800-1840	Historic
Alamocitos Irrigation System	Oldham, Tex.	1910	Water control
Cliffside Helium Field	Potter, Tex.	1927	Industry
Amarillo Army Air Field	Potter, Tex.	Ca. 1942	Military airfield
Singing Median	Randall, Tex.	Ca. 1958	Transportation

Property	County	Date/ Period	Style or Significance
Overland Freight Station	Sherman, Tex.	Ca. 1880	Historic transportation
Vaughan Bros. Oil-burning Irrigation Engine	Swisher, Tex.	1914	Water control
Tulia Waterworks	Swisher, Tex.	Ca. 1880	Water control
Lake Van	Chaves, N. Mex.	1890	Water control
Atlas Missile Sites	Chaves, N. Mex.	1961	Military
Goddard Rocket Collection	Chaves, N. Mex.	1930	Scientific
Rio Feliz Timber Bridge	Chaves, N. Mex.	1920	Transportation
Salt Creek Bridge	Chaves, N. Mex.	1938	Transportation
Rio Feliz Bridge	Chaves, N. Mex.	1926	Transportation
Pecos River Bridge, Roswell	Chaves, N. Mex.	1939	Transportation
Northern Canal	Chaves, N. Mex.	1890	Water control
Hondo Project	Chaves, N. Mex.	1907	Water control
Federal Fish Hatchery	Chaves, N. Mex.	1932	Engineering
Stone Family Irrigation System	Chaves, N. Mex.	1880	Water control
Falsey Draw Bridge	Chaves, N. Mex.	1938	Transportation
Hyes and Bonney Ice Plant	Chaves, N. Mex.	Ca. 1900	Industry
Hope Retard Dam	Chaves, N. Mex.	1941	Water control
Canal Bridge	Chaves, N. Mex.	1938	Transportation
Dexter Wells	Chaves, N. Mex.	1893	Water control
Pecos River Bridge, Dexter	Chaves, N. Mex.	1907	Transportation
A. T. and S. F. Railroad Depot	Curry, N. Mex.	1908	Railroad
Fort Sumner Railroad Bridge	De Baca, N. Mex.	1906	Railroad
Sumner Dam	De Baca, N. Mex.	1937	Water control

Property	County	Date/ Period	Style or Significance
Taiban Bridge	De Baca, N. Mex.	1933	Transportation
Pecos River Bridge, Fort Sumner	De Baca, N. Mex.	1926	Transportation
Taiban Creek Bridge	De Baca, N. Mex.	1933-1933	Transportation
Yeso Bridge	De Baca, N. Mex.	1934	Transportation
Goodnight-Loring Trail	De Baca, N. Mex.	1866	Transportation
Fort Sumner Railroad Depot	De Baca, N. Mex.	1906	Railroad
Fort Sumner Railroad Bridge No. 2	De Baca, N. Mex.	1939	Railroad
Fort Sumner Irrigation District Canal System	De Baca, N. Mex.	1950	Water control
Fort Sumner Irrigation District Conversion Dam	De Baca, N. Mex.	1950	Water control
Fort Sumner Bridge	De Baca, N. Mex.	1915	Transportation
Eclipse Windmill	De Baca, N. Mex.	Ca. 1900	Water control
Arroyo de Anil Bridge	De Baca, N. Mex.	1937	Transportation
SEC Corporation Dry Ice Plant and Pipeline	Harding, N. Mex.	1939	Industry
Orchard Ranch	Harding, N. Mex.	Ca. 1885	Water control
Dry Ice Plant	Harding, N. Mex.	Ca. 1948	Industry
Solano Water Stop	Harding, N. Mex.	Ca. 1907	Railroad
Ranger Lake Windmill	Lea, N. Mex.	Ca. 1880	Water control
South Plains and Santa Fe Railway	Lea, N. Mex.	1928	Railroad
Texas/New Mexico Railway	Lea, N. Mex.	1930	Railroad
Basin No. 1 Oil Well	Lea, N. Mex.	1926	Industry
Plaza Largo Creek Bridge	Quay, N. Mex.	1937	Transportation
Highway 66 Timber Bridge			

Property	County	Date/ Period	Style or Significance
No. 2	Quay, N. Mex.	1931	Transportation
Highway 66 Concrete Bridge	Quay, N. Mex.	1936	Transportation
Montoya Bridge No. 1-3	Quay, N. Mex.	1936	Transportation
Montoya Railroad Trestle	Quay, N. Mex.	Ca. 1910	Railroad
Rock Island Railroad Bridge	Quay, N. Mex.	1935	Railroad
San Juan Creek Bridge	Quay, N. Mex.	1929	Transportation
Canadian River Bridge	Quay, N. Mex.	1954	Transportation
Portales Windmills	Roosevelt, N. Mex.	Ca. 1900	Water control
Portales Irrigation Project	Roosevelt, N. Mex.	1911	Water control
Dry Stone Fence	Union, N. Mex.	1870	Historical
Oklahoma State Line Bridge	Union, N. Mex.	1935	Transportation
Old Clayton Dam	Union, N. Mex.	Ca. 1900	Water control
Clayton Windmill Turbine Generator	Union, N. Mex.	1977	Energy
Cienaguilla Creek Bridge	Union, N. Mex.	Ca. 1920	Transportation
Carrizozo Creek Bridge	Union, N. Mex.	1914	Transportation
Colorado and Southern Railroad	Union, N. Mex.	1887	Railroad
Colmor Cutoff	Union, N. Mex.	1930	Railroad
Devoy Flume	Union, N. Mex.	1908	Water control
Clayton Railroad Depot	Union, N. Mex	1888	Railroad
Clayton Dam	Union, N. Mex.	1954	Water Control
Dry Cimarron River Irrigation Canal	Union, N. Mex.	Ca. 1910	Water control
Dry Cimarron River Bridge	Union, N. Mex.	Ca. 1910	Transportation
State Line Brige	Union, N. Mex.	1928	Transportation

Property	Count''	Date/ Period	Style or Significa
Southern Pacific Railroad	Quay, San Miguel, Harding, N. Mex.	1902	Railroad
Belen Cutoff	Valencia, Torrance, Guadalupe, De Baca, Curry, N. Mex.	1902	Railraod
Pecos Valley and Northeastern Railway	Eddy, Chaves Roosevelt, N. Mex.	1898	Railroad
Panhandle Oil Field	Wheeler, Gray, Carson, Hutchinson, Potter, Tex.	1916	Industry
Chocktaw, Oklahoma, and Texas Railroad	Carson, Gray Oldham, Potter, Wheeler, Tex.	1901	Railroad
Chisom Trails	Tom Green, Oldham, Bailey, Potter, Tex.	Ca. 1875	Transportati
Lake Meredith	Hutchinson, Moore, Potter, Tex.	1962	Water contr
Fort Worth and Denver South Plains Railroad	Castro, Floyd, Hale, Hall, Lubbock, Tex.	1925	Railraod
St. Louis, Rocky Mountain, and Pacific Railway	Union, Colfax, Tex.	1905	Railroad
Amarillo to Roswell Furrow	Potter, Randall Deaf Smith, Parmer, Tex., Chaves, N. Mex.	Ca. 1889	Transportati

APPENDIX D

CULTURAL RESOURCE INVENTORY FOR UTAH HYDROLOGIC BASINS

This appendix tabulates the results of FY 1980 Regional Sample Survey conducted by the Archaeological Center, University of Utah and Woodward-Clyde Consultants for HDR Sciences. Refer to Section 2.4.3 for a discussion of the survey results.

Explanation of abbreviations for site chart:

M-X Number	M-X Project Site Number
Site Number	Smithsonian Site Number
Cultural Affil	Cultural Affiliation
Site Type	Archaeological Site Type
Vegetation Assoc	Vegetation Association
Valley Name	U.S.G.S. Hydrological Basin Name
Elev	Elevation above sea level
Site Area	Area of site in square meters
P	Presence of projectile points
C	Presence of ceramics
D	Presence of lithic debitage
S	Presence of structures
E	Text excavation (yes or no)
Landform	Primary Landform
Depositional Environment	Depositional Environment

Appendix D - Cultural Resource Inventory for Utah Hydrologic Basins (Page 1 of 10).

M-X Site No.	Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	F	Landform	Depositional Environment
4 3PI 1	42MD 0	Unknown		Isolate	Greasewood	Snake	5030	0						Valley	Playa
4 0P 1	42MD 553	Archaic	Fremont	Field Camp	Shadscale	Snake	5320	100		x	x		x	Valley	Talus
4 0P 1	42MD 554	Unknown		Isolate	Small Sagebrush	Snake	5540	7						Ridge	Cliff
4 10P 1	42MD 555	Unknown		Isolate	Pinyon-Juniper	Snake	6160	15,000			x			Valley	Fan
4 19PI 1	42MD 0	Unknown		Isolate	Greasewood	Snake	5460	0			x			Valley	Fan
4 19PI 2	42MD 0	Unknown		Isolate	Greasewood	Snake	5460	0	x					Valley	Fan
4 27P 1	42MD 564	Fremont		Field Camp	Greasewood	Snake	5360	1,500		x	x			Valley	Aluvial Plain
5 OPI 1	42BE 0	Unknown		Isolate	Sagebrush	Pine	5990	0			x			Valley	Fan
5 3PI 1	42MD 0	Unknown		Isolate	L. Rabbitbrush	Pine	5095	0			x			Valley	Extinct Lk.Feat
5 4PI 1	42MD 0	Unknown		Isolate	Greasewood	Pine	5090	0			x			Valley	Playa
5 4PI 2	42MD 0	Unknown		Isolate	Greasewood	Pine	5090	0			x			Valley	Playa
5 5PI 1	42BE 0	Unknown		Isolate	Shadscale	Pine	5240	0						Valley	Fan
5 11P 1	42BE 842	Archaic	Fremont	Field Camp	Pinyon-Juniper	Pine	6300	30,000	x	x	x			Valley	Fan
5 14PI 1	42BE 0	Unknown		Isolate	Winter-fat	Pine	5425	0			x			Plain	Flood Plain
5 16PI 1	42BE 0	Unknown		Isolate	Sagebrush	Pine	6000	0	x					Plain	Alluvial Plain
5 16PI 2	42BE 0	Archaic		Isolate	Sagebrush	Pine	5960	0	x					Plain	Alluvial Plain
5 16PI 3	42BE 0	Archaic		Isolate	Sagebrush	Pine	6000	0	x					Plain	Alluvial Plain
5 17PI 1	42BE 0	Unknown		Isolate	Sagebrush	Pine	5980	0			x			Valley	Fan
5 17PI 2	42BE 0	Unknown		Isolate	Sagebrush	Pine	5985	0						Valley	Fan
5 17PI 3	42BE 0	Unknown		Isolate	Sagebrush	Pine	5900	0						Valley	Fan
5 18P 1	42BE 843	Archaic	Fremont	Isolate	Pinyon-Juniper	Pine	6300	99,998	x	x	x			Canyon	Fan
5 18P 2	42BE 844	Fremont		Res. Base	Pinyon-Juniper	Pine	6385	400	x	x	x			Ridge	Fan
5 18PI 1	42BE 0	Unknown		Isolate	Shadscale	Pine	6800	0						Canyon	Fan
5 19P 1	42BE 845	Archaic	Fremont	Field Camp	Pinyon-Juniper	Pine	6650	45,000	x	x	x			Hill	Colluvium
5 19P 2	42BE 846	Unknown		Isolate	Pinyon-Juniper	Pine	6600	9			x			Valley	Alluvial Plain
5 19P 3	42BE 847	Shoshoni		Isolate	Pinyon-Juniper	Pine	6600	6		x				Valley	Alluvial Plain
5 20P 1	42BE 858	Archaic	Fremont	Isolate	Pinyon-Juniper	Pine	6500	99,998	x		x			Valley	Fan
5 21M 1	42BE 859	Archaic	Euro-Am.	Res. Base	Sagebrush	Pine	7600	99,998	x		x	x		Canyon	Alluvial Plain
5 21PI 1	42BE 0	Unknown		Isolate	Sagebrush	Pine	6000	0	x					Valley	Fan
5 21PI 2	42BE 0	Unknown		Isolate	Sagebrush	Pine	6045	0			x			Valley	Fan

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M-X Site No.		Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	F	Landform	Depositional Environment
5 22PI	1	42BE 0	Unknown		Isolate	Pinyon-Juniper	Pine	6460	0			x			Valley	Colluvium
5 23PI	1	42BE 0	Unknown		Isolate	Plains/Priairie	Pine	6760	0			x			Canyon	Fan
5 25P	1	42MD 562	Unknown		Isolate	Pinyon-Juniper	Pine	5650	100			x			Valley	Dune
5 25PI	1	42BE 0	Unknown		Isolate	Pinyon-Juniper	Pine	6300	0	x					Plain	Alluvial Plain
5 25PI	2	42BE 0	Archaic		Isolate	Pinyon-Juniper	Pine	6260	0	x					Plain	Alluvial Plain
5 26P	1	42MD 563	Shoshoni		Isolate	Pinyon-Juniper	Pine	5600	*****	x	x	x		x	Valley	
5 27P	1	42BE 848	Fremont		Isolate	Pinyon-Juniper	Pine	6560	60,000		x	x			Valley	Alluvial Plain
5 27P	2	42BE 849	Fremont		Isolate	Pinyon-Juniper	Pine	6560	40,000	x	x	x			Valley	Alluvial Plain
5 27P	3	42BE 850	Unknown		Isolate	Pinyon-Juniper	Pine	6600	80,000			x			Valley	Alluvial Plain
5 27H	1	42BE 861	Euro-Am.		Res. Base	Pinyon-Juniper	Pine	6560	2,000				x		Valley	Alluvial Plain
5 28P	1	42BE 851	Archaic	Fremont	Field Camp	Pinyon-Juniper	Pine	6600	45,000		x	x			Valley	Outcrop
5 28P	2	42BE 852	Fremont	Unknown	Field Camp	Pinyon-Juniper	Pine	6560	2,800		x	x			Valley	Outcrop
5 28P	3	42BE 853	Fremont		Isolate	Pinyon-Juniper	Pine	6550	500		x	x			Valley	Alluvial Plain
5 28P	4	42BE 854	Archaic	Fremont	Isolate	Pinyon-Juniper	Pine	6530	600	x	x	x			Valley	Stream Terrace
5 28P	5	42BE 855	Archaic	Fremont	Field Camp	Pinyon-Juniper	Pine	6270	1,600		x	x			Valley	Outcrop
5 OP	1	42BE 856	Fremont		Field Camp	Pinyon-Juniper	Pine	6480	500		x	x			Valley	Outcrop
5 28P	6	42BE 857	Fremont	Shoshoni	Res. Base	Pinyon-Juniper	Pine	6600	2,500	x	x	x			Ridge	Outcrop
6 0PI	1	42MD 0	Unknown		Isolate	Greasewood	Tule	4427	0			x			Valley	Playa
6 0PI	2	42MD 0	Unknown		Isolate	Pickleweed/Samp	Tule	4422	0			x			Valley	Playa
6 1HI	1	42JB 0	Euro-Am.		Isolate	Shadscale	Tule	4860	0						Valley	Extinct Lk.Feat
6 3HI	1	42JB 0	Euro-Am.		Isolate	Horsebrush	Tule	5160	0						Valley	Alluvial Plain
6 4HI	1	42JB 0	Euro-Am.		Isolate	Shadscale	Tule	4520	0	x					Valley	Alluvial Plain
6 0P	1	42JB 228	Fremont		Field Camp	Pickleweed/Samp	Tule	4435	750	x	x	x			Valley	Dune
6 0P	1	42MD 505	Unknown		Isolate	Pinyon-Juniper	Tule	6800	63			x			Hill	Stream Terrace
6 0P	2	42MD 506	Unknown		Field Camp	Pinyon-Juniper	Tule	6550	70						Canyon	Outcrop
6 0P	3	42MD 507	Unknown		Isolate	Pinyon-Juniper	Tule	6520	54						Canyon	Outcrop
6 9P	1	42MD 530	Fremont		Field Camp	Sagebrush	Tule	6160	75		x	x			Hill	Cliff
6 9H	1	42MD 531	Euro-Am.		Field Camp	Sagebrush	Tule	6240	150					x	Hill	Cliff
6 11P	1	42MD 445	Unknown		Isolate	Greasewood-Shad	Tule	4430	2500			x			Valley	Dune
6 11P	2	42MD 446	Fremont	Unknown	Res. Base	Greasewood-Shad	Tule	4430	31,000	x	x	x			Valley	Dune

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M-X Site No.	Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
6 0P 1	42MD 447	Fremont		Isolate	Greasewood-Shad	Tule	4430	1,500		x	x			Valley	Dune
6 14PI 1	42MD 0	Unknown		Isolate	Cold Desert Shr	Tule	4930	0			x			Valley	Fan
6 16P 1	42MD 448	Unknown		Isolate	Salt Des. Shrub	Tule	4433	200			x			Valley	Dune
6 16P 2	42MD 449	Unknown		Isolate	Greasewood	Tule	4434	62,500	x		x			Valley	Dune
6 16P 3	42MD 450	Archaic		Isolate	Greasewood	Tule	4434	10,000	x		x			Valley	Dune
6 17PI 1	42MD 0	Unknown		Isolate	Pickleweed/Samp	Tule	4422	0			x			Valley	Playa
6 17PI 2	42MD 0	Unknown		Isolate	Greasewood	Tule	4423	0			x			Valley	Dune
6 17PI 3	42MD 0	Unknown		Isolate	Greasewood	Tule	4425	0			x			Valley	Dune
6 18P 1	42MD 544	Unknown		Isolate	L. Rabbitbrush	Tule	4445	0			x			Valley	Extinct Lk.Feat
6 23P 1	42MD 508	Unknown		Isolate	Salt Des. Shrub	Tule	4433	2,400			x			Valley	Dune
6 23P 2	42MD 509	Unknown		Isolate	Salt Des. Shrub	Tule	4430	2,000	x					Valley	Dune
6 23P 3	42MD 510	Unknown		Isolate	Mud Flats letc.	Tule	4430	10,000	x					Valley	Dune
6 26PI 1	42MD 0	Unknown		Isolate	Cold Desert Shr.	Tule	4555	0			x			Valley	Alluvial Plain
6 27PI 1	42MD 0	Unknown		Isolate	Shadscale	Tule	4427	0	x					Valley	Extinct Lk. Feat
6 27PI 2	42MD 0	Unknown		Isolate	Shadscale	Tule	4422	0			x			Valley	Extinct Lk. Feat
6 33P 1	42MD 511	Fremont		Res. Base	Sagebrush	Tule	5400	600	x	x	x			Canyon	Colluvium
6 36PI 1	42MD 0	Unknown		Isolate	Cold Desert Shr	Tule	4830	0			x			Valley	Colluvium
6 37PI 1	42MD 0	Archaic	Fremont	Isolate	L. Rabbitbrush	Tule	4720	0	x					Valley	Fan
6 37PI 2	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4720	0			x			Valley	Fan
6 37PI 3	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4730	0						Valley	Fan
6 37PI 4	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4730	0			x			Valley	Fan
6 38PI 1	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4800	0			x			Valley	Fan
6 38PI 2	42MD 0	Unknown		Isolate	L.Rabbitbrush	Tule	4800	0			x			Valley	Fan
6 38PI 3	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4800	0			x			Valley	Fan
6 38PI 4	42MD 0	Unknown		Isolate	Horsebrush	Tule	4800	0			x			Valley	Fan
6 38PI 5	42MD 0	Unknown		Isolate	Horsebrush	Tule	4800	0			x			Valley	Fan
6 38PI 6	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4800	0			x			Valley	Fan
6 39PI 1	42MD 0	Unknown		Isolate	Cold Desert Shr	Tule	4840	0			x			Valley	Fan
6 0P 1	42MD 512	Fremont		Field Camp	Cold Desert Shr	Tule	4820	16,500	x	x	x			Hill	Fan

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M-X Site No.	Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
6 40PI 1	42MD 0	Unknown		Isolate	Shadscale	Tule	4800	0			x			Valley	Fan
6 40PI 2	42MD 0	Unknown		Isolate	Shadscale	Tule	4760	0			x			Valley	Playa
6 41PI 1	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4860	0			x			Valley	Fan
6 41PI 2	42MD 0	Unknown		Isolate	Shadscale	Tule	4860	0			x			Valley	Fan
6 41PI 3	42MD 0	Unknown		Isolate	L. Rabbitbrush	Tule	4880	0			x			Valley	Fan
6 42PI 1	42MD 0	Unknown		Isolate	Salt Des. Shrub	Tule	5360	0			x			Valley	Stream Bad
6 42HI 1	42MD 0	Euro-Am.		Isolate	Salt Des. Shrub	Tule	5360	0						Valley	Stream Bad
7 0PI 1	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5440	0						Valley	Coluvium
7 6M 1	42JB 229	Unknown	Euro-Am.	Isolate	Pinyon-Juniper	Fish Sp	5240	28,000			x			Mtn. Spine	Fan
7 0P 1	42JB 230	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5000	100			x			Hill	Cliff
7 9P 1	42JB 231	Unknown		Isolate	Greasewood-Shad	Fish Sp	4367	4,200			x			Valley	Playa
7 9P 2	42JB 232	Unknown		Isolate	Greasewood-Shad	Fish Sp	4367	1,800			x			Valley	Playa
7 9PI 1	42JB 0	Unknown		Isolate	Greasewood-Shad	Fish Sp	4373	0			x			Valley	Playa
7 11P 1	42JB 233	Unknown		Isolate	Greasewood-Shad	Fish Sp	4460	18,125			x			Valley	Playa
7 12P 1	42JB 234	Unknown		Isolate	Horsebrush	Fish Sp	4720	99,998			x			Valley	Alluvial Plain
7 13P 1	42JB 235	Unknown		Isolate	Horsebrush	Fish Sp	4980	1,200			x			Plain	Extinct Lk. Feat
7 14P 1	42JB 236	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5400	4			x			Hill	Outcrop
7 14PI 1	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5480	0						Valley	Fan
7 14PI 2	42JB 0	Unknown		Isolate	Shadscale	Fish Sp	5400	0						Valley	Fan
7 16P 1	42JB 255	Unknown		Isolate	Sagebrush	Fish Sp	4630	5,000						Valley	Alluvial Plain
7 17P 1	42JB 237	Unknown		Isolate	Horsebrush	Fish Sp	4880	800			x			Plain	Alluvial Plain
7 17PI 1	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	4878	0			x			Valley	Alluvial Plain
7 17PI 2	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	4878	0			x			Valley	Alluvial Plain
7 17PI 3	42JB 0	Unknown		Isolate	Cold Desert Shr.	Fish Sp	4870	0			x			Valley	Alluvial Plain
7 17PI 4	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	4870	0			x			Valley	Alluvial Plain
7 18PI 1	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5430	0			x			Valley	Stream Terrace
7 18PI 2	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5490	0			x			Valley	Stream Terrace
7 20P 1	42JB 238	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5080	600			x			Plain	Alluvial Plain
7 20P 2	42JB 239	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5100	300			x			Ridge	Dune

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M-X Site No.	Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
7 20PI 1	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5039	0			x			Hill	Colluvium
7 20PI 2	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5050	0			x			Valley	Colluvium
7 20PI 3	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5062	0			x			Valley	Alluvial Plain
7 20PI 4	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5062	0			x			Valley	Aluvial Plain
7 20PI 5	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5065	0			x			Valley	Alluvial Plain
7 20PI 6	42JB 0	Unknown		Isolate	Pinyon-Juniper	Fish Sp	5075	0			x			Valley	Alluvial Plain
7 20HI 1	42JB 0	Euro-Am.		Isolate	Pinyon-Juniper	Fish Sp	5035	0						Hill	Colluvium
7 20HI 2	42JB 0	Euro-Am.		Isolate	Pinyon-Juniper	Fish Sp	5090	0						Valley	Alluvial Plain
7 20HI 3	42JB 0	Euro-Am.		Isolate	Pinyon-Juniper	Fish Sp	5060	0						Valley	Colluvium
7 20HI 4	42JB 0	Euro-Am.		Isolate	Pinyon-Juniper	Fish Sp	5090	0						Valley	Colluvium
7 20HI 5	42JB 0	Euro-Am.		Isolate	Pinyon-Juniper	Fish Sp	5110	0						Hill	Colluvium
7 21P 1	42JB 240	Archaic		Field Camp	Cold Desert Shr	Fish Sp	5220	5,000	x		x			Plain	Alluvial Plain
7 21P 2	42JB 241	Unknown		Isolate	Horsebrush	Fish Sp	5220	100			x			Plain	Alluvial Plain
7 21P 3	42JB 242	Unknown		Isolate	Shadscale	Fish Sp	5210	450			x			Plain	Alluvial Plain
7 21P 4	42JB 243	Unknown		Isolate	Horsebrush	Fish Sp	5210	600			x			Plain	Alluvial Plain
7 21P 5	42JB 244	Unknown		Isolate	Horsebrush	Fish Sp	5220	250			x			Ridge	Unknown
7 21P 6	42JB 245	Unknown		Isolate	Cold Desert Shr	Fish Sp	5240	36			x			Ridge	Unknown
7 21PI 1	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5190	0	x					Valley	Fan
7 21PI 2	42JB 0	Unknown		location	Cold Desert Shr	Fish Sp	5240	0			x			Valley	Fan
7 21PI 3	42JB 0	Unknown		Isolate	Cold Desert Shr	Fish Sp	5240	0			x			Valley	Fan
8 2P 1	42TO 218	Fremont	Archaic	Field Camp	Greasewood-Shad	Dugway	4475	9,000	x		x			Plain	Stream Terrace
8 2PI 1	42TO 0	Unknown		Isolate	Greasewood-Shad	Dugway	4470	0	x					Valley	Extinct Lk. Feat
8 3P 1	42TO 219	Unknown		Isolate	Shadscale	Dugway	4510	7,000			x			Plain	Stream Terrace
8 5H 1	42TO 257	Euro-Am.		Isolate	Shadscale	Dugway	4550	10,000						Valley	Extinct Lk. Feat
8 6P 1	42JB 246	Unknown		Isolate	Rabbitbrush	Dugway	4800	39,375						Valley	Colluvium
8 6P 2	42JB 247	Unknown		Isolate	Rabbitbrush	Dugway	4800	5,200			x			Valley	Colluvium
8 6P 3	42JB 248	Unknown		Isolate	Cold Desert Shr	Dugway	4800	10,000			x			Ridge	Dune
8 7PI 1	42JB 0	Unknown		Isolate	Shadscale	Dugway	4950	0			x			Valley	Alluvial Plain
8 7PI 2	42JB 0	Unknown		Isolate	Shadscale	Dugway	4850	0						Valley	Alluvial Plain

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Appendix D - Cultural Resource Inventory for Utah Hydrologic Basins (Page 6 of 10).

M-X Site No.		Smithsonian Trinomial Designation[1]		Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
8 9H	1	42JB	249	Euro-Am		Isolate	Cold Desert Shr	Dugway	5080	100						Plain	Fan
8 10P	1	42JB	250	Unknown		Isolate	Cold Desert Shr	Dugway	5350	185			x			Valley	Colluvium
8 11M	1	42JB	251	Fremont	Euro-Am.	Isolate	Cold Desert Shr	Dugway	5280	2,100		x	x			Valley	Alluvial Plain
46 1P	1	42JB	252	Unknown		Isolate	Pinyon-Juniper	SevierL	5600	3,000						Hill	Talus
46 1P	2	42JB	253	Unknown		Isolate	Pinyon-Juniper	SevierL	5481	10,000			x			Valley	Flood Plain
46 1P	3	42JB	261	Unknown		Isolate	Pinyon-Juniper	SevierL	5501	40,000			x			Valley	Talus
46 1PI	1	42JB	0	Archaic		Isolate	Pinyon-Juniper	SevierL	5481	0	x					Valley	Flood Plain
46 1PI	2	42JB	0	Unknown		Isolate	L. Rabbitbrush	SevierL	5600	0			x			Hill	Talus
46 2P	1	42JB	262	Unknown		Isolate	Shadscale	SevierL	5140	32,000			x			Valley	Extinct Lk. Feat
46 6P		42JB	254	Unknown		Isolate	Winter-fat	SevierL	5300	9,000			x			Valley	Alluvial Plain
46 3P	1	42MD	518	Fremont		Isolate	Cold Desert Shr	SevierL	4565	80,000						Plain	Flood Plain
46 3P	2	42MD	519	Archaic	Fremont	Isolate	Salt Des. Shrub	SevierL	4565	5,625	x					Plain	Dune
46 4P	1	42MD	556	Fremont		Field Camp	Shadscale	SevierL	4572	12,000	x	x	x			Valley	Extinct Lk. Feat
46 4P	2	42MD	557	Fremont		Isolate	Shadscale	SevierL	4565	4		x	x			Valley	Extinct Lk. Feat
46 5P	1	42MD	520	Unknown		Isolate	Cold Sesert Shr	SevierL	4570	99,998						Valley	Dune
46 9PI	1	42JB	0	Archaic		Isolate	Sagebrush	SevierL	5730	0	x					Valley	Alluvial Plain
46 12P	1	42MD	514	Unknown		Isolate	Cold Desert Shr	SevierL	5400	750			x			Valley	Alluvial Plain
46 14P	1	42JB	263	Unknown		Isolate	Shadscale	SevierL	4580	10,000			x		x	Valley	Extinct Lk. Feat
46 15P	1	42MD	558	Fremont		Field Camp	L. Rabbitbrush	SevierL	4567	15,000			x			Valley	Dune
46 16P	1	42MD	559	Unknown		Isolate	Cold Desert Shr	SevierL	4560	1,800			x		x	Ridge	Playa
46 16PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierL	5640	0			x			Valley	Fan
46 16HI	1	42MD	0	Euro-Am.		Isolate	Shadscale	SevierL	5640	0		x				Valley	Fan
46 17P	1	42MD	560	Unknown		Isolate	Greasewood	SevierL	4566	750			x			Valley	Flood Plain
46 17P	2	42MD	561	Fremont		Field Camp	Shadscale	SevierL	4567	100	x	x				Valley	Flood Plain
46 17PI	1	42MD	0	Unknown		Isolate	Code Desert Shr	SevierL	5190	0			x			Valley	Alluvial Plain
46 17PI	2	42MD	0	Unknown		Isolate	Code Desert Shr	SevierL	5190	0			x			Valley	Alluvial Plain
46 20P	1	42MD	545	Unknown		Isolate	Salt Des. Shrub	SevierL	4572	400			x			Plain	Alluvial Plain
46 20P	2	42MD	546	Unknown		Isolate	Salt Des. Shrub	SevierL	4577	24			x			Valley	Alluvial Plain
46 21M	1	42MD	515	Unknown	Euro-Am.	Isolate	Cold Desert Shr.	SevierL	6040	800			x			Ridge	Fan

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M-X Site No.		Smithsonian Trinomial Designation[1]		Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
46 21M	2	42MD	516	Archaic	Shoshoni	Isolate	Cold Desert Shr	SevierL	6030	9,000	x		x			Mtn. Spine	Fan
46 21PI	1	42MD	0	Unknown		Isolate	Sagebrush	SevierL	6000	0			x			Valley	Fan
46 21PI	2	42MD	0	Unknown		Isolate	Sagebrush	SevierL	6040	0			x			Valley	Fan
46 21PI	3	42MD	0	Unknown		Isolate	Sagebrush	SevierL	6080	0			x			Valley	Fan
46 22P	1	42MD	517	Archaic		Isolate	Shadscale	SevierL	5010	1,800	x		x			Ridge	Fan
46 22PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierL	5005	0			x			Valley	Alluvial Plain
46 22PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierL	5010	0			x			Valley	Alluvial Plain
46 22PI	3	42MD	0	Unknown		Isolate	Shadscale	SevierL	5010	0			x			Valley	Alluvial Plain
46 22PI	4	42MD	0	Archaic		Isolate	Shadscale	SevierL	5010	0	x					Valley	Alluvial Plain
46 23PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierL	4565	0	x					Valley	Extinct Lk. Feat
46 23PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierL	4565	0			x			Valley	Extinct Lk. Feat
46A 6PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	5000	0			x			Valley	Extinct Lk. Feat
46A 6PI	2	42MD	0	Unknown		Isolate	Mud Flats letc.	SevierD	5000	0			x			Valley	Extinct Lk. Feat
46A 6P	1	42MD	513	Unknown		Field Camp	Horsebrush	SevierD	6880	31			x			Valley	Cliff
46A 8HI	2	42MD	0	Euro-Am.		Isolate	Sagebrush	SevierD	6640	0						Valley	Flood Plain
46A 8HI	1	42MD	0	Euro-Am.		Isolate	Sagebrush	SevierD	6640	0						Valley	Flood Plain
46A 10PI	1	42MD	0	Unknown		Isolate	Pinyon-Juniper	SevierD	6520	0						Canyon	Outcrop
46A 11P	1	42MD	521	Archaic		Isolate	Pinyon-Juniper	SevierD	7250	400	x		x			Ridge	Outcrop
46A 13P	1	42MD	522	Unknown		Isolate	Cold Desert Shr	SevierD	4638	24			x			Valley	Colluvium
46A 18P	1	42MD	523	Fremont	Shoshoni	Res. Base	Greasewood	SevierD	4580	1,800	x	x	x			Plain	Dune
46A 18P	2	42MD	524	Fremont		Field Camp	Greasewood	SevierD	4575	3,750		x	x	x		Plain	Dune
46A 18P	3	42MD	525	Unknown		Field Camp	Greasewood	SevierD	4590	400	x		x			Plain	Dune
46A 21P	1	42MD	526	Fremont		Field Camp	Pickleweed/Samp	SevierD	4545	2,400		x	x			Plain	Dune
46A 21P	2	42MD	527	Fremont		Field Camp	Pickleweed/Samp	SevierD	4550	800	x	x	x			Valley	Dune
46A 21P	3	42MD	528	Fremont		Field Camp	Pickleweed/Samp	SevierD	4545	99,998	x	x	x			Valley	Dune
46A 23PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4572	0						Valley	Fan
46A 23PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierD	4572	0			x			Valley	Fan
46A 23PI	3	42MD	0	Unknown		Isolate	Shadscale	SevierD	4572	0			x			Valley	Fan
46A 24P	1	42MD	551	Fremont	Archaic	Isolate	Shadscale	SevierD	4550	16,000		x	x			Valley	Extinct Lk. Feat

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M-X Site No.		Smithsonian Trinomial Designation[1]		Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	E	Landform	Depositional Environment
46A 26P	1	42MD	529	Unknown		Isolate	Horsebrush	SevierD	4840	99,998			x			Hill	Extinct Lk. Feat
46A 26HI	1	42MD	0	Euro-Am.		Isolate	Cold Desert Shr	SevierD	4950	0						Ridge	Colluvium
46A 27PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4530	0			x				
46A 27PI	2	42MD	0	Unknown		Isolate	Mud Flats letc.	SevierD	4522	0			x			Valley	Playa
46A 27PI	3	42MD	0	Unknown		Isolate	Mud Flats letc.	SevierD	4522	0			x			Valley	Playa
46A 27PI	4	42MD	0	Unknown		Isolate	Shadscale	SevierD	4546	0			x			Valley	Extinct Lk. Feat
46A 27PI	5	42MD	0	Unknown		Isolate	Mud Flats letc.	SevierD	4521	0			x			Valley	Extinct Lk. Feat
46A 27HI	1	42MD	0	Euro-Am.		Isolate	Shadscale	SevierD	4528	0						Valley	Extinct Lk. Feat
46A 28PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4655	0						Valley	Fan
46A 28PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierD	4725	0			x			Valley	Fan
46A 30PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4754	0			x			Valley	Extinct Lk. Feat
46A 30HI	1	42MD	0	Euro-Am.		Isolate	Horsebrush	SevierD	4720	0						Valley	Dune
46A 31PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4534	0			x			Valley	Extinct Lk. Feat
46A 34PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4525	0			x			Valley	Fan
46A 34HI	1	42MD	0	Euro-Am.		Isolate	Shadscale	SevierD	4580	0						Valley	Outcrop
46A 34HI	2	42MD	0	Euro-Am.		Isolate	Shadscale	SevierD	4580	0						Valley	Outcrop
46A 36H	1	42MD	552	Euro-Am.		Isolate	Shadscale	SevierD	5200	7,000						Canyon	Stream Terrace
46A 40PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4710	0			x			Valley	Extinct Lk. Feat
46A 40PI	2	42MD	0	Archaic		Isolate	Shadscale	SevierD	4710	0	x		x			Valley	Extinct Lk. Feat
46A 40PI	3	42MD	0	Unknown		Isolate	Shadscale	SevierD	4742	0						Valley	Extinct Lk. Feat
46A 41PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4560	0			x			Valley	Extinct Lk. Feat
46A 41PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierD	4550	0			x			Valley	Extinct Lk. Feat
46A 43PI	1	42MD	0	Unknown		Isolate	Shadscale	SevierD	4550	0			x			Valley	Extinct Lk. Feat
46A 43PI	2	42MD	0	Unknown		Isolate	Shadscale	SevierD	4550	0			x			Valley	Extinct Lk. Feat
46A 43PI	3	42MD	0	Unknown		Isolate	Shadscale	SevierD	4550	0			x			Valley	Extinct Lk. Feat
46A 43PI	4	42MD	0	Archaic		Isolate	Shadscale	SevierD	4541	0	x					Valley	Extinct Lk. Feat
46A 43PI	5	42MD	0	Unknown		Isolate	Pickleweed/Samp	SevierD	4535	0						Valley	Extinct Lk. Feat
54 1P	1	42MD	547	Unknown		Field Camp	Pinyon-Juniper	Wah Wah	6343	1,125			x			Ridge	Colluvium
54 1P	2	42 MD	548	Unknown		Isolate	Pinyon-Juniper	Wah Wah	6383	3,200			x			Ridge	Colluvium

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M-X Site No.	Smithsonian Trinomial Designation[1]	Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	F	Landform	Depositional Environment
54 2P 1	42MD 549	Unknown		Field Camp	Pinyon-Juniper	Wah Wah	5965	5,000			x			Valley	Alluvial Plain
54 3P 1	42MD 550	Unknown		Isolate	Shadscale	Wah Wah	5395	32,000			x			Hill	Alluvial Plain
54 5PI 1	42MD 0	Unknown		Isolate	Pinyon-Juniper	Wah Wah	5880	0			x			Valley	Dune
54 6PI 1	42MD 0	Euro-Am.		Isolate	Shadscale	Wah Wah	5520	0						Valley	Fan
54 8PI 1	42MD 0	Unknown		Isolate	Shadscale	Wah Wah	5120	0			x			Valley	Fan
54 11PI 1	42MD 0	Unknown		Isolate	Shadscale	Wah Wah	4660	0			x			Valley	Fan
54 12PI 1	42MD 0	Unknown		Isolate	Shadscale	Wah Wah	4732	0						Valley	Extinct Lk. Feat
54 15PI 1	42MD 0	Unknown		Isolate	Shadscale	Wah Wah	5120	0						Valley	Alluvial Plain
54 18PI 1	42BE 0	Unknown		Isolate	L. Rabbitbrush	Wah Wah	5680	0						Valley	Flood Plain
54 0H 1	42BE 862	Euro-Am.		Res. Base	Cold Desert Shr	Wah Wah	5250	24,000		x		x		Valley	Fan
54 22PI 1	42BE 0	Unknown		Isolate	Winter-fat	Wah Wah	5050	0						Valley	Alluvial Plain
54 22HI 1	42BE 0	Euro-Am.		Isolate	Winter-fat	Wah Wah	5070	0						Valley	Alluvial Plain
54 23PI 1	42BE 0	Unknown		Isolate	L. Rabbitbrush	Wah Wah	5480	0						Valley	Fan
54 23HI 1	42BE 0	Euro-Am.		Isolate	L. Rabbitbrush	Wah Wah	5520	0						Valley	Fan
54 25HI 1	42BE 0	Euro-Am.		Isolate	Cold Desert Shr	Wah Wah	5440	0						Valley	Colluvium
54 26PI 1	42BE 0	Unknown		Isolate	Sagebrush	Wah Wah	5580	0			x			Valley	Alluvial Plain
54 26PI 2	42BE 0	Unknown		Isolate	Sagebrush	Wah Wah	5480	0						Valley	Alluvial Plain
196 1PI 1	26LN 2108	Unknown		Isolate	Shadscale	Hamlin	6205	0	x					Valley	Fan
196 4P 1	26LN 2120	Archaic	Fremont	Isolate	Greasewood-Shad	Hamlin	6120	99,998	x	x	x			Plain	Fan
196 6PI 1	26LN 2110	Unknown		Isolate	Shadscale	Hamlin	5740	0			x			Valley	Fan
196 9PI 1	26LN 2111	Unknown		Isolate	Winter-fat	Hamlin	5711	0			x			Valley	Alluvial Plain
196 9PI 2	26LN 2112	Unknown		Isolate	Cold De[illegible]t Shr	Hamlin	5715	0	x					Valley	Alluvial Plain
196 14PI 1	26LN 2121	Unknown		Isolate	Sagebrush	Hamlin	6310	0			x			Valley	Fan
196 16PI 1	42BE 0	Unknown		Isolate	Sagebrush	Hamlin	6205	0	x					Canyon	Flood Plain
196 17P 1	26LN 2113	Unknown		Isolate	Pinyon-Juniper	Hamlin	6382	22,500			x			Hill	Colluvium
196 17P 2	26LN 2114	Unknown		Isolate	Pinyon-Juniper	Hamlin	6342	15,000			x			Hill	Colluvium
196 17P 3	26LN 2115	Unknown		Isolate	Pinyon-Juniper	Hamlin	6382	15,000			x			Hill	Colluvium
196 17P 4	26LN 2116	Unknown		Isolate	Pinyon-Juniper	Hamlin	6342	45,000			x			Hill	Colluvium
196 17PI 1	26LN 2117	Unknown		Isolate	Pinyon-Juniper	Hamlin	6382	0			x			Hill	Colluvium

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M-X Site No.		Smithsonian Trinomial Designation[1]		Cultural Affiliation 1	Cultural Affiliation 2	Site Type	Vegetation Association	Hydrologic Basin Name	Elevation	Site Area	P	C	D	S	F	Landform	Depositional Environment
196 17PI	2	26LN	2118	Unknown		Isolate	Pinyon-Juniper	Hamlin	6382	0			x			Hill	Colluvium
196 18PI	1	26LN	2109	Unknown		Isolate	Sagebrush	Hamlin	6060	0						Valley	Fan
196 28P	1	26LN	2119	Archaic	Anasazi	Field Camp	Pinyon-Juniper	Hamlin	6800	99,998	x	x	x			Canyon	Colluvium

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[1] 0 indicates number not yet assigned.

APPENDIX E

CULTURAL RESOURCE INVENTORY FOR NEVADA HYDROLOGIC BASINS

This appendix tabulates the results of the FY 1980 Regional Sample Survey conducted by Basin Research Associates and Gilbert-Commonwealth Associates, Inc., for HDR Sciences. Refer to Section 2.4.4 for a discussion of the survey results.

Code for MX Site Summary Form

ACTIVITY

1	hunting	11	historic isolated - bottle, etc.
2	plant processing	12	isolated hearth
3	tool/rework manufacture	13	trade item
4	primary tool manufacture	14	pinyon cache
5	hideworking	15	mining
6	bone and woodworking	16	communication - telegraph, telephone
7	general processing	17	stage stop, stage line
8	pottery	18	historic corral
9	habitation - structure	19	railroad line & assoc. historic trash abandoned
10	trash dump		

LANDFORM

a	alluvial fan	l	sand dune
b	valley floor - alluvial plain	m	floodplain
c	valley slope	n	alluvial slope
e	playa	o	canyon mouth
f	playa edge	p	pass/saddle
g	terrace	r	base of hill
h	hill - ridgetop		
i	hill slope		
j	wash		
k	cliffsite (rockshelter)		

CHRONOLOGY

A	Paleo-Indian (Western Pluvial included - fluted and crescents)
B	Great Basin Archaic (Pinto, Humboldt, Elko)
C	Rosespring, Eastgate
D	Late Prehistoric (Cottonwood, Desert Side Notch)
E	Historic
F	Fremont
G	Shoshone
H	Snake Valley

VEGETATION

PJ	Pinyon-juniper
CDS	Cold Desert Shrub
SDS	Salt Desert Shrub
WDS	Warm Desert Shrub

WATER SOURCE

I	Intermittent
P	Permanent

TABLE CAPTION TITLES

Vegi	Vegetation
Strat	Stratum (A or B)
Site Area	Site area in m^2
Dist. from V. Fl.	Elevational distance from valley floor in meters
Dist. to N. Water	Distance to nearest water in meters
Ldfm	Landform
Chrono	Chronology

SITE SUMMARY

Smith Creek Valley
Basin 134

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	B	1	I		47	10m	b	Isolated	C
2-P1	PJ	Lithic scatter	B	1,3,4	I	18,750	200	0-5m	j,s	Restricted	B
2-P2	CDS	Isolated	B	1	I		187	0-50m	o,s	Isolated	B
2-P3	PJ	Lithic scatter	B	3,4	I	13,125	206	0-5m	s	Restricted	
2-P4	CDS	Lithic scatter	B	3	I	5,000	187	0-5m	a	Ephemeral	
2-P5	CDS	Lithic scatter	B	3	I	3,750	178	20m	a	Ephemeral	
6-P1	CDS	Isolated	B	5	I		8	4m	b	Isolated	
7-P1	CDS	Isolated	B	1	I		44	100m	b	Isolated	
7-P2	CDS	Isolated	B	1	I		44	75m	b	Isolated	
8-P1	SDS	Lithic milling	A	2,3,7	I	115	0	2m	f	Restricted	
8-P2	SDS	Lithic milling	A	2,3,8	I	42	0	2m	g	Restricted	G
8-P3	SDS	Lithic scatter	A	3,8	I	66	0	2m	g	Ephemeral	G
8-P4	SDS	Lithic scatter	A	1,3	I	29	0	100m	g	Restricted	
10-P1	SDS	Isolated	A	7	P		11	900m	b	Isolated	
10-P2	CDS	Isolated	A	5	P		11	700m	b	Isolated	
10-P3	CDS	Lithic scatter	A	1,3,7	P	8,000	8	600m	b	Restricted	B,C,D
10-P4	CDS	Lithic scatter	A	1,3	P	114	5	75m	b	Restricted	B
10-P5	CDS	Lithic scatter	A	3	P	1,575	11	775m	b	Ephemeral	
10-P6	CDS	Lithic scatter	A	3	P	1,283	11	725m	b	Ephemeral	
10-P7	CDS	Isolated	A	7	P		11	1,075m	b	Isolated	
10-P8	CDS	Temp. camp	A	1,3,8	P	1,800	11	750m	b	Restricted	G

SITE SUMMARY

Smith Creek Valley
Basin 134
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
10-P9	CDS	Isolated	A	6	P		5	500m	b	Isolated	
10-P10	CDS	Isolated	A	7	P		5	775m	b	Isolated	
10-P11	CDS	Lithic scatter	A	3	P	65	5	680m	b	Ephemeral	
10-P12	CDS	Isolated	A	1	P		5	700m	b	Isolated	
11-P1	SDS	Lithic scatter	A	3	I	500	2	1m	g	Ephemeral	
11-P2	SDS	Isolated	A	7	I		0	40-50m	f	Isolated	
11-P3	SDS	Isolated	A	7	I		0	50m	f	Isolated	
13-P1	CDS	Isolated	B	1	I		80	600m	b	Isolated	
13-P2	CDS	Isolated	B	3	I		80	600m	b	Isolated	
15-P1	CDS	Isolated	B	1	I		99	25m	n	Isolated	D
15-P2	CDS	Isolated	B	3	I		229	5m	a	Isolated	
15-P3	PJ	Lithic scatter	B	1,3,7	I	2,600	133	5m	a	Restricted	B,C,D
15-P4	CDS	Isolated	B	1	I		133	5m	a	Isolated	B
15-P5	CDS	Isolated	B	1	I		120	25m	j	Isolated	
15-P6	CDS	Isolated	B	3	I		108	10m	j	Isolated	
16-P1	CDS	Lithic scatter	B	3,6	I	10,700	204	1,250m	b	Restricted	
16-P2	PJ	Lithic scatter	B	3,6	I	1,820	204	1,350m	i	Restricted	
16-P3	PJ	Lithic milling	B	1,2,3,6	I	1,007	204	1,250m	i	Minor camp	C
16-P4	PJ	Rock alignment(?) lithic scatter	B	3	I	300	204	1,000m	h	Ephemeral	

SITE SUMMARY

Smith Creek Valley
Basin 134
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
16-P5	PJ	Lithic scatter	B	3,7	I	7,000	200	300m	i	Restricted	
16-M1	PJ	Historic trash/ lithic scatter	B	1,3,7,11	I	7,875	181	60m	i	Restricted	B,E
18-P1	CDS	Lithic scatter	B	1,3,7	I	780	108	400m	b	Restricted	
20-P1	PJ	Lithic scatter	B	3	I	2,500	285	750m	i	Ephemeral	
20-P2	PJ	Lithic scatter	B	3,7	I	1,250	279	950m	i	Restricted	
20-P3	PJ	Lithic scatter	B	3	I	100	261	700m	i	Ephemeral	
20-P4	CDS	Isolated	B	1	I		261	650m	c	Isolated	B
21-P1	CDS	Lithic scatter	B	3,7	I	264	108	600m	b	Restricted	
22-P1	CDS	Lithic scatter	B	3	I	805	123	220m	b	Ephemeral	
23-M1 (off)	PJ	Historic trash/ lithic scatter	A	1,3,6,7, 11	P	640,000	230	0-5m	c	Minor camp	B,C,E
24-M1	PJ	Historic trash/ lithic scatter	A	1,2,3,5,7	P	320,000	230	0m	c	Sustained	B,C,D,E

SITE SUMMARY

Ione Valley
Basin 135

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
11-P1	CDS	Isolated	B	1	I		300	10m	c	Isolated	B
3-P1	CDS	Isolated	B	1	I		260	800m	b	Isolated	B
5-P1	CDS	Lithic scatter	B	3,4	I	42	220	350m	b	Restricted	
17-P1	SDS	Lithic scatter	A	1,3,7	I	13,600	1,700	200m	b	Restricted	B
17-P2	CDS	Milling station	A	1,2,3,7	I	550	1,700	75m	c	Minor	B
17-P3	CDS	Milling station	A	2,3	I	396	1,700	15m	c	Restricted	
8-P1	CDS	Lithic scatter	B	3	I	600	100	150m	b	Ephemeral	
12-M1	PJ	Lithic scatter-mill station	B	2,3	I	4,900	1,200	15m	i	Restricted	
12-P1	PJ	Pinyon cache	B	14	I	355	1,500	10m	i	Restricted	
14-P1	CDS	Isolated	B	2	I		0	250	i	Isolated	
15-P1	CDS	Lithic scatter	A	3,5,7	I	22,500	300	0	c	Restricted	C
1-P1	PJ	Lithic scatter	B	3,7	I	2,475	635	600	c	Restricted	
1-P2	PJ	Isolated	B	2	I		555	600	i	Isolated	
1-P3	PJ	Lithic scatter	B	3,4	I	12,000	860	600	i	Restricted	
3-H1	CDS	Historic trash dump	B	10	I	420	98	800	b	Historic	E

SITE SUMMARY

Big Smoky Valley
Basin 137a

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	B	5	I		296	1,000+m	b	Isolated	
2-P1	SDS	Lithic scatter	B	1,4,6	I	33,200	293	20m	b	Restricted	A,B,C,D
2-P2	CDS	Lithic scatter	B	3	I	40.5	293	20-50m	b	Ephemeral	
2-P3	CDS	Isolated	B	7	I		293	100+m	b	Isolated	
2-P4	SDS	Isolated	B	1	I		296	100+m	b	Isolated	B
2-P5	SDS	Isolated	B	1,3	I		293	20+m	b	Isolated	
2-P6	SDS	Isolated	B	7	I		293	100m	b	Isolated	
2-P7	SDS	Isolated	B	1	I		296	100m	b	Isolated	B
2-H1	CDS	Isolated	B	11	I		296	100+m	b	Isolated	E
3-P1	SDS	Temp. camp	B	1,2,3	I	25,344	290	0m	b	Restricted	B,C
3-P2	SDS	Isolated	B	2	I		293	0m	b	Isolated	
3-P3	SDS	Isolated	B	1	I		296	10m	b	Isolated	B
3-P4	SDS	Isolated	B	1	I		296	10m	b	Isolated	
3-P5	SDS	Isolated	B	7	I		290	50m	b	Isolated	
4-P1	CDS	Lithic scatter	B	3	I	169	442	40m	i	Ephemeral	
4-H1	CDS	Historic trash dump	B	10	I	10,500	445	40m	i	Restricted	E
5-P1	CDS	Isolated	A	3	I		326	25m	b	Isolated	
5-P2	CDS	Lithic scatter	A	4,5,7	I	1,768	326	5m	j	Restricted	

SITE SUMMARY

Big Smoky Valley
Basin 137a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
5-P3	CDS	Lithic scatter	A	3,5	I	119	326	35-40m	j,m	Restricted	
5-P4	CDS	Lithic scatter	A	1,3,5,7	I	3,840	326	0-10m	m	Restricted	D
5-P5	CDS	Isolated	A	3	I		326	15m	b	Isolated	
5-P6	CDS	Isolated	A	3	I		326	80+m	b	Isolated	
5-H1	CDS	Historic trash dump	A	10	I	20	326	20m	b	Ephemeral-restricted	E
5-H2	CDS	Historic trash dump	A	10	I	372	326	0-5m	b	Ephemeral-restricted	E
5-H3 (off)	CDS	Historic trash dump	A	10	I	99.75	326	20m	b	Restricted	E
8-H1 (off)	SDS	Historic trash dump	A	10	I	8,000	326	0m	j,c	Restricted	E
12-P1	CDS	Isolated	B	1	I		70	100m	b	Isolated	C
14-P1 (off)	CDS	Isolated	B	1	I		454	100m	h	Isolated	B
16-P1	CDS	Lithic scatter	B	3	I	3,000	117	400m	b	Ephemeral	
16-P2	CDS	Lithic scatter	B	1,3	I	72	116	800m	b	Restricted	
20-H1 (off)	CDS/SDS	Isolated	B	11	I		235	0m	b	Isolated	E
22-H1	CDS	Isolated	B	11	I		220	0m	j,o	Isolated	E
23-P1	CDS	Lithic scatter	B	3,5	I		101	800m	b	Restricted	
24-P1	SDS/CDS	Chipping circle	B	3,4	I	200	219	30m	b	Ephemeral	

SITE SUMMARY

Big Smoky Valley
Basin 137a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
26-M1 (off)	SDS	Lithic scatter/ mining camp	B	3,4,9,11, 15	P	4,000	350	0m	c,r	Ephemeral/ sustained	E
28-P1	SDS	Lithic scatter	B	1,3,4,7	I	80,000	69	1,200m	b	Restricted	B
28-P2	CDS	Lithic scatter	B	3	I	50	71	1,600m	b	Ephemeral	
28-P3	CDS/ SDS	Lithic scatter	B	3	I	28	72	1,400m	b	Ephemeral	
29-P1	CDS	Isolated	B	3	I		67	800m	b	Isolated	
33-P1	CDS	Isolated	B	1	I		235	0m	i,j	Isolated	C
33-P2	CDS	Isolated	B	6,7	I		235	0m	m	Isolated	
34-P1	CDS	Isolated	B	1	I		21	5m	b	Isolated	D
35-P1	CDS	Isolated	B	6,7	I		143	3,800m	c,m	Isolated	
36-P1	Alkalai flats	Isolated	B	6,7	I		7	1,500m	b	Isolated	
36-P2	Alaklai flats	Isolated	B	7	I		7	150m	b	Isolated	
37-P1	SDS	Village	B	1,3,4,7, 8	I	120,000	9	0-20m	b	Sustained	B,C,D,G
37-P2	SDS	Isolated	B	6,7	I		9	50m	b	Isolated	
38-P1	CDS	Isolated	B	5	I		277	20m	i,o	Isolated	
38-P2	CDS	Isolated	B	8	I		253	40m	0	Isolated	H
38-P3	CDS	Isolated	B	6,7	I		253	20m	0	Isolated	
38-P4	CDS	Lithic scatter	B	1,3,5,6, 7	I	1,650	253	0-10m	0	Minor	

SITE SUMMARY

Big Smoky Valley
Basin 137a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
38-H1	CDS	Isolated	B	11	I		277	5m	o	Isolated	E
39-H1	CDS	Glory-hole-mining	B	11,15	I	25	201	50m	b	Ephemeral	E
39-H2	CDS	Railroad bern	B	19	I		204	line crosses washes	b	Sustained	E
40-P1	CDS	Isolated	B	3	I		143	100m	b	Isolated	
40-P2	CDS	Isolated	B	3	I		146	30m	b	Isolated	
40-P3	CDS	Lithic scatter	B	3,7	I	9	143	100m	b	Ephemeral	
40-H1	CDS	Railroad berm	B	19	I	348	144	line crosses washes	b	Sustained	E
40-H2	CDS	Historic trash dump	B	10	I	140	143	50m	b	Restricted	E
40-H3	CDS	Historic isolate	B	11	I		143	40m	b	Isolated	E
42-H1	SDS	Railroad berm	B	19	I		34	line crosses washes	b	Sustained	E
43-H1	WDS	Railroad berm	B	19	P		12	line crosses washes	b,e,	Sustained	E
44-P1	WDS	Isolated	A	7	I		0	2,000m	e	Isolated	
44-P2	WDS	Isolated	A	4	I		0	2,000m	e	Isolated	

SITE SUMMARY

Big Smoky Valley
Basin 137a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
44-H1	WDS	Historic isolate	A	11	P		0	2,000m	b	Isolated	E
46-P1	SDS	Lithic scatter	A	1,3,6,7	I	40,200	503	50m	h	Restricted	B
46-H1	CDS/ SDS	Mining camp	A	9,15	P	150,000	500	100m	c,r	Sustained	E
47-P1	CDS	Isolated	A	3,7	P	380	463	750m	c,j	Isolated	
47-P2	CDS	Isolated	A	3,7	P	10	407	65m	c,j	Isolated	
47-H1	CDS	Historic isolate	A	11	P		402	900m	c,j	Isolated	E
47-M1	CDS	Historic trash/ lithic scatter	A	3,7,11	P	30	588	625m	c,j	Isolated	E
50-H1	SDS	Railroad berm	B	19	I		3	100m	b	Sustained	E
54-P1	CDS	Isolated	B	7	I		219	0m	n	Isolated	
55-P1	CDS	Isolated	B	7	I		197	20m	h	Isolated	
56-H1	PJ/CDS	Historic ranch and corral	A	9,10, 18	p	5,625	631	30m	o	Sustained	E
57-H1	CDS	Historic isolate	A	11	I		363	10m	c	Isolated	E
57-M1	CDS	Lithics and historic ranch	A	7,9,10,18	P	55,100	418	0m	c	Sustained/ restricted	E
D3 H1	SDS	Historic isolate	B	11	I		85	200m	b	Isolate	E
D4 P1	SDS	Lithic scatter	B	3	I	.25	15	0m	e,1	Ephemeral	
D4 P2	CDS/ SDS	Isolated	B	7	I		15	100m	e,1, r	Isolated	

SITE SUMMARY

Big Smoky Valley
Basin 137a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D4 P3	CDS/ SDS	Temp. camp	B	1,2,3,6, 7	I	29,700	15	0-20m	e,1, r	Sustained	C
D4 P4	SDS	Lithic scatter	B	3,7	I	84	12	0m	e,1	Ephemeral	
D4 P5	SDS	Isolated	B	7	I		12	10m	e,1	Isolated	
D5 P1	CDS	Isolated	B	1	I		357	30+m	1	Isolated	
D5 P2	CDS	Isolated	B	5	I		305	15m	a	Isolated	
D5 P3	SOS	Lithic scatter	B	3,6	I	41	299	10m	a	Ephemeral	
D5 P4	CDS	Rockshelter	B	3,5	I	133	357	20m	a,1	Restricted	
D5 P5	CDS	Isolated	B	1	I		351	20+,	a	Isolated	C

SITE SUMMARY

Kobeh Valley
Basin 139

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
2-P1	CDS	Isolated	B	1	I		320	300m	a	Isolated	C
5-P1	PJ	Lithic scatter	A	1,3,5,6,7		120,000	600	0m	n	Sustained camp	B,C
11-P1	CDS	Isolated	B	1	I		240	75m	b	Isolated	B
13-P1	CDS	Isolated	B	5	I		200	4m	b	Isolated	
13-P2	CDS	Isolated	B	1	I		200	4m	b	Isolated	
15-P1	CDS	Isolated	A	1	P		130	200m	1	Isolated	
18-P1	CDS	Lithic scatter	A	1,3	P	100	100	0m	b	Restricted	
18-P2	CDS	Isolated	A	7	P		100	200m	1	Isolated	
23-P1	CDS	Lithic scatter	B	3,7	I	540	440	300m	b	Restricted	
23-P2	CDS	Lithic scatter	B	3	I	1,485	440	300m	b	Ephemeral	
24-P1	CDS	Lithic scatter	B	1,3	I	10	240	200m	b	Restricted	
30-P1	CDS	Lithic scatter	A	3,7	I	51	600	300m	b	Restricted	
17-P1	CDS	Lithic scatter	B	1,3,6,7	I	90	20	200m	g	Minor	B
17-P2	CDS	Lithic scatter	B	1,3	I	51	40	50m	g	Restricted	C
17-P3	CDS	Lithic scatter	B	1,3,7	I	460	30	10m	g	Restricted	B
17-P4	CDS	Lithic scatter	B	1,3,7	I	1,665	40	200m	g	Restricted	D
17-P5	CDS	Lithic scatter	B	3,7	I	171	40	75m	g	Restricted	
17-P6	CDS	Lithic scatter	B	3,7	I	7.5	40	50m	g	Restricted	B
17-P7	CDS	Lithic scatter	B	1,3	I	238	40	100m	g	Restricted	B
17-P8	CDS	Isolated	B	1	I		40	100m	g	Isolated	B

SITE SUMMARY

Kobeh Valley
Basin 139
(continued)

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D2-P1	CDS	Isolated	B	1	I		360	150m	j	Isolated	C
D2-P2	CDS	Isolated	B	7	I		340	100m	g	Isolated	
D2-P3	CDS	Isolated	B	1	I		360	150m	g	Isolated	B
14-P1	CDS	Lithic scatter	B	1,3,7	I	1,500	120	50m	b	Restricted	B
20-P1	CDS	Isolated	B	1	I		160	(1 km) 1,000m	b	Isolated	D
21-H1	CDS	Historic isolated	B	11	I		100	(1.6 km) 1,600m	b	Historic isolated	E
29-H1	CDS	Historic isolated	B	11	I		410	175m	c	Historic isolated	E
1-P1	CDS	Lithic scatter	A	3,6,7	I	5,250	840	100m	a	Restricted	
1-P2	CDS	Isolated	A	7	I		800	200m	h	Isolated	
32-P1	CDS	Isolated	A	7	P		200	125m	b	Isolated	
32-P2	CDS	Temp. camp	A	1,2,3,7,8	P	132,000	200	0	b	Sustained	B,C,D,G
32-P3	CDS	Isolated	A	7	P		200	100m	b	Isolated	

SITE SUMMARY

Monitor Valley
Basin 140

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
5-P1	CDS	Isolated	B	7	I		305	20m	b	Isolated	
5-P2	CDS	Isolated	B	1	I		305	100m	b	Isolated	B
7-P1	CDS	Isolated	B	7	I		0	1,000m	b	Isolated	
9-P1	CDS	Isolated	A	1	I		24.4	200m	b	Isolated	C
10-P1	CDS	Lithic scatter	B	3,4,7	I	2,250	42,7	0m	i	Restricted	
11-P1	CDS	Isolated	A	7	I		48,8	450m	i	Isolated	
14-P1	CDS	Lithic scatter	B	3,4	I	25	109,7	30m	o	Restricted	
15-P1	CDS	Lithic scatter	A	1,3,7	I	600,000	103,6	0	h	Restricted	B

SITE SUMMARY

Ralston Valley
Basin 141

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	B	1	I		207	0m	a	Isolated	C
1-P2	CDS	Isolated	B	1	I		207	0m	a	Isolated	B
2-P1	CDS	Lithic scatter	B	3,7	I	100	264	100m	a	Restricted	
2-P2	CDS	Lithic scatter	B	1,3,7	I	900	264	125m	a	Restricted	B
2-H1	CDS	Historic trash dump	B	10	I		264	200m	a	Historic trash dump	E
4-P1	CDS	Milling station	A	2,3,7	P	2,500	253	300m	a	Restricted	
4-P2	CDS	Lithic scatter	A	1,3,7	P	30,000	232	50m	c	Restricted	D
4-H1	CDS	Historic-living/ mining	A	9,15	P	1,600	238	25m	i	Historic-mining	E
4-H2	CDS	Historic-telegraph poles	A	16	P		244	0m	i	Historic-communication	E
5-P1	CDS/ PJ	Isolated	A	7	P		293	200m	i	Isolated	
5-P2	CDS	Isolated	A	2	P		293	200m	j	Isolated	
5-P3	CDS/PJ	Lithic scatter	A	3,7	P	1,000	354	200m	h	Restricted	
5-H1	CDS/PJ	Historic-stage stop	A	17	P	180,000	257	0	i	Historic-stage stop	E
7-H1	CDS	Historic-isolated	B	11	I		96		b	Historic-isolated	E

SITE SUMMARY

Ralston Valley
Basin 141
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
7-H2	CDS	Historic-isolated	B	11	I		96		b	Historic-isolated	E
9-P1	CDS	Isolated	B	7	I		70	100(m)?	b	Isolated	
9-P2	CDS	Isolated	B	7	I		61	200(m)?	b	Isolated	
10-P1	CDS	Isolated	B	7	I?		55	100(m)?	b	Isolated	
13-H1	CDS	Historic-isolated	B	11	I		0	?	b	Historic-isolated	E
15-P1	CDS	Isolated	B	7	I		122	100m	i	Isolated	
15-P2	CDS	Lithic scatter	B	3	I	25	122	10m	n	Ephemeral	
15-P3	CDS	Isolated	B	1	I		122	100m	g	Isolated	B
D2-P1	PJ	Lithic scatter	B	3,7	I	160,000	353	0	p	Restricted	

SITE SUMMARY

Antelope Valley
Basin 151

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D1 + D2 P1	PJ	Lithic scatter	B	3,7	I	7,875	800	600m	i	Restricted	
D1 P2	PJ	Temp camp	B	3,7,8	I	2,814	640	800m	i	Restricted	G
D1 P3	PJ	Isolated	B	1	I		720	600m	i	Isolated	B
D2 P2	PJ	Isolated	B	1	I		760	300m	i	Isolated	B
D2 H1	PJ	Historic	B	10	I	240	640	400m	i	Historic	E
3-P1	CDS	Mill station lithic scatter	A	1,2,3,7	P	68,750	182	0m	b	Minor camp	C,D
3-P2	CDS	Isolated	A	6	P		182	350m	b	Isolated	
6-P1	PJ	Isolated	B	1	I		600	650m	b	Isolated	B
6-P2	PJ	Isolated	B	1	I		600	650m	b	Isolated	D
6-P3	PJ	Isolated	B	1	I		640	650m	b	Isolated	B
6-H1	PJ	Historic-isolated	B	11	I		640	650m	b	Historic-isolated	E
6-H2	PJ	Historic-isolated	B	11	I		640	600m	b	Hitoric-isolated	E
6-M1	PJ	Temp camp	B	1,3,7,8	I	16,000	540	800m	h	Minor camp	C,D,G

SITE SUMMARY

Little Smoky Valley
Basin 155a

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS/PJ	Lithic scatter	B	3,4,7	I	91,200	134	400m	i	Restricted	
1-P2	CDS/PJ	Isolated	B	1	I		183	800m	i	Isolated	C
3-P1	CDS	Isolated	B	1	P		12	900m	b	Isolated	B
3-P2	CDS	Lithic scatter	B	3,7	P	4,598	12	800m	b	Restricted	
3-P3	CDS	Isolated	B	1	P		12	700m	b	Isolated	C
5-M1	CDS	Lithic scatter	B	1,3,7	I	16,000	24	1,600m	b	Restricted	B,E
7-P1	CDS	Lithic scatter	B	3,7	I	3,325	55	600m	b	Restricted	
10-P1	CDS	Lithic scatter-quarry	B	3,4,5,6	I	33,000	97	100m	j,g	Minor camp	
10-P2	CDS	Lithic scatter	B	3	I	468	97	100m	j,g	Ephemeral	
10-P3	CDS	Lithic scatter	B	3,7	I	1,360	97	150m	j,g	Restricted	
10-P4	CDS	Lithic scatter	B	3,5	I	680	97	100m	j,g	Restricted	
10-P5	CDS	Quarry-lithic scatter	B	3,4,7	I	48,000	164	25m	j,g	Special restricted	
11-P1	CDS	Isolated	A	7	I		97	100m	i	Isolated	
11-P2	CDS	Lithic scatter	A	1,3,7	I	56,875	97	10m	i	Restricted	B,C
12-P1	CDS	Isolated	B	1	I		326	200m	c	Isolated	B
12-H1	CDS	Historic-trash dump	B	10	I	1	326	400m	c	Historic-trash dump	E
14-P1	CDS	Lithic scatter	B	3,5,6,7	I	2,025	97	75m	i	Minor camp	
14-P2	CDS	Isolated	B	1	I		110	75m	a	Isolated	B

SITE SUMMARY

Little Smoky Valley
Basin 155a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
14-P3	CDS	Lithic scatter	B	3,5,7	I	496	97	50m	a	Restricted	
15-P1	CDS	Lithic scatter	B	4	I	263	220	400m	h	Ephemeral	
16-P1	CDS	Lithic scatter	B	3	I	30	164	300m	b	Ephemeral	
17-P1	CDS	Isolated	B	3	I		305	200m	b	Isolated	
17-P2	CDS	Isolated	B	3	I		305	100m	b	Isolated	
17-P3	CDS	Isolated	B	3	I		305	300m	b	Isolated	
17-P4	CDS	Lithic scatter	B	3,7	I	72.5	317	75m	b	Restricted	
18-P1	CDS	Isolated	B	3	I		207	100m	h	Isolated	
19-P1	CDS	Isolated	B	3	I		177	50m	b	Isolated	
19-P2	CDS	Isolated	B	5	I		170	75m	b	Isolated	
D1 P1	CDS	Isolated	B	1	I		30	160m	b	Isolated	B
D1 P2	CDS	Lithic scatter	B	3,7	I	5,850	30	180m	b	Restricted	
D1 M1	CDS	Lithic scatter/ historic trash	B	3,4,7	I	12,500	30	85m	b	Restricted	E
D2 P1	CDS	Lithic scatter	B	3,7	I	1,344	109	800m	a	Restricted	
D2 H1	CDS	Historic trash dump	B	10	I	15	85	300m	a	Historic trash dump	E
D3 P1	PJ/CDS	Isolated	B	7	I		110	450m	a	Isolated	
D3 P2	PJ/CDS	Lithic scatter	B	3,4,7	I	2,700	122	400	a,p	Restricted	
D3 P3	CDS	Isolated	B	2	I		122	300	j	Isolated	

SITE SUMMARY

Little Smoky Valley
Basin 155a
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D3 P4	PJ/CDS	Lithic scatter	B	1,3,4,7	I	360,000	110	0m	p	Minor camp	
D3 P5	PJ/CDS	Isolated	B	3	I		110	250m	i	Isolated	
D3 P6	PJ/CDS	Temp camp	B	3,4,7,8	I	270	110	20m	i	Minor camp	G
D3 P7	PJ/CDS	Isolated	B	2	I		122	400m	j	Isolated	

SITE SUMMARY

Little Smoky Valley
Basin 155bc

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
23-P1	CDS	Isolated	A	7	I		25	100m	a	Isolated	
23-P2	CDS	Isolated	A	7	I		25	50m	a	Isolated	
23-P3	CDS	Isolated	A	7	I		25	150m	a	Isolated	
1-P1	CDS	Lithic scatter	B	3	I	64	275	1m	a	Ephemeral	
1-P2	CDS	Lithic scatter	B	3,4,7	I	97,500	299	100m	a	Restricted	
3-P1	CDS	Lithic scatter	B	1,3,4,7	I	27,000	189	100m	a	Minor camp	B
6-P1	CDS	Lithic scatter	B	3,4,7	I	200,000	177	100m	a	Restricted	
7-P1(off)	CDS	Isolated	B	1	I		135	600m	b	Isolated	C
8-P1	PJ/CDS	Temp. camp	A	1,2,3,4,6	P	87,500	354	0m	1	Sustained	B,G
12-M1	PJ	Lithic scatter	A	1,3,6,7	P	140,800	360	0m	1	Minor camp	B,C,E
13-P1	CDS	Lithic scatter	B	3,4,7	I	2,800	159	50m	c	Restricted	
13-P2	CDS	Lithic scatter	B	3,4	I	3,500	171	400m	c	Restricted	
14-P1	CDS	Lithic scatter	B	1,3,7	I	120,000	80	0m	a	Restricted	B
16-P1	CDS	Lithic scatter	B	1,3,4,7	I	840	86	600m	a	Minor camp	B
18-P1	CDS	Isolated	B	1	I		40	850m	b	Isolated	B
19-P1	CDS	Isolated	B	7	I		40	200m	b	Isolated	
26-P1	CDS	Isolated	A	1	I		0	200m	a	Isolated	B
26-P2	CDS	Isolated	A	2	I		0	100m	a	Isolated	

SITE SUMMARY

Little Smoky Valley
Basin 155bc
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
21-P1	CDS	Isolated	B	7	I		116	100m	b	Isolated	
10-P1	CDS	Isolated	B	1	I		115	100m	a	Isolated	B
2-P1	CDS	Lithic scatter	B	3,7	I	11,880	220	50m	a	Restricted	
2-P2	CDS	Isolated	B	7	I		232	50m	a	Isolated	
24-P1	CDS	Lithic scatter	B	1,7	I	1,069	116	25m	a,b	Restricted	B
24-P2	CDS	Isolated	B	1	I		116	100m	b	Isolated	B
24-P3	CDS	Isolated	B	7	I		92	25m	a,b	Isolated	
24-P4	CDS	Isolated	B	7	I		98	25m	a,b	Isolated	
24-P5	CDS	Isolated	B	6	I		92	10m	a,b	Isolated	
24-P6	CDS	Isolated	B	7	I		92	100m	a,b	Isolated	
24-P7	CDS	Isolated	B	1	I		92	100m	a,b	Isolated	C
24-P8	CDS	Isolated	B	7	I		92	10m	a,b	Isolated	
22-P1	CDS	Lithic scatter	B	3,7	I	234,000	31	50m	a,b	Restricted	
22-P2	CDS	Isolated	B	1	I		37	50m	b	Isolated	B
22-P3	CDS	Isolated	B	7	I		37	100m	b	Isolated	

SITE SUMMARY

Coal Valley
Basin 171

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
3-P1	CDS	Isolated	A	7	I		30m	0m	e	Isolated	
5-P1	CDS	Isolated	B	6	I		180m	5m	a,c	Isolated	
6-P1	CDS	Lithic scatter	B	3,5,7	I	20,000	15	10m	e	Restricted	
6-P2	CDS	Lithic scatter	B	3,7	I	800	15	0m	e	Restricted	
7-P1	CDS	Lithic scatter	A	1,3	I	900	15	0m	e	Restricted	B
10-P1	CDS	Isolated	B	1,3	I		15	0m	e	Isolated	B
12-P1	CDS	Lithic scatter	B	1,3	I	250	15	0m	e	Restricted	B
12-P2	CDS	Isolated	B	7	I		15	0m	e	Isolated	
12-P3	CDS	Isolated	B	7	I		15	0m	e	Isolated	
12-P4	CDS	Lithic scatter	B	3,4,7	I	5,000	15	0m	e	Restricted	
12-P5 (off)	CDS	Isolated	B	1	I		15	0m	e	Isolated	B
14-P1	CDS	Isolated	B	7	I		201	50m	i	Isolated	
14-P2	CDS	Isolated	B	7	I		180	200m	i	Isolated	
14-P3	CDS	Isolated	B	2	I		178	50m	i	Isolated	
14-P4	CDS	Isolated	B	7	I		174	0m	i,j	Isolated	
14-P5	CDS	Isolated	B	1	I		155	25m	i	Isolated	B
14-P6	CDS	Isolated	B	7	I		149	1m	i,j	Isolated	
14-H1	CDS	Historic trough	B	11,20	I	2,000	210	0m	i	Minor	E
15-P1	CDS	Isolated	B	7	I		15	100m	b	Isolated	
15-P2	CDS	Lithic scatter	B	3,5,7	I	312	15	80m	b	Restricted	
15-P3	CDS	Lithic scatter	B	3	I	500	15	50m	b	Ephemeral	

SITE SUMMARY

Coal Valley
Basin 171
(continued)

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
16-P1	CDS	Lithic scatter	B	3,7	I	200	15	2m	b	Restricted	
16-P2	CDS	Lithic scatter	B	3,7	I	250	15	100m	b	Restricted	
16-P3	CDS	Lithic scatter	B	3	I	150	15	0m	b,j	Ephemeral	
17-P1	CDS	Isolated	B	1	I		0	0m	e	Isolated	C
18-P1	CDS	Isolated	B	7	I		76	50m	b	Isolated	
18-P2	CDS	Isolated	B	5	I		76	100m	b	Isolated	
18-P3 (off)	CDS	Isolated	B	7	I		76	100m	b	Isolated	

SITE SUMMARY

Garden Valley
Basin 172

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	B	1	I		31	50m	b	Isolated	
4-P1	CDS	Isolated	B	1	I		31	50m	b	Isolated	
5-P1	CDS	Lithic scatter	B	1,3,7	I	10,000	92	100m	a	Restricted	B,C
5-P2	CDS	Isolated	B	1	I		92	100m	a	Isolated	B
10-P1	CDS	Isolated	B	1	I		152	200m	b	Isolated	D
11-P1	CDS	Lithic scatter	B	3	I	504	92	100m	a	Ephemeral	
11-P2	CDS	Isolated	B	1	I		92	100m	a	Isolated	
11-P3	CDS	Isolated	B	3	I		92	150m	a	Isolated	
11-H1	CDS	Historic isolate	B	11	I		92	150m	a	Isolated	E
11-H2	CDS	Historic isolate	B	11	I		92	50m	a	Isolated	E
14-P1	CDS	Lithic scatter	B	3,7	I	400	92	20m	c	Restricted	
14-P2	CDS	Isolated	B	1	I		92	0m	a,j	Isolated	B
16-P1	CDS	Pottery scatter	B	8	I		152	20m	a	Restricted	G
16-P2	CDS	Isolated	B	1	I		152	50m	a	Isolated	D
D1 P1	CDS	Isolated	B	1	I		31	500m	b	Isolated	C
D2 P1	CDS	Lithic scatter	B	3,7	I	2,000	213	100m	c	Restricted	
D2 P2	CDS	Isolated	B	1	I		213	48m	c,i	Isolated	
D2 P3	CDS	Isolated	B	1	I		213	100m	c,i	Isolated	C
D2 H1	CDS	Historic isolate	B	11	I		213	150m	c,i	Isolated	E

SITE SUMMARY

Railroad Valley
Basin 173b

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
2-H1	CDS	Historic-isolated	B	10	I		493	450m	a	Historic dump	E
4-P1	CDS	Lithic scatter	A	3,4,7	P	37,500	420	500m	h	Special restricted-quarry	
4-P2	CDS	Lithic scatter	A	3,4	P	120,000	341	0m	c	Restricted	
6-P1	CDS	Lithic scatter	B	3,7	I	150,000	292	0m	c	Restricted	
14-P1	CDS	Lithic scatter	A	3	P	22,500	219	0m	a	Ephemeral	
14-P2	CDS	Lithic scatter	A	3	I	15,000	219	75m	a	Ephemeral	
D1 P1	CDS	Lithic scatter	B	3,4	I	1,500	414	300m	i	Restricted	
D1 P2	CDS	Isolated	B	7	I		402	75m	g	Isolated	
D1 P3	CDS	Isolated	B	1	I		420	250m	i	Isolated	B
D1 P4	CDS	Lithic scatter	B	3,4	I	1,000	451	200m	h	Restricted	
D2 P1	CDS	Lithic scatter	B	3,7	I	1,250	423	400m	h	Restricted	
D2 P2	CDS	Lithic scatter	B	3,4	I	400	451	400m	i	Restricted	

SITE SUMMARY

Jakes Valley
Basin 174

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
3-P1	CDS	Lithic scatter	B	3,4,7	I	320,000	28	0m	c	Restricted	
5-P1	CDS	Lithic scatter	A	1,3,7	I	400	25	100m	g	Restricted	B
8-P1	CDS	Isolated	B	1	I		3	2,250m	b	Isolated	A
10-P1	CDS	Isolated	A	7	I		28	0m	j	Isolated	
12-P1	CDS	Isolated	B	1	I		64	0m	j	Isolated	B
6-P1	CDS	Lithic scatter	B	3,7	I	100	64	10m	a	Restricted	
D1 P1	PJ/CDS	Isolated	B	7	I		67	0m	j	Isolated	
D1 P2	PJ/CDS	Lithic scatter	B	3,7	I	1,000	180	0m	l	Restricted	
D1 P3	PJ/CDS	Isolated	B	7	I		95	30m	l	Isolated	
D2 P1	PJ/CDS	Isolated	B	7	I		137	100m	l	Isolated	
D3 P1	PJ/CDS	Lithic scatter	B	3	I	3,750	122	450m	h	Ephemeral	
D3 P2	PJ/CDS	Lithic scatter	B	3	I	75	119	250m	l	Ephemeral	
D3 P3	PJ/CDS	Isolated	B	1	I		119	300m	l	Isolated	B
D3 P4	PJ/CDS	Lithic scatter	B	3	I	800	104	425m	l	Ephemeral	
D4 P1	PJ/CDS	Isolated	B	7	I		92	5m	l	Isolated	
D4 P2	PJ/CDS	Isolated	B	7	I		116	0m	l	Isolated	
D5 P1	PJ	Lithic scatter	B	3,4	I	9,450	204	12m	a	Restricted quarry?	
D5 P2 (off)	PJ	Isolated	B	1	I		192	325m	h	Isolated	C

SITE SUMMARY

Jakes Valley
Basin 174
(continued)

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D5 P3	PJ	Mill station	B	2,3,4	I	21	192	325m	h	Restricted	
D5 P4 (off)	PJ	Lithic scatter	B	1,3,4	I	814	156	100m	1	Restricted	B
D5 P5	PJ	Lithic scatter	B	3,4	I	61,600	156	0m	1	Restricted	
D5 P6	PJ	Lithic scatter	B	3,4	I	200	156	150m	1	Restricted	
D5 P7	PJ	Lithic scatter	B	3,4	I	1,400	143	80m	n	Restricted	
D5 P8	PJ	Lithic scatter	B	3,4	I	12	156	25m	h	Restricted	

SITE SUMMARY

Long Valley
Basin 175

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	SDS	Isolated	B	1	I		42	1,300m	b	Isolated	A
3-P1	CDS	Isolated	B	7	I		42	2,500m	e	Isolated	
3-P2	CDS	Isolated	B	1	I		42	2,000m	e	Isolated	A
6-P1	CDS	Lithic scatter	B	3,6	I	290	57	150m	h	Restricted	
6-P2	CDS	Isolated	B	7	I		57	150m	i	Isolated	
6-P3	CDS	Isolated	B	1	I		57	75m	i	Isolated	A
6-P4	CDS	Isolated	B	7	I		57	75m	i	Isolated	
6-P5	CDS	Lithic scatter	B	3,7	I	30	57	40m	m	Restricted	
6-P6	CDS	Isolated	B	7	I		57	100m	m	Isolated	
9-P1	CDS	Isolated	B	7	I		94	0m	j	Isolated	
D1 P1	PJ/CDS	Lithic scatter	B	3	I	7,500	112	0m	a	Ephemeral	
D2 P1	PJ/CDS	Isolated	B	1	I		97	0m	j	Isolated	B
D4 P1	CDS	Isolated	B	7	I		94	0m	j	Isolated	
8-P1	CDS	Isolated	A	7	I		11	2,800m	f	Isolated	
D8 P1	PJ/CDS	Isolated	B	7	I		72	15m	m	Isolated	
13-P1	PJ/CDS	Lithic scatter	A	1,3,7	I	324	103	80m	h	Restricted	C
13-P2	PJ/CDS	Lithic scatter	A	3,7	I	667	103	100m	h	Restricted	
D7 P1	PJ/CDS	Lithic scatter	B	1,3,7	I	481	133	75m	h	Restricted	C
D7 H1	PJ/CDS	Historic-Isolated	B	11	I		133	75m	m	Historic-Isolated	E

SITE SUMMARY

Long Valley
Basin 175
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D9 P1	CDS	Isolated	B	7	I		72m	75m	m	Isolated	
D9 P2	PJ	Lithic scatter	B	1,3,7	I	350	72	100m	h	Restricted	C
D6 P1	CDS	Lithic scatter	B	3	I	108,100	11	35m	l	Ephemeral	
D10 P1	PJ	Lithic scatter	B	1,3,7	I	105,000	103	10m	h	Restricted	B
D10 P2	PJ	Isolated	B	2	I		103	25m	m	Isolated	
D10 P3	PJ	Isolated	B	7	I		103	10m	m	Isolated	
D13 P1	PJ/CDS	Lithic scatter	B	1,3	I	2,888	316	150m	a	Restricted	C
D13 P2	PJ/CDS	Lithic scatter	B	3	I	1,925	316	200m	a	Ephemeral	
D12 P1	PJ/CDS	Temp. camp	A	1,3,7,8	P	15,750	26	200m	h	Minor	B,C,G
D12 P2	PJ/CDS	Temp. camp	A	9,14	I	49	286	150m	h	Restricted	
D12 P3	PJ/CDS	Lithic scatter	A	1,3	P	115,312	286	100m	h	Restricted	B

SITE SUMMARY

Butte Valley
Basin 178b

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
4-P1	PJ/CDS	Isolated	B	7	I		12	50m	1	Isolated	
4-P2	PJ/CDS	Isolated	B	1	I		12	50m	1	Isolated	B
8-P1	SDS	Isolated	B	7	I		12	300m	e	Isolated	
11-P1	CDS	Isolated	B	5	I		42	50m	a	Isolated	
13-P1	CDS	Lithic scatter	B	3,7	I	40	73	250m	a	Restricted	
D1 P1	PJ	Temp. camp	A	1,2,3,4, 6,7,8	I	81,000	286	0	1	Sustained	B,C,D,G
D1 M1	PJ/CDS	Historic trash lithic scatter	A	1,2,3,4,7	P	120,000	286	0m	1	Sustained	B,E
D1 H1	PJ/CDS	Historic isolated	A	11	P		286	300m	1	Historic isolated	E
D3 P1 off	PJ/CDS	Temp. camp	B	1,3,4,6, 7,8	I	4,750	347	25m	a,r	Sustained	B,G
D3 H1	PJ/CDS	Historic corral	B	18	I	2,500	347	200m	a,r	Historic corral	E
D3 P2	PJ	Isolated	B	7	I		347	300m	1	Isolated	
D5 P1	PJ/CDS	Isolated	B	7	I		73	5m	a,1	Isolated	
D5 P2	PJ	Isolated	B	7	I		73	25m	a,r	Isolated	
D2 P1	PJ	Temp. camp	B	1,3,4,7,8	I	23,100	347	100m	1	Sustained	B,C,D,G
D2 P2	PJ	Temp. camp	B	1,3,4,7,8	I	1,500	347	200m	1	Sustained	B,G

SITE SUMMARY

Butte Valley
Basin 178b

Unit Site Number		Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D2	P3	PJ	Temp. camp	B	1,3,4,7,8	I	49,500	347	400m	f	Sustained	B,G
D2	M1	PJ	Lithic scatter	B	3,4,7	I	72	347	100m	r	Restricted	E
D7	P1	CDS	Isolated	B	1	I		195	200m	f	Isolated	B
D7	P2	CDS	Lithic scatter	B	3,7	I	25	195	225m	r	Restricted	
D7	P3	PJ/CDS	Lithic scatter	B	3	I	630	195	100m	f	Ephemeral	

SITE SUMMARY

Steptoe Valley
Basin 179

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
5-P1	PJ	Lithic scatter	A	1,2,3,6,7	P	17,500	186	200m	H	Sustained	B,C,D,G
5-P2	PJ	Temp. camp	A	1,2,3,7	P	7,200	131	200m	I	Minor	B,C,G
5-P3	PJ	Temp. camp	A	1,2,3	P	5,130	195	250m	I	Restricted	B,D,G
8-P1	PJ	Lithic scatter	A	1,3,7	I	20,000	353	200m	h	Restricted	B,D

SITE SUMMARY

Cave Valley
Basin 180

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	PJ	Lithic scatter	B	1,3,7	I	30,000	155	500m	h	Restricted	B,C
1-P2	PJ	Lithic scatter	B	3,7	I	31,200	140	120m	h	Restricted	
1-P3 (off)	PJ	Lithic scatter	B	1,3,7	I	1,600	146	400m	c	Restricted	
1-P4	PJ	Isolated	B	1	I		149	200m	h	Isolated	B
1-P5	PJ	Lithic scatter	B	3	I	1,200	155	200m	h	Ephemeral	
2-P1	PJ	Lithic scatter	B	1,3,5,7	I	1,974	83	800m	h	Restricted	D
3-P1	PJ	Temp. camp	A	1,3,5,7,8	I	1,500	167	75m	c	Sustained	C,D,G
3-P2	PJ	Lithic scatter	A	1,3,4,7	I	1,800	158	300m	c	Restricted	B
3-P3	PJ	Chipping circle	A	3,7	I	12	158	50m	c	Ephemeral	
3-P4	PJ	Lithic scatter	A	1,3,7	I	.680	292	100m	c	Restricted	C
3-P5	PJ	Isolated	A	3,7	I		204	100m	h	Isolated	
3-P6	PJ	Lithic scatter	A	1,3,7,8	I	314	143	50m	h	Minor camp	B,C,H
3-P7	PJ	Lithic scatter	A	3,7	I	20	146	50m	c	Restricted	
4-P1	CDS	Isolated	B	1	I		317	100m	c	Isolated	C
4-P2	CDS	Isolated	B	1	I		76	150m	c	Isolated	B
5-P1	CDS	Isolated	B	1	I		15	1,000m	b	Isolated	C
8-P1	CDS	Isolated	B	1	I		4	1,000m	b	Isolated	B
8-P2	CDS	Isolated	B	3,7	I		4	1,000m	b	Isolated	
8-P3	CDS	Isolated	B	1	I		4	2,000m	b	Isolated	B
8-P4	CDS	Isolated	B	1	I		4	1,000m	b	Isolated	

SITE SUMMARY

Cave Valley
Basin 180
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
10-P1	CDS	Isolated	A	7	I		76	100m	c	Isolated	
D1 P1	CDS	Isolated	B	7	I		317	10m	c	Isolated	
D1 H1	CDS	Historic isolate	B	11	I		39	12m	c	Isolated	E
D2 P1	CDS	Isolated	B	7	I		314	500m	c	Isolated	
P2 P2	CDS	Isolated	B	7	I		314	500m	c	Isolated	
D2 P3	CDS	Lithic scatter	B	1,3,7	I	3,200	314	575m	c	Restricted	C
D2 P4	CDS	Lithic scatter	B	3	I	25	314	600m	c	Epehemeral	
D2 P5	CDS	Lithic scatter	B	1,3,5,7	I	500	314	600m	c	Minor camp	C,D
D2 P6	PJ	Lithic scatter	B	3,7	I	700	314	1,000m	b	Restricted	
D1 P7	PJ	Lithic scatter	B	1,3,6,7	I	555	320	750m	c	Minor camp	B
D2 P8	PJ	Lithic scatter	B	3,7	I	1,500	320	750m	c	Restricted	
D2 P9	PJ	Lithic scatter	B	1,3,7	I	6,307	320	500m	c	Restricted	B
D3 P1	CDS	Isolated	B	7	I		3.0	10m	b	Isolated	
D3 P2	CDS	Lithic scatter	B	3,7	I	6,000	3.0	600m	b	Restricted	B

SITE SUMMARY

Dry Lake Valley
Basin 181

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	PJ/CDS	Camp/village	A	1,2,3,5, 6,7,8	P	225,000	616	100m	t	Sustained camp	B,C,D,F, G,H
1-P2	PJ/CDS	Isolated	A	1,7,8	P		601	10m	t,u	Isolated	G
1-P3	PJ/CDS	Temp. camp	A	1,3,6,7,8	P	25,000	597	10m	t,u	Minor camp	G
1-H1	PJ	Homestead/mining	A	9,10	P	300	567	0m	t,u	Sustained	E
2-P1	PJ	Lithic scatter	B	1,3,6,7,8	I	2,000	476	100m	c	Sustained	B,C,G
2-P2	PJ	Isolated	B	7	I		469	0m	b	Isolated	
3-P1	PJ	Lithic scatter	A	3,7	I	260	518	20m	a,c	Restricted	
3-P2	PJ	Isolated	A	1	I		494	80m	i	Isolated	B
3-P3	PJ	Isolated	A	7	I		530	0m	i	Isolated	
4-P1	PJ/CDS	Isolated	B	5,7	I		421	50m	a,c	Isolated	
5-P1	CDS	Isolated	B	5	I		430	30m	a,c	Isolated	
6-P1	PJ	Isolated	B	1,7	I		393	0m	a,c	Isolated	B
7-P1	CDS	Isolated	B	7	I		350	0m	c,j	Isolated	
8-P1	CDS	Pottery scatter lithic scatter	A	1,3,7,8	I	900	500	100m	c	Minor camp	F,G
8-P2	CDS	Temp. camp	A	1,3,7,8	I	500	491	20m	c	Restricted	C,F,G
8-P3	PJ	Pottery scatter lithic scatter	A	1,3,7,8	I	600	482	10m	c,j	Minor camp	D,F,G
8-P4	CDS	Pottery scatter	A	8	I		479	0m	c,j	Ephemeral	G
8-P5	CDS	Isolated	A	1,3	I		479	20m	a,c	Isolated	C
8-P6	CDS	Temp. camp	A	1,3,8	I	300	494	30m	a,c	Restricted	F,G

SITE SUMMARY

Dry Lake Valley
Basin 181
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
8-P7	CDS	Temp. camp	A	1,3,7,8	I	340	500	20m	a,c	Minor camp	B,H
8-P8	CDS	Temp. camp	A	1,7,8	I		506	30m	a,c	Restricted	H
8-P9	CDS	Lithic scatter	A	1,3,5	I	60	488	0m	a,c	Restricted	
8-P10	CDS	Isolated	A	8	I		506	60m	a,c	Isolated	G
8-H1	CDS	Historic isolate	A	11	I		500	50m	a,c	Isolated	E
9-P1	CDS	Lithic scatter	B	1,3,5,7,8	I	36,000	482	40m	c	Sustained	C,D,F
9-P2	CDS	Isolated	B	7	I		471	40m	c	Isolated	
9-P3	CDS	Lithic scatter	B	1,3,5,7	I	9,450	469	40m	c,j	Minor camp	B,C,D
9-P4	CDS	Isolated	B	7	I		451	30m	j	Isolated	
9-P5	CDS	Lithic scatter	B	1,3,7	I	6,936	451	10m	c,j	Restricted	B
9-P6	CDS	Lithic scatter	B	3,7	I	56	457	0m	j	Restricted	
9-P7	CDS	Lithic scatter	B	3,7	I	50	469	5m	c	Restricted	
9-P8	CDS	Isolated	B	8	I		463	20m	j	Isolated	G
9-P9	CDS	Isolated	B	1	I		463	20m	c,j	Isolated	C
9-P10	CDS	Lithic scatter	B	3,7	I	200	469	20m	c,j	Restricted	
9-P11	CDS	Isolated	B	1	I		468	70m	j	Isolated	B
10-H1	CDS	Historic isolate	B	11	I		269	500m	b	Isolated	E
12-H1	CDS	Historic trash campsite	B	10	I	320	226	5m	i,j	Sustained	E
13-P1	CDS	Isolated	B	7	I		293	0m	i	Isolated	

SITE SUMMARY

Dry Lake Valley
Basin 181
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
16-P1	CDS	Chipping circle	B	3,7	I	100	262	100m	i,j	Ephemeral	
16-P1	CDS	Lithic scatter	B	3,7	I	2,000	144	150m	b,1	Restricted	
16-P2	CDS	Isolated	B	7	I		149	150m	b,1	Isolated	
16-P3	CDS	Isolated	B	1	I		148	100m	b,1	Isolated	B
16-P4	SDS	Isolated	B	1	I		148	75m	b,1	Isolated	B
17-P1	CDS	Isolated	B	1	I		235	50m	b,j	Isolated	D
17-P3	CDS	Isolated	B	3	I		227	40m	b,j	Isolated	
17-P4	CDS	Isolated	B	3	I		241	80m	b	Isolated	
17-H1	CDS	Historic isolate	B	11	I		226	10m	b,j	Isolated	E
17-M1	CDS	Historic isolate/ lithic scatter	F	3,7,11	I	400	226	80m	b,j	Ephemeral/ isolate	E
18-P1 (off)	CDS	Isolated	B	1	I		149	110m	b	Isolated	C
19-P1	CDS	Isolated	B	3	I		95	200m	b	Isolated	
20-P1	CDS	Isolated	B	1	I		335	15m	a,c	Isolated	B
21-P1	CDS/SDS	Isolated	B	1	I		73	75m	b	Isolated	B
21-P2 (off)	CDS	Isolated	B	1	I		70	100m	b	Isolated	B
24-P1	PJ	Isolated	A	3,7	I		262	150m	i,j	Isolated	

SITE SUMMARY

Dry Lake Valley
Basin 181
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
24-H1	PJ	Historic isolate	A	11	I		265	25m	b	Isolated	E
24-M1	CDS	Historic structure/ temp. camp	A	1,3,7,8,9	P	290,000	259	0m	c,m	Sustained/ minor camp	B,C,D,E, G,H
26-P1	CDS	Lithic scatter	B	3,7	I		31	0m	b	Ephemeral	
27-P1	CDS	Isolated	B	7	I		66	150m	b	Isolated	
31-P1	CDS	Lithic scatter	A	3,7	I	1,500	1.5	150m	b	Restricted	
31-P2	CDS	Lithic scatter	A	1,3,7	I	28	3.0	150m	b	Restricted	
36-P1	CDS/ SDS	Isolated	A	7	I		1.5	0m	e	Isolated	
36-P2	CDS	Isolated	A	1,3	I		1.5	150m	e	Isolated	B

SITE SUMMARY

Delamar Valley
Basin 182

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
5-P1	PJ/CDS	Rock shelter	B	2	I	6	320	50-100m	c	Ephemeral	
7-I1	CDS	Isolated	B	7	I		139	800m	c	Isolated	
9-P1	WDS	Isolated	B	1	I		97	within unit	c	Isolated	B
13-P1	CDS	Isolated	B	1	I		421	50-100m	c	Isolated	C
13-P2	CDS	Lithic scatter	B	3,7	I	3,975	55	20-50m	c	Restricted	
13-P3	CDS	Isolated	B	2	I		55	50-100m	b	Isolated	
13-P4	CDS	Isolated	B	1	I		55	200m	c	Isolated	B
14-P1	WDS	Isolated	B	1	I		305	100m	h	Isolated	C
16-P1	CDS	Isolated	A	2	I		49	80-100m	c	Isolated	
17-P1	WDS	Isolated	A	1	I		414	0m	h	Isolated	
17-M1	WDS	Historic trash/ lithic scatter	A	1,3,7, 10	P	25,000	402	0m	f	Restricted	E
D1 P1	CDS	Lithic scatter	B	3,7	I	2,280	177	250m	t	Restricted	B
D1 P2 (off)	CDS	Isolated	B	1	I		177	300m	f	Isolated	B
D1 P3	CDS	Isolated	B	1	I		177	0m	b	Isolated	
D2 P1	CDS	Isolated	B	1	I		91	20m	c	Isolated	
D4 P1	CDS	Isolated	B	7	I		152	5m	b	Isolated	

SITE SUMMARY

Delamar Valley
Basin 182
(continued)

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
10-H1	WDS	Historic Isolate	B	11	I		152	10m	n	Isolated	E
12-H1	CDS	Historic Isolate	B	11	I		73	50-100m	n	Isolated	E
17-H1	WDS	Historic Isolate	A	11	I		414	0m	h	Isolated	E
D4 H1	CDS	Historic Isolate	B	11	I		149	5m	J	Isolated	E

SITE SUMMARY

Lake Valley
Basin 183

Unit Site Number	Vegl	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	A	7	I		202	0m	a	Isolated	
1-P2	CDS	Isolated	A	1	I		2[illegible]2	5m	a	Isolated	D
1-P3	CDS	Lithic scatter	A	1,2,3,7	I	990	208	0m	a	Minor camp	
1-P4	CDS	Isolated	A	3,7	I		220	0m	a	Isolated	
1-M1	CDS	Temp. camp	A	1,2,3,5, 6,7	P	8,000	238	0m	a	Sustained	B,E
2-P1	CDS	Isolated	B	6	I		147	0m	a	Isolated	
4-P1	CDS	Lithic scatter	A	1,3,6,7	I	2,176	308	10m	a	Minor camp	D
5-P1	CDS	Temp. camp	A	1,2,3,6,7	I	10,800	174	100m	a	Sustained camp	B,C,D
5-P2	CDS/ PJ	Isolated	A	1	I		195	20m	a	Isolated	B
5-P3	CDS/PJ	Isolated	A	1	I		135	0m	a	Isolated	B
5-P4	CDS/PJ	Temp. camp	A	1,2,3,7	I	15,000	141	10m	a	Sustained camp	
7-P1	PJ	Temp. camp	A	1,2,3,5, 6,7	I	320,000+	171	0m	a	Sustained camp	B,C,D
9-P1	PJ	Lithic scatter	A	3	P	484	195	110m	b	Ephemeral	
9-P2	PJ	Lithic scatter	A	1,2,3,7	P	36,000	186	125m	l	Minor camp	B,G
9-P3	PJ	Lithic scatter	A	1,3,7	P	1,900	183	200m	l	Restricted	B
9-P4	PJ	Lithic scatter	A	3,7	P	140	189	125m	l	Restricted	
9-P5	PJ	Lithic scatter	A	1,3,7	I	12,000	195	250m	b	Restricted	B
9-P6	PJ	Lithic scatter	A	1,5	I	750	205	800m	b	Restricted	B

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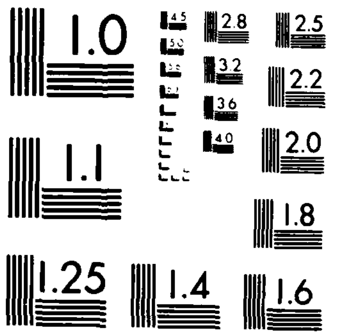

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SITE SUMMARY

Lake Valley
Basin 183
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
9-P7	PJ	Lithic scatter	A	1,3,7	I	1,400	217	175m	i	Restricted	
P8 not used											
9-P9	PJ	Isolated	A	7	I		226	100m	h	Isolated	
9-P10	PJ	Lithic scatter	A	1,3,7	I	3,500	226	100m	h	Restricted	D
12-P1	SDS	Temp. camp	A	1,2,3	I	8	2.0	4,750m	b	Restricted	B,G
14-P1	PJ	Rock alignment	A	14	I	6.5	293	150m	i	Ephemeral	
14-P2	PJ	Temp. camp	A	3.7	I	3,000	287	150m	i	Restricted	F
14-P3	PJ	Isolated	A	2	I		287	75m	i	Isolated	F
14-P4	PJ	Rock alignment	A	14	I	2	250	175m	i	Ephemeral	
14-P5	PJ	Rock alignment	A	1,14	I	9	247	100m	h	Ephemeral	
15-P1	PJ	Isolated	A	1	I		427	0m	i	Isolated	
15-P2	PJ	Temp. camp	A	1,2,3,6,7	I	3,000	342	175m	h,i	Sustained	F,G
15-P3 (off)	PJ	Temp. camp	A	3,7	I	2,500	208	0m	c	Restricted	G
16-P1	SDS	Isolated	A	1	I		2.0	300m	b	Isolated	B
18-P1	PJ	Lithic scatter	B	1,3	I	1,875	122	50m	b	Restricted	B
18-P2	PJ	Lithic scatter	B	3	I	4,950	110	15m	b	Ephemeral	
19-P1	CDS/ SDS	Lithic scatter	A	2,3,5,7	I	18,000	0	20m	e	Minor camp	
19-P2	CDS	Isolated	A	1	I		2.0	40m	e	Isolated	

SITE SUMMARY

Lake Valley
Basin 183
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
20-P1	CDS/ SDS	Lithic scatter	A	3,7	I	375	2,0	50m	e	Restricted	
21-P1	SDS	Isolated	B	1	I		50	0m	b	Isolated	
23-P1	CDS	Isolated	B	3,7	I		58	100m	c	Isolated	
23-P2	CDS	Isolated	B	7	I		49	50m	c	Isolated	
26-P1	PJ	Isolated	B	1	I		214	275m	i	Isolated	B
28-P1	CDS	Isolated	B	1	I		19	100m	b	Isolated	B
29-P1	CDS	Lithic scatter	B	3,5,6,7	I	550	107	30m	b	Restricted	
31-P1	PJ	Temp. camp	A	2,3,7	I	160,000	147	0m	c	Sustained	B,C,D,F,G
32-P1	PJ	Temp, camp	B	1,2,3,5, 6,7	I	320,000	131	0m	c	Sustained	B,C,D,F,G
D1 P1	CDS	Lithic scatter	B	1,3,7	I	15,000	2,0	10m	e	Restricted	B
D1 P2	CDS	Isolated	B	3	I		2.0	0m	b	Isolated	
D1 P3	CDS/ SDS	Lithic scatter	B	1,3,5,7	I	10,000	1.0	10m	b	Minor	B
D3 P1	CDS	Lithic scatter	B	3	I	600	0	300m	b	Ephemeral	
D3 P2	CDS	Lithic scatter	B	3,5,9	I	1,800	0	300m	b	Restricted	
D3 P3	CDS	Temp. camp	B	1,2,3,5, 6,7	I	7,800	0	300m	b	Sustained	B,G
D3 P4	CDS	Temp. camp	B	2,3,5	I	2,000	0	300m	b	Minor	G

SITE SUMMARY
Lake Valley
Basin 183
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
D3 P5	CDS	Temp. camp	B	2,3,7	I	4,500	0	200m	b	Minor	B,G
D3 P6	CDS	Temp. camp	B	1,2,3	I	1,100	0	500m	b	Restricted	B,G
D3 P7	CDS	Temp. camp	B	2,3	I	800	0	550m	b	Restricted	G
D3 P8	CDS	Temp. camp	B	1,2,3,7	I	5,200	20	600m	b	Minor	B,G
D4 P1	PJ	Temp. camp	B	1,2,3,7	I	40,000	317	400m	i	Minor	B,G
D4 P2	PJ	Isolated	B	7	I		299	75m	I	Isolated	
D4 P3	PJ	Isolated	B	1	I		290	75m	I	Isolated	B
D4 P4	PJ	Isolated	B	7	I		293	100m	i	Isolated	
D4 P5	PJ	Isolated	B	1	I		293	75m	i	Isolated	B
D4 P6	PJ	Isolated	B	7	I		293	75m	i	Isolated	
D4 P7	PJ	Lithic scatter	B	1,3,7	I	50	311	100m	h	Restricred	B
D4 P8	PJ	Isolated	B	3,7	I		305	20m	h	Isolated	
D4 P9	PJ	Temp. camp	B	1,2,3	I	1,000	305	0m	h	Restricted	G
D7 P1	PJ	Lithic scatter	B	1,3	P	2,700	229	175m	c	Restricted	
D7 P2	PJ	Lithic scatter	B	1,3	P	9,000	256	75m	c	Restricted	D,G
D8 P1	PJ	Isolated	B	7	I		83	400m	c	Isolated	
D8 P2	PJ	Isolated	B	1	I		77	50m	b	Isolated	B
1-M1	CDS	Corral/ranch	A	10	P	8,000	238	0m	a	Sustained	E
4-H1	CDS	Historic isolate	A	11	I		290	100m	a	Isolated	E
7-H1	PJ	Historic isolate	A	11	I		220	50m	a	Isolated	E
22-H1	PJ	Corral	B	10,18	I	1,875	64	130m	h	Sustained	E
D2 H1	CDS	Historic isolate	B	11	I		34	800m	c	Isolated	E

SITE SUMMARY

Spring Valley
Basin 184

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
1-P1	CDS	Isolated	B	7	I		33	600m	b	Isolated	
1-P2	CDS	Isolated	B	7	I		33	400-800m	b	Isolated	
4-P1	CDS	Isolated	B	1	I		6	0m	b,e	Isolated	B
4-P2	CDS	Isolated	B	1	I		6	0m	b,e	Isolated	C
7-P1	CDS/ SDS	Isolated	B	1	I		3	1,200m	b	Isolated	B
11-P1	PJ	Lithic scatter	A	1,3,7	P	6,000	218	200m	g	Restricted	
11-P2	PJ	Isolated	A	8	I		195	80m	i,r	Isolated	G
11-P3	PJ	Isolated	A	1	I		195	150m	i	Isolated	
12-P1	PJ	Isolated	B	3	I		99	300m	b	Isolated	
14-P1	PJ	Lithic scatter	A	1,3,7,8	I	19,728	140	300m	c	Minor camp	G
14-P2	PJ	Lithic/pottery scatter	A	1,2,3,6, 7,8	I	5,600	189	0m	i	Minor camp	D,G,H
14-P3	PJ	Lithic/pottery scatter	A	1,2,3,7,8	P	12,500	179	150m	i	Minor camp	C,G
14-P4	PJ	Isolated	A	1,7	P		179	375m	i	Isolated	
14-P5	PJ	Isolated	A	7	I		189	200m	i	Isolated	
17-P1	PJ	Temp. camp	A	1,2,3,7, 8,12	I	5,850	256	0m	i	Sustained	B,C,H
17-P2	PJ	Isolated	A	1,7	I		263	200m	i	Isolated	
17-P3	PJ	Isolated	A	1,7	I		256	225m	i	Isolated	
20-P1	PJ	Lithic scatter	B	1,3,7	I	7,840	189	250m	b	Minor camp	B,C

SITE SUMMARY

Spring Valley
Basin 184
(continued)

Unit Site Number	Vegi	BLM Site Type	Strat.	Activity	Water Source	Site Area	Dist. from V. Fl	Dist. to N. Water	LdFm	BRA-CAI Site Type	Chron
20-P2	PJ	Isolated	B	1	I		179	600m	b	Isolated	C
21-P1	CDS	Lithic scatter	B	1,3,7	I	3,360	195	100m	b	Restricted	
21-P2	PJ	Isolated	B	1	I		231	50m	b	Isolated	B
22-P1	PJ	Isolated	A	1	P		451	750m	i	Isolated	C
22-P2	PJ	Lithic scatter	A	1,3,7	I	5,200	469	500m	i	Isolated	D
22-P3	PJ	Lithic scatter	A	1,3,7	P,I	800	439	600m	i	Restricted	B
22-P4	PJ	Temp. camp	A	1,2,3,7,8	P	6,600	411	200m	i	Minor camp	B,C,D,G
23-P2	PJ	Lithic scatter	A	1,3,5,7,8	I	20,000	378	100m	P	Sustained	B,C,D,G
23-P3	PJ	Lithic scatter	A	1,3,7,8	P	22,500	365	50m	i	Minor camp	B,C,D,G
23-M1	PJ	Corral, historic trash/lithic scatter	A	1,2,3,5,7, 8,10,18	P,I	150,000	346	0m	r	Sustained	B,C,E,G

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