DETERMINATION OF CULTURAL AFFILIATION OF ANCIENT HUMAN REMAINS FROM SPIRIT CAVE, NEVADA

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1. BACKGROUND

A. The Native American Graves Protection and Repatriation Act of 1990

Section 5 of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) directs federal agencies, including the Bureau of Land Management (BLM) to: (1) inventory all Native American human remains and associated funerary objects taken from Public Lands; and (2) to the extent possible, identify the geographical and cultural affiliation, if any, of such items.

For each set of remains or objects, the BLM has to identify cultural affiliation by determining if there is a "shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or individual and an identifiable earlier group." (43CFR10.4(3). Affiliation is established when, in the opinion of the BLM, a preponderance of the evidence shows a relationship of shared group identity. If there is no demonstrable relationship, then the remains or objects are unaffiliated.

If a set of remains or objects is affiliated, then the BLM publishes a notice in the Federal Register and allows 30 days for Native American individuals or groups to contest the determination. There is no legal requirement to publish a notice of a determination that remains or objects are unaffiliated. Instead, a list of unaffiliated remains is sent to the National Park Service, who in turn forwards it to the NAGPRA Review committee.

Affiliated remains are subject to repatriation, upon request by the lineal descendants or the culturally affiliated tribe. The BLM retains possession and control of unaffiliated remains and would continue to curate them at a museum.

If the determination is not contested, the BLM negotiates the place and manner of repatriation with the lineal descendants or affiliated tribe and disposes of the remains or objects according to their wishes. The law allows for deferred repatriation of remains and objects that are "indispensable for the completion of a specific scientific study, the outcome of which would be of major benefit to the United States."

Pursuant to Section 7(a)(4) of NAGPRA, a lineal descendant or tribe may make a claim regarding human remains which are determined to be unaffiliated. The claimant must show by a preponderance of the evidence that the remains are culturally affiliated. All relevant information, including geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or expert opinion may be considered. Upon written receipt of the evidence for such a claim, the BLM must evaluate it with the same process and criteria used in making the initial determination. The BLM may affirm the original determination or make a new determination. The BLM

retains ownership and control of the remains or objects and cannot complete repatriation until all claims are settled.

B. Human Remains Inventory

In Nevada, the BLM began implementing NAGPRA in 1991 and as required by the law developed a summary of unassociated funerary objects, sacred objects, and objects of cultural patrimony from BLM managed lands in Nevada by November 16, 1996. Since the Nevada State Museum is the primary repository for archaeological collections from BLM managed lands in Nevada, the museum prepared an inventory of human remains and associated funerary objects curated at the museum and provided it to the BLM on July 1, 1996. The summary and the inventory have not been published in the Federal register, however, they were provided to appropriate tribal governments, including the Fallon Paiute-Shoshone Tribe in 1996.

The initial museum inventory listed 120 sets of remains that were tentatively provenanced as having been removed from BLM managed lands in Nevada. The museum recommended that three sets of these remains should be affiliated and 117 sets should not. During the BLM review of the inventory, BLM staff determined that there could be as many as 149 sets of remains (not 120) recovered from BLM managed lands in Nevada. Of the 149 sets of remains tentatively identified in the second inventory, three sets were not from BLM managed lands and one set was not Native American. This resulted in a final NAGPRA inventory of 145 sets of remains that represent a minimum of 154 individuals. In the inventory, the Museum recommended that three of these sets could be affiliated and that the other 141 could not be affiliated. The BLM agreed with the Museum on the affiliated remains and the three sets of affiliated remains (of the 145 sets) have been repatriated. The BLM has been independently evaluating the remaining sets of remains and has concluded that 35 of the 141 sets may be reasonably affiliated based on the preponderance of the available evidence. The BLM is currently in consultation with appropriate tribes over these remains. The BLM is presently in consultation with appropriate tribes to finalize the affiliation determination for these 35 sets and is still investigating the remaining 107 sets. In addition, the BLM has repatriated seven sets of human remains found on BLM managed lands in Nevada since NAGPRA was passed in 1990.

C. Spirit Cave

In March 1996, before the completion of the NAGPRA inventory, the Nevada State Museum was approached by physical anthropologists from the University of California, Davis with a request for a collaborative investigation of early human remains from western Nevada. Since most of the remains of interest for this study came from BLM managed lands, the Museum requested authorization for consumptive testing (DNA analysis or radiocarbon dating) on 41 sets of human remains from BLM managed public

lands, including a mummy from Spirit Cave. Since these cultural items were also included in the NAGPRA inventory, the BLM contacted Northern Paiute tribal governments and began consulting with them on this request.

From the first consultation meeting, the tribes strongly opposed consumptive testing and asserted their cultural affiliation with the human remains from Spirit Cave. In March 1997, the Fallon Paiute-Shoshone Tribe, representing all Northern Paiute tribal governments, formally asserted a NAGPRA claim of cultural affiliation with the remains. They also strongly opposed consumptive testing and requested immediate repatriation of all remains and associated funerary objects from Spirit Cave. The tribes supported the claim with evidence on geographic location, textiles, and expert testimony provided by tribal elders. The tribe also said that they were developing additional evidence from oral tradition supporting the claim. BLM deferred the decision on consumptive testing until the NAGPRA process could be completed.

At a November 25, 1997 meeting, hosted by the Pyramid Lake Paiute tribe, Northern Paiute and Shoshone representatives informed the BLM that they would not respond to any additional requests for consultation on this issue. They were firm in their position that they had provided sufficient information for the BLM to determine that they are the only modern people culturally affiliated with the remains and demanded that the remains be repatriated immediately.

A series of additional consultations during 1998, to inform the tribe of the evidence counter to their claim and to elicit more evidence supporting the tribe's claim, failed to produce any additional information. In the Fall of 1998, the BLM, based on available evidence, reached the preliminary conclusion that while the human remains from Spirit Cave are Native American, they were not culturally affiliated with any living individual or contemporary human group. At a briefing with Washington Office and Departmental Staff, on January 21, 1999, the evidence for this determination was reviewed and the group reached the consensus that the decision complied with NAGPRA and its implementing regulations.

At a meeting on January 22, 1999, to inform the tribes of this preliminary decision, the Chair of the Fallon Paiute-Shoshone Tribe asked for more time to develop and present evidence of affiliation and was allowed until June 11, 1999 to produce additional evidence. In a letter dated April 14, 1999, the Fallon Paiute-Shoshone Tribe, now represented by counsel, requested a meeting with the BLM to discuss an extension of the June 11, 1999 deadline and other issues relating to the Spirit Cave remains. At the meeting on May 18, 1999, the Fallon Paiute-Shoshone Tribe, through counsel, asked for an extension until December 17, 1999 to present evidence. In July 1999, the Fallon Tribe was given a final extension until December 17, 1999 and once again was given the evidence on which the preliminary decision was based. On December 16, 1999, the Fallon Tribe, through counsel, provided their response to the evidence supporting a

determination of unaffiliated and on December 29, 1999 the tribal attorneys sent BLM a memorandum again claiming affiliation with the Spirit Cave remains; detailing the tribe's legal and substantive arguments supporting affiliation; and asking the BLM to act on its request for repatriation.

In a letter dated January 24, 2000, the Nevada State Museum informed the BLM that they are no longer taking the lead in Spirit Cave scientific studies and in a letter dated April 6, 2000 formally withdrew its request for DNA testing of human remains from the western Lahontan Basin, which includes Spirit Cave. Despite a request from the University of California, Davis, dated March 2, 2000, for permission to conduct DNA testing on the Spirit Cave remains, the BLM is not actively considering any requests for testing or analysis of the Spirit Cave remains at this time.

2. LEGAL ISSUES

A. Trust and NAGPRA Issues

The trust relationship between non-BIA federal agencies and federally-recognized Indian Tribes is a complex one. At its broadest, the relationship mixes legal duties and moral obligations with expectations that have grown up in the course of dealings between the Federal government and the Indian tribe, both generally, and as to the specific transaction. Therefore, though BLM does not consider the human remains at issue here to be trust assets, BLM has been diligent in trying to protect its general trust relationship with the Tribe throughout the consultation required by NAGPRA for making this affiliation decision.

BLM recognizes its fiduciary responsibility to engage in fair dealing in conducting any government to government transaction with Indian tribes. However, the primary impetus for consultation and the duty to decide cultural affiliation in this case, does not arise from a trust responsibility owed by the Federal Government to the tribes. The responsibility is instead a requirement of NAGPRA. See for example 25 U.S.C. 3003.

NAGPRA requires an initial inventory of human remains and funerary objects in museums, including existing museum or federal agency records, inventories or catalogues, relevant studies and other pertinent data for the limited purpose of determining geographical origin, cultural affiliation and basic facts surrounding the acquisition and accession of the human remains. 25 U.S.C. 3003(b)(2). In this case, the tribe requested that the consultation and cultural affiliation determination under NAGPRA be conducted on remains from Spirit Cave prior to completion of the inventory for the larger collection at the Nevada State Museum.

BLM has collected and evaluated only information pertinent to the inquiry standard set forth in 3003(b)(2) of NAGPRA, e.g., information which may tend to show geographical

origin, cultural affiliation and basic facts surrounding the acquisition and accession of this particular set of Native American human remains. BLM's duty in arriving at a decision here, is to determine cultural affiliation, e.g., that a shared group identity exists which can reasonably be traced either historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group. 25 U.S.C. 3001(2). BLM has determined that because of the prehistoric age of the remains in question, they represent the remains of a Native American person as defined by NAGPRA.[1]

However, BLM's responsibility in determining affiliation, as enunciated by NAGPRA, is to determine affiliation between a particular Indian tribe and an identifiable earlier group. See, 25 U.S.C. 3001(2). In order to determine that remains are culturally affiliated with an Indian tribe even though not clearly identifiable as such, the totality of circumstances surrounding acquisition of the remains must be examined and the decision-maker must determine that grounds exist for a reasonable belief that the remains are affiliated with the Indian Tribe. 25 U.S.C. 3003(d)2(C). Where cultural affiliation cannot be determined as part of the inventory process, remains must be returned to tribes requesting such remains if the requesting tribe can show cultural affiliation based on a preponderance of the evidence including geographical, kinship, biological, archeological, anthropological, linguistic, folkloric, oral tradition, historical, or other relevant information or expert opinion. 25 U.S.C. 3005(a)(4). While BLM is the decision-maker for the agency, it recognizes that the tribe may request review of this matter from the NAGPRA Review Committee. The Committee may make findings related to cultural items, including human remains. The Review Committee findings could address cultural affiliation or the return of any such items. Any such finding by the Review Committee may be admissible in any action brought alleging violation of NAGPRA. See 25 U.S.C. 3006(c)(3) & (d) and see 25 U.S.C. 3013.

B. Human Rights/Religious Freedom Issues

Human remains are explicitly classified as cultural items under NAGPRA, and NAGPRA fails to list human remains as legally recognized persons or as an entity with legally protected interests. See Na Isi O Na Kupuna O Mokapu v. Dalton, 894 F. Supp. 1397 (D Hawaii 1995). Therefore, while BLM is sensitive to the Tribe's religious beliefs and concerns regarding the status of the dead as persons in their own right, NAGPRA reposes the legal rights of ownership and control, where affiliation has been determined and repatriation has occurred, in the living Native American lineal descendant or culturally affiliated tribe. Where affiliation has not been determined, and until the remains are repatriated, ownership and control in this case presumably continue to rest with the government.

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[1] The remains of a tribe, culture or people indigenous to the United States. 25 U.S.C. 3001 (9).

A law may be burdensome or contrary to a group's religious beliefs and still be neutral in its application. See Employment Division v. Smith, 494 U.S. 872, 878 (1990). Here, NAGPRA has set up rights in the living and not with the dead. Generally, the law recognizes quasi-property rights over the bodies of the dead and their effects in the living beneficiaries of the person or in his/her lineal descendants. See Black's Law Dictionary, "Cadaver nullius in bonis." (No one may have a right of property in a corpse). Generally, the scope of this quasi-property right is limited to family members and their rights relate to burial of the person, allowing and autopsy, etc., and may not apply after a corpse has been buried for a long time, See, e.g., T. Sueve, Mortuary Law 9-10 (7th. rev. ed., 1984), See also Dougherty vs. Merchantile Safe Deposit & Trust, 387A, 2d. 244, 246 (Md. 1978), Spiegel vs. Evergreen Cemetery, 186 A. 585, 586-87 (N. J., 1936), Snyder vs. Holy Cross, 352A. 2d. 334, 340 (Md. 1976), Fuller v. Marx, 724 F. 2d 717 (8th. Cir., 1984).

3. NECESSARY ELEMENTS AND DECISION CRITERIA

A. Standing

For the purposes of complying with NAGPRA, the BLM had to decide if the remains from Spirit Cave were Native American and who if anyone should be consulted about their disposition. NAGPRA defines a Native American as "of, or relating to, a tribe, people, or culture that is indigenous to the United States" [25 USC 3001 SEC 2(9)] . Under this definition, the BLM determined, based on dating, that the remains in question were Native American and subject to the provisions of NAGPRA. Further, since the Northern Paiute territory defined by the Indian Claims Commission [7 Ind. Cl Comm 322:372-373 (1959)] included Spirit Cave, the BLM contacted Northern Paiute tribal governments and began consulting with them on this request.

B. Affiliation

Section 5 of NAGPRA directs federal agencies (including the BLM) to determine the cultural affiliation, if any, of human remains and associated funerary objects from federal lands.

For each set of remains or objects, the BLM has to determine the cultural affiliation, if any, by following the procedures set forth at 43 CFR 10. According to 43 CFR 10.14(c-f), the BLM will determine cultural affiliation as follows:

> (c) Criteria for determining cultural affiliation. Cultural affiliation means a relationship of shared group identity that may be reasonably traced historically or prehistorically between a present-day Indian tribe or Native Hawaiian organization and an identifiable earlier group. All of the following requirements must be met to determine cultural affiliation between a present-day Indian tribe or

Native Hawaiian organization and the human remains, funerary objects, sacred objects, or objects of cultural patrimony of an earlier group:

(1) Existence of an identifiable present-day Indian tribe or Native Hawaiian organization with standing under these regulations and the Act; and

(2) Evidence of the existence of an identifiable earlier group. Support for this requirement may include, but is not necessarily limited to evidence sufficient to:

(i) Establish the identity and cultural characteristics of the earlier group,

(ii) Document distinct patterns of material culture manufacture and distribution methods for the earlier group, or

(iii) Establish the existence of the earlier group as a biologically distinct population; and

(3) Evidence of the existence of a shared group identity that can be reasonably traced between the present-day Indian tribe or Native Hawaiian organization and the earlier group. Evidence to support this requirement must establish that a present-day Indian tribe or Native Hawaiian organization has been identified from prehistoric or historic times to the present as descending from the earlier group.

(d) A finding of cultural affiliation should be based upon an overall evaluation of the totality of the circumstances and evidence pertaining to the connection between the claimant and the material being claimed and should not be precluded solely because of some gaps in the record.

(e) Evidence. Evidence of a kin or cultural affiliation between a present-day individual, Indian tribe, or Native Hawaiian organization and human remains, funerary objects, sacred objects, or objects of cultural patrimony must be established by using the following types of evidence: geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion.

(f) Standard of proof. Lineal descent of a present-day individual from an earlier individual and cultural affiliation of a present-day Indian tribe or Native Hawaiian organization to human remains, funerary objects, sacred objects, or objects of

cultural patrimony must be established by a preponderance of the evidence. Claimants do not have to establish cultural affiliation with scientific certainty.

C. Burden of Proof

1. Based on these provisions, the burden of proof rests with a group claiming affiliation, who must:

a. be an identifiable present-day Indian tribe with standing under these regulations and the Act;

b. identify an earlier group by establishing the identity and cultural characteristics of the earlier group through documenting distinct patterns of material culture manufacture and distribution methods, or establishing the existence of the earlier group as a biologically distinct population; and

c. provide evidence of the existence of a shared group identity between the present-day Indian tribe and the earlier group and establish that the present-day Indian tribe has been identified from prehistoric or historic times to the present as descending from the earlier group.

D. Decision Criteria

1. Once a claim has been made the BLM must base its decision on:

a. an overall evaluation of the totality of the circumstances and evidence pertaining to the connection between the claimant and the material being claimed. Claims do not have to establish cultural affiliation with scientific certainty and should not be denied solely because of some gaps in the record; and

b. the preponderance of the following types of evidence: geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion rests to support the claim.

4. EVIDENCE

In considering the lines of evidence mentioned in NAGPRA as potentially relevant to determining affiliation, there are four logically possible outcomes. In the following summary, each line of evidence will be described and then evaluated as to whether it: (1) supports a determination of affiliated; (2) supports a determination of unaffiliated; (3) is inconclusive for determining affiliation; or (4) is not applicable to the determination.

A. Archaeological

1. The Archaeology of Spirit Cave:

a. Initial Discovery, Excavation, and Description

Spirit Cave, located in the Grimes Point/Stillwater area (Figure 1), about seventy-five miles, east of Reno, Nevada, was excavated in 1940 by S. M. Wheeler and Georgia N. Wheeler (Wheeler and Wheeler 1940; 1969:73-78). As described by the Wheelers, the cave is a west-facing, dry, rockshelter, approximately twenty-five feet wide, fifteen feet deep and an average of five feet high (Figure 3). The cave was wavecut into a beach terrace of Lake Lahontan and its walls were tufa covered, suggesting long periods of inundation by the lake. It was filled with wind-blown sand deposits, roof-spall, and rocks apparently brought in by people. There was a quarter circle of rocks extending from the center of the rear wall to just inside of the entrance on the north wall. There was also a small chamber off of the northeast corner of the main cave.

On August 11, 1940, the Wheelers began excavating within the arc of rocks and just over a foot below the surface uncovered “a large mat, very finely twined, with a warp of split tules and a weft of native hemp cord,” that was wrapped around “a few human bones, all that remained of some early Nevadan” (Wheeler and Wheeler 1969:73). This is the burial recorded as Burial #1 by the Wheelers, who collected the mat and reburied the associated human remains (Dansie 1997:5). Next the Wheelers discovered that “immediately below this [Burial #l] was another large mat of tules, the warp held together by rows of tule twining about 5 inches apart” and this mat covered a second burial (Wheeler and Wheeler 1969:73). The Wheelers recorded this burial as Burial #2, and it is now known as the Spirit Cave Mummy, or Spirit Cave Man.

Burial #2 was buried in a pit measuring “6 feet long, 4 feet wide, and 3 feet 9 inches deep” that was “lined with sagebrush, on which the mortuary bundle was deposited and then covered with more brush (Figure 4). The upper part of the pit had been filled with rocks which the wind eventually concealed with fine sand. Later the intrusive upper burial [Burial #1] was laid on the first.”(Wheeler and Wheeler 1969:73). As described by the Wheelers, the head of the mortuary bundle [Burial #2] was “at a depth of 2 feet 4 inches and slightly higher than the hips," was "oriented 55 degrees east of true north." After photographing and recording it, the bundle was removed and transported to the Nevada State Museum, where it remains today (NSM 1996).

After removing the bundle burial [Burial #2] to the Nevada State Museum, the Wheelers spend several days cleaning, opening, and studying it. Once the bundle was opened, the Wheelers describe the body as follows:

> "It lay on its right side on a fur blanket, the legs being semi-flexed, with the knees opposite the hips. The upper half was wrapped in a close twined mat of the type found with the intrusive burial. It was sewn together around the head. A similar mat was wrapped around the balance of the body and a large mat of tules, 35 inches by 50 inches, was laid over the entire bundle, the lower corners being tied together under the feet. . . ."

"The bones of the lower portion of the body were exposed but, from the hips upward, it was partially mummified. The scalp was complete with a small tuft of hair remained. Within an hour after exposure to the light and air the black hair became reddish. The clothing consisted of a pair of leather moccasins and a breechcloth of fiber. There were no other accompaniments with the burial." (Wheeler and Wheeler 1969:73-74).

Based on their observations, and expert opinions, the Wheelers thought that Burial #2 was "a young adult male" that was "approximately 1500 to 2000 years old" (Wheeler and Wheeler 1969:74). They also observed that "all of these mats [bundled around Burial #2] were of types found elsewhere in the caves of the Fallon area and in Lovelock Cave 40 miles to the north" (Wheeler and Wheeler 1969: 73).

Five days after removing Burial #2, the Wheelers returned to Spirit Cave to look for more burials and "against the rear wall at a point about 10 feet south of the initial discovery" [Burials#1 and #2] and at a depth of 24 inches found "a small twined bag of split tules from beneath of which protruded the edge of a close twined bag of native hemp"(Wheeler and Wheeler 1969:74). The bags "lay on the bottom and at the rear end of a pit 5 feet wide, 6 feet long, and 2.5 feet deep (Figure 5) which had been used for crematory purposes and then filled in"(Wheeler and Wheeler 1969:74). The Wheelers recorded the human remains in the two bags as Cremation #1 and Cremation #2 and noted that "both were definitely buried at the same time" (Wheeler and Wheeler 1969:75, 77-78).

In closing, the Wheelers noted that “complete excavation revealed that Spirit Cave had not been inhabited but the shelter had been used for burial and the small inner chamber for storage" (Wheeler and Wheeler 1969:75).

b. Subsequent Description and Analysis

1. Radiometric Dating

Based on their observations, and expert opinions, the Wheelers thought that Burial #2 was, “a young adult male” that was “approximately 1500 to 2000 years old” (Wheeler and Wheeler 1969:74). However, a series of subsequent radiometric dates (AMS $C_{14,}$ uncalebrated) shows that this assessment is in error (Kirner et al. 1997:54-56). The weighted mean of a series of dates run on hair and matting reveals that Burial #2 dates to a weighted mean age of 9,415+/-25 years B. P. (Tuohy and Dansie 1997:25).

In addition, the matting collected from Burial #1 has been dated to 9,270+/-60 B.P. and an adult female bone fragment, which may be part of Burial #1 (Tuohy and Dansie 1997:35) has been dated to 9300+/-70 years B.P. (Tuohy and Dansie 1997:25). The cremation that the Wheelers labeled as Cremation #2 has been dated to 9040+/-50 years B.P. and Tuohy and Dansie (1997:25,35) assume that this date applies to Cremation#1 as well.

A sub-adult male bone from the cave dated to 4640+/-50 years B.P.; a coiled basket fragment dated to 2,200+/-60 years B.P.; and a twined grass mat dated to 1,700+/-60 years B.P. (Tuohy and Dansie 1997:25).

2. Human Remains (Table 1)

a. Spirit Cave Mummy: Although the Wheelers identified Burial #2 as, “a young adult male” subsequent analysis and description have identified it as the remains of a 45-55 year-old male with hair and dental morphology that are biologically related to Northern Asians and Native Americans (Goodman and Martin 1999:3-4,11).

As discussed in Section 4(B), cranial morphological measurements of Burial #2 were statistically compared to a worldwide sample of contemporary populations and this showed that the remains fall outside of the range of

variation of any population represented in their comparative sample (Jantz and Owsley 1997:66-81).

b. Cremated Remains: The Wheelers assumed that the cremated human remains in the two bags were from two individual burials and labeled them as Cremation #1 and Cremation #2, (Wheeler and Wheeler 1969: 77-78). Later analysis is mixed. One examination suggests that Cremations #1 and #2 are the remains of one individual (Owsley 1996), possibly a twenty-five-year-old woman (Tuohy and Dansie 1997:35). Larsen (1985: 395) suggests that there are two cremations, one is an adult (AHUR 773) and the other a twenty-five-year-old woman (AHUR 752). For this report, The BLM reexamined the cremations and concluded that Cremations #1 and #2 are the remains of one individual, most likely those of a young adult female (Damadio 2000:35).

c. Additional Human Remains: The Wheelers did not publish descriptions of any human remains other than Burial #1, Burial #2, Cremation #1 and Cremation #2. However, their field notes identified (Wheeler and Wheeler 1940), and subsequent analysis confirms, at least two additional sets of human remains from Spirit Cave (Owsley 1996). One set (AHUR 770) appears to include fragments of the remains of a thirty to thirty-five-year-old female buried 9300+/-70 years B.P.(Tuohy and Dansie 1997:25). Based on dating, Tuohy and Dansie (1997:35) thought that the woman may be Burial #1, however the Wheelers (Wheeler and Wheeler 1940) suggest that she is a different burial altogether. In addition, Larsen (1985:395) notes that there are remains from additional individuals cataloged under AHUR 770 but does not indicate number, age, or gender. Damadio (2000: 36) suggests a maximum of five individuals are included in AHUR 770. The other (AHUR 748) is an adolescent male buried 4640+/-50 years B.P. (Damadio 2000:36); Tuohy and Dansie 1997:25).

3. Textiles

The Wheelers observed that “all of these mats [bundled around Burial #2] were of types found elsewhere in the caves of the Fallon area and in Lovelock Cave 40 miles to the north” (Wheeler and Wheeler 1969: 73). Subsequent analysis identified the matting in which Burials #1 and #2 were wrapped were "diamond plaited" mats unique to Spirit Cave (Tuohy and Dansie 1997:34). Fowler et al. (1997; 2000) are in the process of fully describing the matting from Spirit Cave and they have now redefined the "diamond plaited" matting and bags as warp-faced-plain-weave textiles because the diamond pattern is not made by twill plaiting. This textile type is very fine and even weaving with the warp woven so tightly that the weft is barely visible (hence warp faced). The warp is constructed from split bulrush stems and the weft from paired cords of dogbane, big sagebrush, or juniper (Fowler et al. 2000:7). Edge cords are principally big sage (Fowler et al. 2000:8). The quality and uniformity of the textiles may be the result of weaving on a loom or other frame (Fowler et al. 2000:10-13). All known archaeological examples of warp-faced-plain-weave textiles similar to those from Spirit Cave are found in sites within a few miles of Spirit Cave and date to between 9470+/-60 and 9040+/-50 years B.P. (Fowler et al. 2000:13-14, Table 1). Fowler et al. (2000:14) note a "typologically similar" but much less fine mat from Oregon that has been dated to 540+/- 50 years B.P. It is unlikely that the Oregon mat and the Spirit Cave textiles come from a continuous tradition and "there is no evidence [other than the Oregon mat] that this particular mat making technique continued into ethnographic times" in the Great Basin (Fowler et al. 2000:14).

c. Archaeological Issues:

There are three archaeological issues relevant to determining if the human remains from Spirit Cave are affiliated with any contemporary individuals or groups. These are (1) Culture History; (2) Textiles; and (3) Burial Practices. Culture history is relevant because the remains are more than 9,000 years old and the passage of time and the natural evolution of cultures through time diminish the likelihood that any set of remains is, or can be, affiliated. Burial practices and textiles are relevant because they are the only nonbiological data directly associated with the most ancient burials from the Spirit Cave.

2. Culture History (Table 3)

Since 1915, when systematic archaeological research began in the Great Basin (Fowler 1986:17), archaeologists have documented numerous changes in cultural adaptations from the region in general and in the Spirit Cave area in particular (for summaries see Grayson 1993:233-276; Elston 1986:135-148). Following Grayson (1993:193) this summary of the culture history of the Spirit Cave area is divided into three parts corresponding to the accepted divisions of the Holocene geological epoch. These are the (1) Early Holocene, 10,000 to 7,500 years B.P.; (2) Middle Holocene, 7,500 to 4,500 years B.P.; and (3) Late Holocene, 4,500 years B.P. to 500 years B.P. While these distinctions are somewhat arbitrary, they are useful in this discussion because they capture significant changes in both the environment and cultural adaptation to those environments (Table 3).

a. The Early Holocene: 10,000 to 7,500 Years B.P.

Although, Burial #1, Burial #2, Cremation #1, and Cremation #2 from Spirit Cave have been dated to the beginning of the early Holocene, there is no evidence of Spirit Cave being used in the remainder of the early Holocene [after about 8,900 years B.P. (Tuohy and Dansie 1997:25)].

During the early Holocene, the climate of the Great Basin was cooler and/or moister than it is today and the environment dominated by widespread shallow lakes and marshes (Grayson 1993:197). In the Spirit Cave area, the environment is dominated by the dessication of Lake Lahontan into several remnant lakes (such as Pyramid, Walker, and Winnemucca Lakes and extensive marshes (at Stillwater and Lovelock for example) (Mehringer 1986:34-37). Throughout this period, pine and sagebrush are giving way to shadscale and greasewood and subalpine conifers are retreating up the mountains (Mehringer 1986:43-47; Grayson 1993:197-199). Grayson (1993:244) and others have argued that from the human point of view, "the Great Basin may never have been more productive than it was during the early Holocene."

Archaeological evidence from the early Holocene in the Western Great Basin is relatively sparse and generally limited to surface quarry sites, lithic sites, and shallow cave deposits in sites like Spirit Cave (Elston 1986:137). Based on this evidence and assumptions drawn from early Holocene sites elsewhere, archaeologists have argued that in the early Holocene, people lived in the valley bottoms, around lakes and along permanent water sources and subsisted by hunting large mammals, collecting small animals and easily gathered marsh plant foods (Grayson 1993:242-244; Elston 1986:137). Marsh plants were the staple plant food

and small animals (rodents, rabbits, and waterfowl) the staple meat source. Piñon pine had not invaded the region and upland areas were sparsely used. Spears were the dominant technology for hunting big game and nets and snares were probably used to collect small mammals. There is no evidence of plant processing with ground stone tools. Sites with evidence of houses, storage pits, or other structures are unknown (Grayson 1993:248) and there are no known rock art sites dated to the early Holocene.

Other than these gross generalizations, there is no evidence from the early Holocene that one can use to identify a human group that is distinct from other human groups that may have lived in the area. Given the paucity of the archaeological record for the early Holocene, there is no way to know how many different groups lived in the region and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants in later periods. In lithic technology, the early Holocene is dominated by stemmed and fluted spear points that do not survive into later periods, and a lack of ground stone seed processing equipment that dominates later periods. As discussed in detail in Section 4(A)(3), warp-face-plain weave (diamond plaited) textiles are limited to the early Holocene and coiled basketry is absent. The lack of sites with evidence of houses, storage pits, or other structures from the early Holocene is probably a sampling error caused by the difficulty in finding early buried sites. There is no evidence showing which language or languages were spoken in the early Holocene and no evidence suggesting details of social or political organization, territorial boundaries, kinship patterns, religious beliefs, or world view.

b. The Middle Holocene: 7,500 to 4,500 years B.P.

There is no radiometric evidence that Spirit Cave was used between about 8,900 years B.P. and 4,700 years B.P., however, the remains of the 15-year-old male identified in the Spirit Cave Collection dates to the middle Holocene period, as do the two projectile points from the collection (Tuohy and Dansie 1997:32) and possibly the ground stone food grinding stone (metate) identified by the Wheelers, but no longer available for study (Tuohy and Dansie 1997:32).

By the start of the middle Holocene, large lakes and marshes have disappeared, along with ice-age big game, fully modern shadscale communities have been established, and settlement moves away from lakes and rivers. Beginning 6,500 years B.P., piñon pine becomes available, pine nuts replace or complement marsh plants as a dietary

staple, and upland areas are heavily occupied and used for subsistence (Grayson 1993:244). Stemmed and fluted spear points are replaced by smaller notched dart points used on thrown darts (atlatl) to hunt mountain sheep and antelope (Grayson 1993:249-255). Marsh plants become part of a wide range of exploited upland and lowland plant resources and grounds stone tools for processing upland hard seeds appear. In the Spirit Cave area, people lived in smaller groups dispersed widely throughout the full range of available habitats (Elston 1986:139-141). Base camp sites were occupied long enough to develop midden deposits, along with circular house structures, storage pits and other features. Rock art sites appear and there is evidence of extensive trade and contacts outside of the area. Beginning 4,600 years B.P., Lovelock Cave is occupied, and it, along with other caves and rockshelters, are used for equipment caches, food storage, and burials (Elston 1986:140).

As with the early Holocene, there is no evidence to show how many different groups lived in the region during the middle Holocene and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants in later periods. Other than textiles, discussed in Section 4(A)(3), the introduction of ground stone food processing technology, and thrown dart hunting technology, there is no evidence that establishes the identity and cultural characteristics of any distinct human group. However, migration cannot be ruled out as the cause of these introductions and they clearly represent a break in the cultural continuity between the early Holocene and later periods.

There is no evidence showing which language or languages were spoken in the middle Holocene and no evidence suggesting details of social or political organization, territorial boundaries, kinship patterns, religious beliefs, or world view.

The archaeology and paleoenvironmental reconstruction for the middle Holocene is also relevant to this discussion primarily because of the evidence suggesting large-scale abandonment and/or drastic population decline throughout the western Great Basin in general, and in the Spirit Cave area in particular (Grayson 1993:244-248; Elston 1982:193-194). If as Grayson (1993:244) argues there was a hot and dry period of about 1,000 years or so between the time when the “rich resources supported by widespread shallow-water systems were largely gone” and when piñon pine reaches the central and western Great Basin, then there is likely that there were significant human population declines in the region with areas abandoned between about 7,500 years B.P. and 6,500 years B.P. (Grayson 1993:246-248).

Elston (1986:138) and others (cited in Grayson 1993:246-7) have noted that sites dated to this time period are rare in the archaeological record. In the central Great Basin, Thomas (1982:165) found very few middle Holocene sites and none that predate 5,500 years B.P. In the Spirit Cave area, there are at least eight cave sites that show a discontinuity in the occupational sequence, or were not occupied during most of the middle Holocene (Grayson 1993:247-248). These data suggest to Grayson (1993:248) that there was a significant population decline and/or areal abandonment during this period, and that "people made less use of caves during the middle Holocene than they did before and, especially after this time." Grayson (1993:248) attributes this to the loss of marsh and wetland resources due to drying and habitation movement from caves near marshes to other locations, such as open sites adjacent to springs that remained well watered. Therefore, the culture history of the middle Holocene does not provide evidence of the existence of a shared group identity between any present-day Indian tribe and any earlier group, nor does it establish that any present-day Indian tribe has been identified from prehistoric times to the present as descending from any earlier group. In other words, the available evidence from the middle Holocene indicates significant cultural discontinuity between the early Holocene and the late Holocene and therefore, does not support affiliation with any contemporary group.

c. The Late Holocene: 4,500 years B.P. to 500 years B.P.

In the late Holocene, marshes, meadows, and shallow lakes again increase in valley bottoms, but settlement focuses on upland areas. Ground stone plant processing tools become abundant and large quarry sites are mined to produce bifaces, which are widely traded. There is extensive evidence of habitation sites as well as large pit houses with repeated periods of use. Houses contain hearths, storage pits, and burials. As discussed in Section 4(A)(3), Lovelock Wickerware textiles, tule duck decoys, coiled basketry and twill/twined water bottles appear in the archaeological record, as do

At the end of the late Holocene, thrown darts are replaced by the bow and arrow and hunting shifts to an emphasis on capturing rabbits and other small game. Big game hunting shifts from group hunting drives for mountain sheep and antelope to individual deer hunting. Around 600 years B.P. brownware pottery appears and 1,000 years B.P. Lovelock Wickerware disappears. Houses are smaller and shallower and do not have internal features. Caves continue to be used for caches and are again used for burials.

Grayson (1993:255-258) argues that “between 5,000 and 4,000 years B.P., the archaeological record begins to look very much as if it could have been created by people living much the way some Great Basin native people lived when Europeans first encountered them.” However, Thomas (1982:166) points out that "most major sites in the Great Basin lack significant Paiute-Shoshone components [post 1000B.P.]." It is clear that the archaeological record evolves through the late Holocene from significant differences at the end of the middle Holocene toward the ethnographic pattern and only in the last 1,000 years or so does it strongly resemble ethnographic cultural descriptions (Elston 1982:197-199; 1986:145-147).

However, as with earlier periods in the Holocene, there is no evidence to show how many different groups lived in the region during the late Holocene and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants. Near the end of the period, ceramics appear in some parts of the Great Basin for the first time, as does bow hunting technology and coiled basketry. These may have been brought in by migrants from elsewhere. There is no evidence showing which language or languages were spoken in the late Holocene and no evidence suggesting details of social or political organization, territorial boundaries, kinship patterns, religious beliefs, or world view. Therefore, there is nothing in the culture history of the Late Holocene to show that cultural materials and practices similar to historic native peoples appear in the archaeological record until about 1,000 years B.P.

d. Summary and Evaluation

In summary, the culture history of the Spirit Cave area shows significant cultural changes through time, possible in response to significant environmental change, and little evidence for cultural continuity throughout the Holocene. Instead there is evidence of discontinuity in material culture, settlement patterns, and subsistence strategies. While it is difficult to associate ethnicity or language with archaeological materials, the BLM’s review of the available evidence indicates sufficient discontinuity such that it is unlikely that the tribes occupying the Spirit Cave area in historic times are from the same culture as the people who buried their dead in Spirit Cave in the early Holocene or are the direct descendants of that group.

Therefore, BLM’s review of the available evidence indicates that the culture history of the western Great Basin shows a pattern of changes in cultural adaptations that does not support cultural continuity over the last

> 10,000 years. The level of discontinuity is sufficient to warrant the conclusion that the remains from Spirit Cave cannot be reasonably affiliated with any modern tribe or individual.

3. Textiles

James Adovasio, David R. Pedler, Eugene Hattori, Catherine Fowler, Lawrence Dawson, and Charles Rosaire, are the recognized experts on prehistoric and ethnographic textiles in the Great Basin. In published papers and manuscripts produced for more than three decades these experts unanimously recognize basketry technology as a distinct cultural marker. Unlike projectile points styles which can be widely dispersed across cultural boundaries, entire constellations of basketry elements do not diffuse or spread. This renders basketry particularly useful for comparative studies of material culture because basketry technique can be approached and controlled from many points of view. Most conspicuously, basketry reveals the fundamental mechanical factors involved in the technique of making baskets that objectify themselves in the product and are not lost on the process of construction. Therefore basketry and other textiles, contain evidence that reveals the history of group dynamics and cultural identity in an area (Adovasio 1986b).

Adovasio and Pedler (1994) assert that there is no recorded case of overall replacement of one perishable technology by another in the archaeological record of the Americas. The perishable-artifact archaeological record contains virtually no example of complete, spontaneous, technological replacement of basketry construction techniques within a population of weavers. A unique simple plaited textile from the west-central Great Basin demonstrates the substance of their argument. Known in the literature as Lovelock Wickerware, this plaited textile has been dated to between 4,500 and 650 years B.P. (Aikens and Witherspoon 1986). Adovasio, Rosaire, Hattori, Dawson and Fowler have all noted the strong temporal and spatial boundaries of Lovelock Wickerware within the west-central Great Basin. In the archaeological record the technique was used almost exclusively to construct burden baskets and has no ethnographic correlates anywhere in North America. The appearance and disappearance of this textile from the Western Great Basin demonstrates a rare technological turnover within a regional basketry sequence characteristic of population replacement (Adovasio and Pedlar 1994:122). Further, Adovasio stated that although some similar twining and coiled basket wall foundation types are known to Central and Northern Numic speaking groups, minor construction attributes, specifically methods of starting, splicing techniques, and rim finishes, are totally different from those used by Numic Speaking people (Adovasio and Pedlar 1994:122). Adovasio also suggests that the relatively common large flat circular coiled Lovelock parching tray disappears from the archaeological inventory around 1,000

years B.P., at about the start of the proposed dispersal of the Numic speakers. On typological and formal grounds, Adovasio and Pedlar (1994:122) conclude that " whoever were the makers of Lovelock Wickerware and associated Western Great Basin twining and coiling, they were not Northern Paiute or any other Numic Speaking group.

Fowler and Dawson (1986) recognize basketry as one of the technological hallmarks of archaeological and ethnographic Great Basin groups. The data derived from their observations of baskets is important for cultural historical reconstructions and ultimately for their overall interpretations (Table 2). Northern Paiute basketry is predominantly twined and there is strong evidence that coiled baskets were not made by the Numic speaking groups early in their history (Fowler and Dawson 1986:728; Fowler 1988:83-84). In west-central Nevada the closest sources of coiled basketry are the Washoe, who may demonstrate technological links to the basketry of the archaeological "Lovelock Culture" of Western Nevada (Fowler and Dawson 1986:729). Throughout the rest of the Great Basin few links can be traced between the archaeological basketry characteristics and those ethnographically recorded (Adivasio 1986b:50-55; Fowler and Dawson 1986:729). Although one must be cautious equating artifact type with linguistic groups and especially with suggested migrations, there is strong evidence that this can be done with prehistoric and ethnographic basketry in the western Great Basin and that the evidence supports the Numic expansion hypothesis (Adovasio 1986b:55-56; Fowler and Dawson 1986:729).

Adovasio and Pedler (1994:114-123) synthesized the research on North American textiles and developed the argument that while certain construction forms, decorative elements, and basket forms may be borrowed, adopted or traded as finished products, wholesale borrowing of technology and duplicating the myriad of choices in construction detail simply do not occur among neighboring groups. This is because textile manufacture is a learned behavior that is "controlled by or constrained within a set of norms that is passed to the weaver by his or her instructor(s)." (Adovasio and Pedler 1994:117) Textiles, in this sense, are the best evidence of territorial and temporal boundaries to be found in the archaeological record (Adovasio 1986b; Adovasio and Pedlar 1994:114-115).

Adovasio (1974:100) has long postulated the production of basketry as one of the oldest aboriginal crafts in North America. This position is based on extensive research in which he proposes that the antiquity of basketry manufacture is second only to the construction of cordage and netting among items defined as "perishable fiber arts."

Prehistoric basketry, unlike ceramics or lithics, is only preserved intact under relatively special conditions. In particular, the preservation of textile remains is

only possibly by preventing the development of bacteria that is detrimental to organic matter. This is only possible in virtually anaerobic environments found in dry, cold caves and rock shelters throughout North America.

Based on comparative studies of archaeological textiles in North America, Adovasio (1986:194) has developed at least three distinct prehistoric basketry manufacturing regions within the Great Basin: the Northern Basin Basketry Region, the Western Basin Basketry Region, and the Eastern Basin Basketry Region (Figure 6). The western Great Basin Basketry region comprises west and central Nevada and contiguous areas of California.

Within the Western Basin Basketry region Adovasio has identified 16 basketry technique types (Adovasio 1970:1-40). Of these, seven are coiled varieties, eight are twined, and one is a distinctive form of plaiting known in the literature as Lovelock Wickerware. This distinctive technique of plaiting has no ethnographic correlates, nor has it been found in archaeological contexts outside of the west-central Great Basin. Adovasio (1970:5) defines twining as a subclass of textiles manufactured by passing moving (active) horizontal elements, technically called wefts, around stationary (passive) vertical elements called warps. Coiling is a class of basketry manufactured by sewing stationary, horizontal foundation elements with vertical stitches and plaited basketry is woven by passing elements over each other (Adovasio 1970:4-5). Adovasio (1970:5) also defines "a stitch slant"as a term used to denote the pitch or lean of the wefts. He notes that the direction of the weft pitch has nothing to do with left or right-handedness. The direction of stitch pitch is one of the more diagnostic attributes of twined basketry particularly in the establishment of regional complexes. Simple twining is defined by Adovasio and others as a common variety of twined basketry in which "single" warps are engaged between each weft crossing. Each succeeding weft row engages the same warps at the same interval. In this type of twining warps may actually number more than one, but whatever their number warps function as a single unit. In simple twining the stitch slant may be down to the right (z-twist) or down to the left (s-twist) with the weft rows placed close together or spaced far apart.

A brief synopsis of the evolution of these textile types in the Holocene in the Western Basketry Region (Adovasio 1970:7-9; 1986:199-200) is as follows:

> In Stage I (9,000 to 4,500 B.C.) twining dominates the textile complex and includes open and close simple twining with wefts twisted down-to-the-right. Generally these are represented by mats and flexible bags and containers. Late in this period simple twining, with wefts twisted up to the right, appears as does diagonal twining. Lovelock Wickerware and coiling are absent throughout this stage. Some very finely twined, and decorated

specimens from the western great Basin have been dated to this stage (Ellis-Pinto 1994).

Stage 1 is dominated by twined types, both simple twined and close simple twining both with Z-twisted wefts (moving elements are twisted down to the right over stationary wefts). Simple twined items are generally represented by mats and flexible bags, and occasionally semi-flexible containers in several shapes. Some forms of multiple warp sandals appear at this time. The majority of basketry constructed of S-twisted wefts (moving elements are twisted up to the right) appeared later in this stage, as did diagonal twining. Significantly, coiling and Lovelock Wicker is not present at this stage.

Textiles recovered with the Spirit Cave remains date to this stage. The Spirit Cave remains were bundled into a simple twined mat over a tightly plaited, cordage weft mat. This type of matting was categorized as twined until recently when on closer examination it was determined to be warp-face-plain-weave (diamond plaited). Recent, dates from these warp-face-plain-weave (diamond plaited) textiles associated with the remains from Spirit Cave (Tuohy and Dansie 1997:25) have extended Adovasio's Stage 1 chronology by at least 400 years.

Stage II (4500 to 2000 B.C.) is marked by an increase in coiled containers using a multiple rod foundation, generally with non-interlocking or intentionally split stitches. Decorated and undecorated twining with a variety of wall types is present, however, no Lovelock Wickerware is present.

Stage III (2000 to 1000 B.C.) has multiple rod foundation coiled containers which continue through this period and begins to eclipse all types of twining. Some very early Lovelock Wickerware may be present at this time as are several varieties of woven sandals.

Stage IV (1000 B.C. to A.D. 1000), has decorated and undecorated rigid and flexible twining continuing to be manufactured although forms are limited. Lovelock Wickerware is produced within a very limited area. Three rod bunched coiled foundation basketry is common as are three varieties of coiled containers of single rod foundation. The coiled basket from Spirit Cave dates to about 200 B.C. (Tuohy and Dansie 1997:25), well within this stage

Stage V (A.D. 1000 to 1800 or later), is marked by the fact that the distinctive large coiled round flat parching trays are no longer constructed

> although other coiled items are still present. Lovelock Wickerware does not occur. Twined seed beaters, twined winnowing trays and multiple warp sandal types are common. As a whole basketry and sandal types of this period are technologically distinct and essentially unrelated to previous cultural developments.

Technological changes apparent in the basketry chronology for the western Great Basin (Table 2) demonstrates cultural technology boundaries in perishable technology at precisely the same time as the proposed arrival and dispersal of the Numic speakers (Adovasio 1986a:204-205). Numic basketry technology appears to be unrelated to technologies before about A.D. 1000. Adovasio believes this is observable throughout the rest of the archaeologic and linguistic record. Practically simultaneous with the basketry turnover are other material culture changes and linguistic developments that render the recent migration hypothesis the most satisfactory of the competing Numic dispersion scenarios [Sections 4(A)(5) and E(2)]. Other changes in the western Great Basin archaeological record at the 1000 A.D. boundary include the appearance of ceramics in the northern Great Basin and the disappearance of certain sandal types in the northern and western Great Basin associated with pre 1000 A.D. populations.

Between 1933 until 1944 ethnographer Willard Z. Park conducted extensive ethnographic interviews with several Northern Paiute elders from the Fallon and Pyramid Lake communities (Fowler 1989). Included in his account is a discussion of Northern Paiute ethnographic textile construction methods. The Northern Paiute methods of textile construction are almost exclusively twined and, late in historic times, coiled items. Park noted that coiling was used predominantly to make serving trays. Later studies would demonstrate the abundance of pre A.D. 1000 coiled forms used for caps, bowls and trays. Two of Park's informants stated that coiled baskets "were not made in the old days and that women learned to make coiled baskets after they saw them in the stores" (Fowler 1988:83-84). Park observed that twining technology was used to construct baskets, bowls, "mush spoons," seed beaters, parching trays, caps, cone-shaped burden baskets, and water jugs. The latter were pitched to render them watertight. Park noted the construction of rabbit skin and pelican skin blankets using a frame.

Summary and Evaluation

Between 4500 B.C. and A.D. 1000 coiled parching trays were characteristic and dominated other forms of basketry. After A.D. 1000 they are conspicuously eclipsed by twined textiles. An example of a distinct technological change is that the pre-Paiute occupants constructed three rod foundation coiled bowls, caps, and round flat trays. Northern Paiute constructed twined parching trays, twined

baskets, and twined caps. Lawrence Dawson suggests those pitched water bottles, so characteristic of the Northern Paiute, are not present in the archaeological record before A.D. 1000. Lovelock Wickerware is present between 1000 B.C. and A.D. 1000 in the form of burden baskets. The Northern Paiute constructed twined burden baskets. Z-twisted twined technology dominates archaeological textiles dated before A.D. 1000. After the postulated arrival of the Numic speakers, twining predominates. Ethnographic accounts demonstrate that Northern Paiute women did not make coiled baskets until relatively recently (Fowler 1989:83-4 and footnotes there) and some, including those from the Spirit Cave area never adopted the practice (Stewart 1941:386). Park's informant from Pyramid Lake said that "In the old days coiled baskets were not made. Women learned to make them after they saw them in stores." (Fowler 1988:83-84).

Based on the available evidence, the BLM determined that the textile evidence does not show cultural continuity throughout the Holocene. Burials #1 and #2 from Spirit Cave were associated with sophisticated warp-face-plain-weave (diamond plaited) textiles that disappeared around 8800 years BP and there was at least one textile tradition (Lovelock Wickerware) in the area between 3000 and 1000 years BP that was different from both the Spirit Cave textiles and ethnographic textiles. Other textiles, clearly associated with the Northern Paiute do not appear in the archaeological record before about 1000 years B.P. and coiled baskets may not have been made until the turn of the century. Therefore, the available textile evidence does not support affiliation between the Spirit Cave remains and any contemporary group.

4. Burial Practices

Most of the limited archaeological evidence, other than textiles, available from Spirit Cave relates to burial practices. If this evidence can be linked to historic or ethnographic burial practices among the Northern Paiute, then this line of evidence would suggest continuity between the people living in the early Holocene and contemporary groups. If these practices cannot be linked, then the data suggest significant cultural discontinuity since the early Holocene. Ethnographic burial practices are described in the Section 4(F)(1) and the archaeological evidence relating to burial practices is discussed here.

In a recent report, Sprague (1999:2) attempts to establish a link between historic practices and those of the people buried in Spirit Cave by defining a “Great Basin [burial] pattern that includes inhumation, especially in rocky areas, with infrequent but regular use of cremation” and he argues that “the few burials found [in the Great Basin] from the earliest to the historic period all fall into a general pattern of mixed inhumation, cremation, and rock crevice disposal” (Sprague 1999:16). While Sprague’s pattern may be characteristic of the northern Great

Basin and southern Plateau region from which he draws most of his evidence, it is difficult to document Sprague's pattern at Spirit Cave itself or for burials from the immediately surrounding region, such as: Lovelock Cave, Elephant Mountain Cave, Stillwater Marsh, or the Carson-Humboldt Sinks (Figure 2).

a. Spirit Cave Burials

As summarized in Section 4(A)(1), there were at least two and possibly three burial events in Spirit Cave none of which appear to conform to Sprague's pattern. Although their radiometric dates do not overlap, Burial #1 and Burial #2 appear to have been interred in the same manner at about the same time. They could represent burials from the same cultural group. Cremation #1 and Cremation #2 (about 9040 years B.P.) most probably represents a different burial tradition, and, given the 300-year gap between it and the earlier burials, is unlikely to have been buried by the same group. There is a gap of at least 4,300 years, between when the cremation (formerly Cremation #1 and Cremation #2) was interred and when the 15-year-old male was buried is some unknown manner around 4640 years B.P. During this gap, there is no evidence that Spirit Cave was used for any purpose.

BLM's review of the available evidence indicates that there are at least two different burial traditions represented at Spirit Cave in the early Holocene. This suggests that there were two different human groups living in the Spirit Cave Area at the same time or that the group that interred Burial #1 and Burial #2 (around 9,400 years B.P.) was replaced by the group that interred the cremation (formerly Cremation #1 and Cremation #2) around 9,000 years B.P. The available evidence is not sufficient to distinguish between these possibilities. However, the 4,300 year gap between the cremation (formerly Cremation #1 and Cremation #2) and the 15-year-old male burial rules out the inference that there is "close to 5000 years of use of the cave for burials and cremations" as argued in Sprague (1999:7). Instead, the available direct evidence from Spirit Cave suggests at least three independent burial traditions, two around 9,000 years B.P. and one about 4,600 years B.P.

b. Lovelock Cave Burials

As described in Ferguson (1996:12-14) none of the three burials excavated by Loud and Harrington (1929:14-16) from Lovelock Cave (Figure 2) and curated at the Smithsonian are similar to the burials from Spirit Cave and none appear to fit Sprague's (1999:2,16) burial pattern. Burial 20, for example was buried in a circular pit about 2.5 feet in diameter and 5 feet

deep. The pit contained the mummified remains of a young child, who was tightly flexed and oriented southwest. The body was wrapped in a woven fur robe and tied with a net. The bundle was covered by a pile of six inverted coiled baskets. Burial 35, was buried in an oval pit filled with cave fill and rocks. Beneath the rocks was an inverted coiled basket and below it were the remains of a young adult. The body was lying on his or her back with the head pointed west and the legs flexed. The remains were wrapped in a dressed skin and covered with fine nets and a horn implement. The face, right side, and right leg were covered by coiled baskets. Burial 35 has been dated to 3400 B.P. (Ferguson 1996:1). Burial 36 was in a round pit that had been filled with grass, rushes, and stone. The floor of the pit was covered with a burnt inverted coiled basket and under the basket were the burnt remains of a small child, wrapped in a net. While some of the burials in Lovelock Cave were burnt *in situ* before being buried, there is no indication that they were cremated (reduced to bone fragments and ash) and interred in textile bags as the Spirit Cave cremation (formerly Cremation #1 and Cremation #2).

In his analysis of the evidence associated with these Lovelock burials related to their affiliation under NAGPRA, Ferguson concluded that "the preponderance of the evidence does not enable a scholarly conclusion to be made about the cultural affiliation of the human remains and associated grave goods [from Lovelock Cave] in the museum's collection" (Ferguson1996: 30).

In discussing all eight burials from Lovelock Cave (buried at various times between 4,500 and 900 years B.P.) including those Ferguson described, Sprague notes that these burials clearly show that:

> "There was no single uniform burial pattern during any one time period at this important site. It reports graves of a female oriented west; a flexed child, oriented southwest; an infant oriented northwest; an adult flexed on the left side, oriented northwest; a grave "burnt" of unknown age, flexed on the back, oriented west, and with stones over it; a child, burned; an infant, burned; and a male adult flexed in the left side and oriented west." (Sprague 1999:5).

In contrast to Ferguson, who could not connect the Lovelock Cave burials to the ethnographic people from the area, Sprague feels that the burials from Lovelock Cave "clearly suggest that the ethnographic situation of a mixed pattern has a deep time depth" (Sprague 1999:5). However, as

described by Ferguson (1996: 12-13) and Sprague (1999:4-5) the burials from Lovelock Cave do not appear to be similar to the earlier burials from Spirit Cave or to the later burials from Stillwater Marsh.

This means that the Lovelock Cave burials, and the similar, approximately contemporaneous Elephant Mountain Cave bundle burials, appear to be from very different burial traditions than those of the earlier people who used Spirit Cave for burials, or the later people who buried their dead at Stillwater Marsh. Therefore, the available burial evidence from Lovelock Cave does not support the argument for affiliation.

c. Elephant Mountain Cave Burials

The burials from Elephant Mountain Cave (Barker 1996), approximately 150 miles northwest of Spirit Cave on the shore of ancient Lake Lahontan (Figure 2), are a good example of the archaeological evidence suggesting that people different from the historic population lived in the area between the early Holocene and ethnographic times.

The cave contained two tightly flexed bundle burials, a juvenile male and a juvenile female (Barker 1995:4). C_{14} dates from material associated with the burials indicate that both were interred within 50 years of each other, sometime between 2120 and 1970 years B.P. (Barker 1995:4). The dates for the burials and the materials associated with them (such as coiled baskets) suggest that the burials are not culturally affiliated with the Numic-speaking people who occupied the area at the time of initial contact with White explorers (Barker 1995:4).

Both burials also suggest a social organization that differs from that portrayed in the Northern Paiute ethnographic record (Section 4 (F)(1), but that may be similar to some of the burials from Lovelock Cave Section 4 (A)(4)(b). At the time of contact, aboriginal cultures were egalitarian with minimal social stratification and nonhereditary leaders (C. Fowler 1992: 64; Steward 1938:246-253). In this type of society, burials are not usually associated with extensive grave goods. The burial bundles illegally excavated from this cave contained extensive grave goods (coiled basketry and rabbit nets) suggesting a degree of social differentiation that was not characteristic of aboriginal cultures at the time of contact. Further, the individuals interred were too young to have earned significant status within the community and their burial, with extensive and valuable grave goods (including rabbit nets, baskets, ornaments, and lithics) suggests that social differences were ascribed or hereditary rather than achieved.

Hereditary status was not typical of aboriginal cultures at the time of contact (Stewart 1939).

In addition to the two bundle burials, the Elephant Mountain collection contains evidence of at least two other burials, one of whom was likely cremated (Barker 1995:4). These burials have not been dated and could have been interred at any time during the Holocene. They suggest the possibility of at least one and possibly two different groups, in addition to the people who interred the bundle burials, used the cave for burials at some time during the last 10,000 years (Barker 1995:4).

While the destruction of the archaeological deposits in the cave by looting make it impossible for us to place this burial evidence in a reasonable chronological sequence and complete cultural context, there is sufficient data to show that the tightly-flexed burials from Elephant Mountain Cave do not conform to Sprague's pattern and are not similar to any of the burials from Spirit Cave or to ethnographic descriptions of Northern Paiute burial practices.

d. Stillwater Marsh

In 1985, flooding in Carson Sink and Stillwater Marsh (Figure 2), immediately adjacent to Spirit Cave, revealed a series of village sites and human burials that were previously unknown to archaeologists and not predicted by any archaeological model (Thomas 1973 as an example) based on descriptions of ethnographic lifeways (Kelly 1995:12-29). The remains of the 416 individuals buried in Stillwater Marsh between 3,500 and 1,000 years B.P. constitute the largest burial population ever recovered in the Western Great Basin (Brooks, et al.: ii, 3). In describing the Stillwater burials, Larsen (1995:36) notes that this population is "unique relative to many other death assemblages" because it was excavated from "isolated graves scattered throughout the marsh region, thus indicating a lack of formal disposal areas." He also notes that the evidence from the Stillwater Marsh "shows no evidence for continuous use of a single burial pattern"(Larsen 1995:37). This conclusion is supported by Sprague who argues, that the Stillwater Marsh population contained numerous different types of burials, including: "a deposition of 7 left, 5 right, and 8 back; a position of 19 flexed, 3 semiflexed, and 2 extended; and an orientation of 10 north, 5 NE, 3 east, 1 SE, 3 south, 3 west, and 4NW," (Sprague 1999:6). Thus, the modal burial was flexed, on its back, oriented north, and "buried in soft soil near the water rather than in higher rocky areas" (Sprague 1999:6-7). In addition, none of the 416 Stillwater Marsh burials

are associated with rocks, rocky areas, rock crevasses, rock shelters, or caves and none are cremated.

While the contextual evidence from the Stillwater Marsh Burial population is limited, due to erosion, wave action, and flooding, the available evidence does not fit with Sprague's (1999:7,16) pattern and does not appear to be similar to the burials from Spirit Cave, Lovelock Cave, or Elephant Mountain Cave. Therefore, the available burial evidence from the Stillwater Marsh does not support the argument for affiliation. However, these burials may be consistent with Northern Paiute burial practices described in the ethnographic literature [see Section 4(F)(1)] and could possibly be used to estimate how long contemporary people, or their direct ancestors have lived in the Spirit Cave area.

e. Carson-Humboldt Sinks Area

In 1981, Kobori (1981:188-195) wrote a brief summary of known human skeletal remains from the Carson-Humboldt Sinks area (Figure 2). In addition to Lovelock Cave and Spirit Cave discussed here, he also reported on burials from other sites in the region. Excavations at Leonard Rock Shelter (Figure 2) revealed an infant burial in fetal orientation, beneath a burned basket that was covered with rocks and dated to around 5,700 years B.P. (Kobori 1981:189). The Leonard Rockshelter burial is similar to some of the burials from Lovelock Cave (Section 4 (A)(4)(b). The Humboldt Lakebed site (Figure 2), immediately below Lovelock Cave yielded several burials that had been exposed by wind deflation. These people were buried on their sides, tightly flexed, in round to oval pits (Kobori 1981:190). An undescribed cremation from this site has been dated to about 2,600 years B.P. (Kobori 1981:190) and similar burials, but no cremations, were recovered from a nearby site in a similar context (Kobori 1981:190).

While Kobori presents limited summary descriptions of the prehistoric burials from the Carson-Humboldt Sinks, he did offer sufficient information to suggest that these burials are different from those from Spirit Cave and that they do not conform to Sprague's (1999: 7,16) burial pattern.

f. Summary and Evaluation

To the extent that Sprague (1999:14-15) is correct that burial practices reflect cultural identity, the available burial evidence does not support affiliation. The direct evidence from Spirit Cave; the tightly-flexed bundle

> burials from Elephant Mountain Cave (about 2,000 years B.P.), the mixed burials from Lovelock Cave (around 3,400 years B.P.), and the Stillwater Marsh burial population (1,250-650 years B.P.) indicate that there have been at least four different burial traditions among groups in the Spirit Cave area between when Burial #1, Burial #2, and the cremation (formerly Cremation #1 and Cremation #2) were interred at Spirit Cave in the early Holocene and when the Northern Paiute occupied the area in ethnographic times. Based on the available evidence, the people practicing these traditions did not bury their dead in a manner that was consistent with the ancient burials from Spirit Cave or with ethnographic descriptions of Northern Paiute burial practices [see Section 4(F)(1)].
>
> Therefore, the BLM's review of the available archaeological evidence related to burial patterns in the region surrounding Spirit Cave throughout the Holocene shows significant cultural discontinuity and does not support the argument that the ancient remains from Spirit Cave are affiliated with any modern individuals or groups.

5. Numic Expansion Archaeology

The Numic expansion model attempts to account for the linguistic geography of the Great Basin (Figure 7) by postulating that the Numic speaking people who lived in the Great Basin in historic times are the descendants of Numic speaking people who migrated across the Great Basin from its southwestern corner around 1000 years B.P. [Sutton and Rhode 1994:6-15; see linguistics Section 4 (E)]. If this model accurately reflects the culture history of the Spirit Cave area, then it means that there was a non-Numic population living in the area before the ancestors of the Northern Paiute arrived. Assessing the validity of the Numic expansion model requires an examination of the linguistic and archaeological evidence upon which it is founded. The linguistic evidence is examined in Section 4 (E) and the archaeological evidence is examined here.

Although some archaeologists and anthropologists (Barker and Pinto 1994) have argued for caution in associating ethnic labels with single artifact types, much of the archaeological support for the Numic expansion model comes from studies relating single artifacts or features classes with ethnic labels (Fowler 1994:103-113). The most convincing of these limited approaches is the work of Adovasio (1986), who has long recognized that basketry can be a culturally sensitive time and ethnicity marker. Specifically, basketry studies augment linguistic and lithic studies that indicate a Numic expansion into the Great Basin around 1,000 years B.P. Between 1000 and 500 years B.P. textile construction techniques change abruptly from wefts twisted down-to-the-right to wefts twisted up-to-the-right (Fowler 1994:112). In addition to the increased presence of twined items relative

to close-coiled items, new basket functions appear. Twined seed beaters, parching trays, hats, bowls and burden baskets replace earlier coiled forms. There is no apparent "bridge" between the decline of plaiting and close coiling and the increase in twined wares in archaeological specimens dated after A.D. 1000. Similar arguments have been made for Numic ceramics (Madsen 1986) and small projectile points (Holmer and Weder 1980).

The most complex arguments for the Numic expansion around 1000 years B.P. are based on computer simulations of migration and an examination of settlement patterns and adaptive strategies rather than single artifact types (Bettinger and Baumhoff 1982; 1983; Young and Bettinger 1992; and Bettinger 1994; Delacorte 1994). Delacorte (1994:2) used data from excavated sites in the western Great Basin (Owens and Rose Valleys) to compare adaptations and settlement/subsistence patterns before and after about 1400 years B.P. He showed that early land-use patterns (before about 1400 years B.P.) were characterized by "populations who migrated between widely separated base camps, from which smaller logistical groups journeyed often to ancillary encampments to exploit certain key resources" (Delacorte 1994:3). On the other hand, late patterns [after about 1400 years B.P.] reveal " a relatively centralized and correspondingly intensive settlement-subsistence strategy" (Delacorte 1994:3). Delacorte characterized the change as the "nearly complete abandonment of earlier settlements" in favor of " intensive pinyon procurement from upland camps and cache sites and [the] establishment of alpine villages" (Delacorte 1994:3-4) and "intensive small game procurement [and intensive plant use] from a series of highly specialized sites (Delacorte 1994:9-10). Since the later pattern is the same as practiced by ethnographic people in the western Great Basin, Delacorte (1994:10-11) concludes that the change is consistent with the Numic expansion model.

Some archaeologists question the idea of a rapid, Numic expansion around 1,000 years B.P. (Aikens 1994, 1998; Grayson 1993, 1999). Dean and Heath (1990) argue that it is impossible to separate so-called Numic plainware ceramics from the plainwares produced by supposedly non-Numic populations and consequently that ceramic evidence cannot be used to identify the spread. Also, Janetski (1990) has shown that there is no obvious relationship between late period ceramics and Numic boundaries at the time of contact. Holmer and Ringe (1986) argue that the “Wahmuza Lance Points” suggest long-term Numic occupation in the Northern Basin-Plateau region. It is also difficult to associate small triangular and side-notched projectile points with Numic boundaries since these points are ubiquitous throughout the West and are defined as different types based more on archaeologists perceptions of cultural boundaries than on any typological differences (Simms 1990).

In their summary of the deliberations at the most recent conference on the Numic expansion model, Madsen and Rhode (1994: 214) divide researchers and their arguments into three positions. One is the traditionalists, who agree with Steward and Lamb and see archaeological and linguistic evidence of an expansion of Numic speaking peoples around 1000 years B.P. Among the participants to the conference, Adovasio and Pedlar, Bettinger, Fowler, Jorgensen, and Sutton represented this position (Madsen and Rhode 1994:214). The second position is labeled as Basinist, in that, these researchers see evidence that proto-Numic speaking, or Numic, speaking peoples occupied all or part of the Great Basin as long as 5,000 years B.P. and since then have alternately occupied and abandoned parts of the region in response to environmental changes. This group at the conference included Aikens, Holmer, Thomas, and Grayson (Madsen and Rhode 1994:214). The third group at the conference, labeled as the Peripheralists, included Janetski, Madsen, Rhode and possibly Simms and Lyneis (Madsen and Rhode 1994:214). Peripheralists argue that the expansion occurred about 1000 years B.P. and extended beyond the boundaries of the physiographic or cultural Great Basin.

In their conclusion to the published volume from this conference evaluating the Numic Expansion model, Madsen and Rhode (1994:219-221) argue that there is a consensus, but not unanimity, among Great Basin archaeologists, linguists, and ethnographers, that the available evidence suggests the Numic expansion probably occurred during the past several thousand years and that it is characterized by the movement of people from the southern or southwestern Basin into the northern and eastern Basin, as well, as into the Colorado Plateau/Rocky Mountain area. This means that the available archaeological evidence relating the Numic Expansion model tends to support the model and indicates that there is likely that non-Numic speaking people or peoples (possibly Hokan or Penutian speakers) lived in the Spirit Cave area before the ancestors of the Northern Paiute arrived, some time in the past several thousand years.

Summary and Evaluation

The available archaeological evidence relating the Numic Expansion model indicates at least one period of cultural, and possibly linguistic discontinuity between when Burial #1, Burial #2, and the cremation (formerly Cremation #1 and Cremation #2) were interred at Spirit Cave in the early Holocene and when the Numic speaking ancestors of the Northern Paiute occupied the area, sometime in the late Holocene.

Therefore, this line of evidence does not support the argument that the ancient remains from Spirit Cave are affiliated with any modern individuals or groups.

B. Biological

1. Introduction

Studies of human biology do not produce unequivocal conclusions for a number of reasons. Fundamentally, human biology changes as the result of genetic and non-genetic (nutrition, disease and other environmental influences) factors. Additionally, there is great biological variation within any given group so that a single individual may not possess any, much less all of the traits that define the group. Also, not all groups have been thoroughly studied or described to provide comparable data against which to compare an unknown. These problems are compounded when one is dealing with a single unknown individual who may have been very typical or atypical of the group he belonged to. Though unequivocal conclusions are not possible, general overall trends and indications may be derived using the data resulting from biological studies.

2. Great Basin Skeletal Biology

Until recently there have been relatively few studies or reports involving human skeletal materials from the Great Basin (Brooks et al 1977, Dansie 1974, Galliher 1978, Gifford 1926, Hardesty 1969, Heizer 1951, Kennedy 1959, Leavitt 1974, Loud & Harrington 1929, Morbeck 1970, Orr & Berger 1965, Reed 1967, Reichlen & Heizer 1966, Romney 1957, Tuohy & Clark 1979, Tuohy & Stein 1969, Warren 1974, Wheeler & Wheeler 1969). Some materials were located and subsequently reburied or returned to tribes (Brooks & Brooks 1979:459, Dansie 1997b:17, Hattori et al 1987:1). Great Basin materials have consisted of isolated randomly distributed or fragmentary skeletons cremated or not cremated; located in caves, crevices, rock shelters, cairns or pits; in flexed or extended positions, with or without associated artifacts (Kobori 1981, Pendleton et al 1982). Few burials were associated with diagnostic artifacts and many sample populations were small and inadequately documented.

However, extensive flooding occurred in the early to mid 1980s, exposing archaeological materials and spawning numerous salvage projects that ". . . more than doubled the number of known precontact human skeletal remains" (Hemphill & Larsen 1999:2) in the Great Basin. This resulted in several new studies (Brooks & Brooks 1990, Brooks et al 1988, Hattori et al 1987, Hemphill 1999, Kaestle 1998; 1997; 1995, Kaestle et al 1999, Kobori et al 1980, Larsen 1985a, b, c, Larsen & Hutchinson 1999, Larsen et al 1995a,b, 1996, Loveland 1991,O'Rourke et al 1999, 1997, Parr et al 1996, Ruff 1999, Smith et al 1995, Stark 1983, Stark & Brooks 1985, Tuohy & Haldeman 1987).

The Great Basin includes highly differentiated micro clines (i.e., marshland, lake shore, sage grasslands, plateau and high altitude environments) which have changed over time, forcing the humans populating the area to develop differing subsistence patterns, though not necessarily diverse biological make up. Early on, Kennedy (1959:19) noted, "the population of the Great Basin shows a basic homogeneity, but minor regional differences occur." Recently, in his study of prehistoric Great Basin populations, Ruff (1999:320), noted that " . . . the 3 Great Basin samples-Stillwater, Malheur, and Great Salt Lake-are very similar in morphology, as they are in inferred behavioral patterns. . . ." Therefore, due to the lack of a large data base and/or conclusive proof of a distinctly diverse biological make up in different areas of the Great Basin, the data discussed in this section include several areas of the Great Basin, rather than simply the western portion.

3. Spirit Cave Man

A Wheeler photograph, taken at the time of recovery (NSM negative number 193), shows the skeleton lying on its right side in a flexed position, the left arm extended toward the knees, the legs semiflexed, with the knees opposite the hips.

Today the remains consist of a complete skeleton (minus a left patella and a few phalanges) including all teeth, with some desiccated skin, ligaments, cartilage and hair present (Damadio 2000:Appendix 1). The skeleton is that of a small gracile, adult male, that was approximately 40-50 years of age at death. An extra thoracic vertebra (13^{th}) and right rib is present with some arthritic lipping evident throughout the skeleton, particularly in the vertebrae, and spondylolysis of the 5^{th} lumbar vertebra. The occlusal surfaces of the teeth are heavily worn with three alveolar abscesses present. Reddish-brown hair is present. There is evidence of blunt force trauma to the skull in the area of the left temple but no indication of the cause or manner of death. The BLM has conducted an inventory of the skeleton, made general measurements and observations and reviewed the available pertinent literature (Damadio 2000).

An early Holocene date of around 9430+/-60 BP (Kirner et al 1997), makes Spirit Cave Man one of the oldest dated remains in the Great Basin and the fourth oldest in North America (Kirner et al 1996:3). Some publications, reports and data have been generated from studies of the skeleton which, present general comment on possible studies (Kaestle 1999, Walker 1999), furnish general descriptive measurement and/or observations (Gill 1998a,Goodman & Martin 1999, Steele 1997), provide specific information or data (Dansie 1997a, Owsley 1996 Tuohy 1994, Tuohy & Dansie 1997, Turner 1998, Wheeler 1997, Wheeler & Wheeler 1969), answer specific research questions (Edgar 1997,1996, Jantz and Owsley 1997) or as part of overall studies of Paleoamericans (Jantz and Owsley 1998, In press, Ozolins 1997 et al, Ozolins 1999, Powell 1999, Powell & Neves 1999,

Steele & Powell 1999). These publications and their findings will be discussed in the pertinent subsections of this section.

4. Biological Affiliation Discussion

Biological Anthropology often attempts to characterize relationships between human populations using biological data (i.e., measurements and/or observations). Using multivariate and biological distance statistics, measurements taken throughout the skeleton and/or dentition, provide data for metric or quantitative means to assess biological distance or affinity (Brace & Hunt 1990). On the other hand, "qualitative methods involve comparisons of frequencies or proportions . . . "(Scott & Turner 1997:256) of various observable traits throughout the skeleton and/or dentition, providing a non metric means to assess biological distance or affinity (Brooks et al 1990, Brues 1990, Gill 1998b, 1984, Gill & Rhine 1990, Haas et al 1994, Holliday 1997, Ossenberg 1994, Rhine 1990, Sauer 1992, Van Vark & Schaafsma 1992).

Several problems are inherent in both metric and non metric methods. One of the most important is that no single morphological feature has been documented as completely free from non-genetic influences (nutrition, disease and other environmental factors). Also, no single individual or small group of individuals is likely to possess the entire suite of traits that appear to define the group. There is variation in groups (Johnston & Schell 1979). There is also a question of inter- and intra-observer error. Though a highly useful tool, the group affinity of a single individual may be impossible to identify using the current state of knowledge of non-genetic influences and the lack of comparable data bases.

The foundation of many biological affiliation discussions regarding the New World is best summarized by Lahr (1995:165). "At issue is whether Amerindians represent a relatively late population diversion from East Asians that entered the American continent at the very end of the Pleistocene, and were thus relatively homogenous in biological terms, or whether the continent was originally occupied by more than one group and possibly earlier in time, before and during the last glacial maximum."

Studies conducted in an attempt to answer the question of the peopling of the Americas have used various techniques (Anderson & Gillam 2000, Ossenberg 1994) but have principally involved measurements and observations of crania and dentition and on the analysis of mtDNA evidence. As Powell (1999:224) notes, "A number of models of New World colonization and dispersal have been suggested by researchers using genetic, dental, and craniofacial databases, including one, three, or four waves of migration from the Old World."

In the case of Spirit Cave Man, hair was present as well, adding a dimension to the customary lines of evidence usually available in the study of ancient materials.

a. Cranial Metric and Non Metric Analysis

Craniometrics are a quantitative attempt to document the morphological similarities or differences between populations using a series of cranial measurements. These cranial measurements generally assess group identity through morphometric comparisons using multivariate and biological distance statistics (Howells 1989,1973,1969). The resulting groups, or clusters, reflect some degree of relationship or lack of relationship. There is an assumption that those populations displaying the most similarities, or affinity, are most closely biologically related. That is, groups that are closely related tend to share similar features and dimensions (measurements).

The lack of comparable data is particularly problematic when dealing with Paleoamerican materials as there are only approximately 20 known individuals. Due to the limited number of ancient materials available, there are relatively few morphometric studies (Jantz & Owsley 1999a,b, Neves & Blum 2000, Ozolins 1999, Powell & Neves 1999, Powell & Rose 2000, Powell & Steele 1992, Steele 2000, Steele & Powell 1999, 1992, Swedlund & Anderson 1999). Studies are often based on different measurements due to the fragmentary or incomplete nature of ancient remains. Most ancient remains do not resemble contemporary Native Americans nor each other. "Specifically, the early skulls consistently have longer, narrower faces; longer, narrower braincases; a more projecting, mid-facial region; and cheekbones that slope to the rear," (Steele 2000:61) than Northern Asians and contemporary North American Indians. Jantz and Owsley (1998:128), in a study on 11 ancient crania, found that " . . . it is critical to recognize the marked heterogeneity among early American crania. This along with the finding that most early American crania are different from recent American Indians means that the history of American populations is much more complex than has generally been supposed."

A prevalent view is most succinctly summarized by Steele and Powell (1994:158) " . . . the late Pleistocene and early Holocene populations of northern Asia and the Americas differed morphologically, but we are unsure of the cause of these differences. One view is that these differences substantiate that the earliest colonizing populations entering Beringia had a different genetic structure than later northern Asians and their North and South American descendants. The second view is that these differences reflect an adaptation of later populations to a different environment or lifestyle, possibly associated with the origins of agriculture, and that these

adaptations were accomplished by the general plasticity of a common genome."

1. Spirit Cave Man Craniometric Studies

In the Jantz and Owsley craniometric study of Spirit Cave Man (Jantz & Owsley 1997) Spirit Cave cranial dimensions were compared to 39 groups around the world (including 8 North American Indian groups) with the number of comparison sample individuals ranging from 22-111. Multivariate analysis of individual components included vault profile, vault and face breadth, facial forwardness and prognathism, and face height, breadth and projection.

Their analysis showed the Spirit Cave cranium closest to "Norse" and "Ainu." It should be noted that the probability for Norse was 0.00084, with Ainu an even lower probability. Table 11 from Jantz & Owsley (1997:80) shows the distances of Spirit Cave Man from all of the comparative samples sorted from the smallest to the largest, and posterior probabilities, showing Zalavar, Blackfeet, Numic, Atayal, and Egypt as the next five with a much lower probability. The authors note that the "major conclusion is that the skull falls outside the range of variation of any modern population represented by currently available samples"(Jantz & Owsley 1997:81). That is not to say the measurements fall outside of the range of variation for modern Homo sapiens; more likely the currently available samples are insufficient to cover the range of variation in modern Homo sapiens.

Steele and Powell found that the . . . " results of principal component analysis of Spirit Cave and Wizards Beach cranial measurements suggested " . . . they were distinct from more recent populations, and that no recent population resembled them" (1999:115). They were also found to be distinct from one another. Also, "though they are distinctive from recent American Indian samples, it is also clear that the recent samples most closely resembling these two specimens are Polynesians and Australians, both populations distinguished by their relatively narrow faces, longer crania, and more projecting faces" (1999:116).

Ozolins, in a study using Spirit Cave, as well as other Paleoamerican cranial measurements, found " . . . that the amount of variation present among Paleoindians is not greater than what

> would be expected for three individuals drawn at random from a single population . . . " (1999:216).
>
> Gill, from his metric and non metric study of Spirit Cave Man (1998:1-2) notes " . . . a mixture of "typical Amerindian" and "traits that are basically Caucasoid" with a "'generalized Caucasoid' trait constellation'."
>
> From the metric and non-metric studies performed to date, Spirit Cave Man does not appear to resemble any contemporary American Indian population. The metric and non-metric data and observations available, given the state of the technology and theoretical framework at this time, does not allow the assignment of Spirit Cave Man to an affiliation with a particular tribe.

b. Dental Morphology

Due to the location, compact structure and relative hardness of teeth, they can be the only hard tissue to remain in ancient burials. Dentition can provide evidence of individual characteristics, age, habitual behavior (Milner & Larsen 1991), cultural (Molleson 1994) and pathological alterations, diet, pathology, environmental stress and indications of general group identity (Kelley & Larsen 1991, Mayhall 1992, Turner et al 1991, Turner 1990). "The use of dental morphology and the observation of dental morphological traits have a long history in dental anthropology" (Mayhall 1992:66). Innumerable studies have been conducted on teeth, particularly the frequency variation of various traits (e.g., shovel-shaped incisors, molar cusp and groove patterns, Carabelli's trait, protostylid, etc.) regarding general group identity (Scott & Turner 1997) with particular focus on the peopling of the New World (Powell 1999,1993, Powell & Neves 1998, Turner 1994 1985).

Some problems are inherent in this methodology. There is overlap in the frequencies of traits, the entire percent of frequency variation worldwide for some traits may range to less than 35% and no trait is totally absent in any group (Scott & Turner 1997). Also, as is true in all morphology based observations, a single individual may possess all, some, or none of the traits that appear to define the group.

With the exception of the third molars, Spirit Cave Man's teeth are severely worn, limiting the information available. Dental discrete trait observations on Spirit Cave Man were recorded by Edgar (1996), Goodman (1999) and Turner (1998). Edgar, Goodman and Turner noted

the presence of incisor shoveling; Turner and Goodman, incisor winging and an interruption groove; Turner observed a shovel shape canine and enamel extensions on molars; and, no Carabelli's trait was noted by any observer. Turner records an overall "impression-Sinodont" (1998:1) for Spirit Cave dentition. Sinodont, a term originated by Turner, specifies a subdivision of the Mongoloid dental complex which generally includes the populations of China, Mongolia, Japan, Korea, Northeast Asia and North and South America (Indian & Eskimo) (Scott & Turner 1997:270-271).

The frequency of the traits noted in the Spirit Cave dentition, and the presence of these traits as a group, is generally higher in Asians and Native Americans. However, for the reasons stated above, this does not address affiliation with a specific contemporary Native American group.

The presence of possible "string" grooves on the incisal surface of 6 teeth of the anterior dentition were noted by Edgar, Goodman and Turner. String grooves have been noted in Great Basin material (Larsen 1985c, 1977, Brooks et al 1988:138-143), however, the " . . . use of teeth as tools is . . . a rather common practice among peoples living in traditional societies throughout the world," (Milner & Larsen 1991:364-365).

Powell (1999), in a study examining craniofacial and dental traits from North and South American Paleoamericans (including Spirit Cave Man), late Holocene material, and Pacific Rim populations, found that " . . . Paleoindians are dentally and craniofacially distinct from both European . . . and modern Native American . . . populations, but not from northeast Asians . . . or Polynesians" (1999:224).

The suite of dental traits present or absent in the dentition of Spirit Cave Man, do not allow for the assignment of Spirit Cave Man to an affiliation with a particular tribe, given the state of the technology and theoretical framework at this time.

c. DNA

Genetic studies, (Anderson et al 1981, Crawford 1998, Heyer 1995, Klein 1999, Labuda et al 1997, Scozzari et al 1997, Shields et al 1992 1993, Szathmary 1994, Torroni et al 1994, Tuross 1994,Ward et al 1991) many using ancient DNA (aDNA) (Andrews 1994, Brown & Brown 1994, Hagelberg 1994, Hagelberg et al 1991, Hagelberg & Clegg 1993, 1991, Hoss 2000, Kolman & Tuross 2000, O'Rourke et al 1996, Ovchinnikov 2000, Paabo 1987 1986, Paabo et al 1988, Parr et al 1996, Rogan & Salvo 1994, Shearin et al 1989, Stone & Stoneking 1993, Tuross & Kolman

2000) particularly mitochondrial DNA (mtDNA) are providing substantial new information regarding the peopling of the Americas (Bonatto & Salzano 1997, Easton et al 1996, Horai et al 1993, Merriwether et al 1995, Schurr 2000ab, Schurr et al 1990, Starikovskaya et al 1998, Stone & Stoneking 1998, Torroni et al 1993a,b,1992, Williams et al 1985, Wilson et al 1985). Many recent studies have involved mtDNA (Bailliet et al 1994, Forster et al 1996, Lorenz & Smith 1994, 1996, O'Rourke et al 1999, Relethford & Harpending 1994, Wallace & Torroni 1992, Wallace et al 1985) as it is inherited from mother to daughter (Conroy 1997) mtDNA generally accumulates mutations in a linear fashion, many mutations correlate with the geographic region where they first occurred, and, are sensitive to changes in gene frequencies that occur over time (Schurr 2000ab). Nearly all American Indians carry one of 4 mtDNA haplogroups (ABCD). These vary among tribes and are also present in Asian and Tibetan groups. As these 4 haplogroups characterize most modern Native American groups, it appears to imply a limited number of founding groups from Asia which spread across North and South America. A new group, X, has been noted (Brown et al 1998; Smith et al 1999) in both ancient and contemporary American Indian material as well as contemporary European and Near Eastern populations. It is also possible that diverse groups entered North America but came to genetic dead ends due to disease, accident or war.

Recent improvements in extraction and amplification techniques (Yang et al 1998, Zierdt et al 1996) allow for better extraction of DNA; however, extraction and amplification of aDNA are problematic (Handt et al 1994, 96, Hoss 2000, Lindahl 1993, Taylor 1996, Tuross & Kolman 2000). When dealing with ancient materials, mtDNA studies are hampered by damaged or contaminated material. "Radiation (mainly UV), temperature, moisture, pH, oxidative agents, and mechanical stress are among the most important factors influencing the survival of DNA under diagenesis." (Herrmann & Hummel 1994:3). Contamination may be "...by either modern DNA of diverse origin and/or ancient microbial DNA," (Herrmann & Hummel 1994:4).

The results of DNA studies on skeletal materials from the eastern and western Great Basin from prehistoric sites thousands of years later than Spirit Cave " . . . suggest a heterogeneous group of ancient populations inhabiting the Great Basin in antiquity. Frequency differences between ancient samples for specific markers may reflect both the diachronic nature of the samples and the well-known occurrence of lineage extinctions in small populations (Avise et al 1984; Heyer 1995)," (O'Roarke et al 1999:101-102).

Kaestle (1995, 1997, 1998; Kaestle et al 1999) has performed analyses of mitochondrial haplogroups and albumin phenotypes from various prehistoric skeletons from Western Nevada dated from 860+/-75 to 9,225+/-60B.P. She has compared these to several modern groups principally located in Arizona, California, Baja California, Nevada and New Mexico. Relatively low sample numbers make any findings rather preliminary and limited, however, these appear to indicate that the Zuni, Washo, Northern Uto-Aztecan speakers and the Great Basin geographic group are generally not related to ancient Western Nevada samples.

DNA analysis was not undertaken with the Spirit Cave remains for a number of reasons. Foremost, it is a destructive technique and, given the unique nature of this material, any destructive techniques must be conservatively considered. Even if sufficient uncontaminated material could be amplified and sequenced, it is most likely it would fall into one of the four haplogroups (ABCD) which includes American Indians and Asians as well.

Moreover, while DNA studies could possibly rule out certain groups as related to this individual, none of the results possible from DNA testing performed at this time, given the present state of the technology and theoretical framework, would allow the assignment of Spirit Cave Man to an affiliation with a particular tribe.

d. Serum Albumin

Albumin has been used for detection and species attribution in ancient materials (Borja 1997). "Albumin, a noncollagenous protein, is one of several serum proteins with rare forms that are specific to particular ethnic groups, language stocks, or language families in the New World" (Smith et al 1995:68). Two variants, albumins Naskapi (Al^{Na}) and Mexico (Al^{Me}) have a high frequency in North and Central American Indians. A high frequency of these variants may provide information on group affinities and origins of American Indians (Smith et al 2000, 1995, Johnston et al 1969, Schell & Blumberg 1988).

Albumin is less studied than mtDNA for a number of reasons and "...it is exceedingly difficult to interpret albumin variant frequencies obtained for single sites or local site complexes in other than a very gross way" (Bettinger 1999:322).

In a study of the prehistoric Stillwater samples (Western Great Basin, approximately 1,000BC to AD 1300), Kaestle et al found, "...the

frequencies of Al^{Me} and haplogroup D are very high and both Al^{Na} and haplogroup C are absent.". . . "Unless sampling error or stochastic evolutionary changes have profoundly influenced the results of this study, the Zuni, Washo, and all Northern (but not Central) Uto-Aztecan language groups, including Numic, and the Great Basin geographic group can also be eliminated from consideration as probable descendants,"(1999:179).

Serum albumin analysis was not undertaken for a number of reasons. Foremost it is a destructive technique and, given the unique nature of this material, any destructive techniques must be conservatively considered.

Moreover, while serum albumin studies could possibly rule out certain groups as related to this individual, but none of the results possible from serum albumin testing performed at this time, given the present state of the technology and surrounding theoretical framework, would allow the assignment of Spirit Cave Man to an affiliation with a particular tribe.

e. Hair Analysis

Hair has long been used to describe group affiliation differences. Ancient objects, paintings, carvings and monumental sculpture depict hair - it's style, length, texture and color in the case of pigment survival. The gross form of head hair was important as a decisive group affiliation criteria in early anthropological studies. The macroscopic appearance of hair was the elementary method of study until the early 1800's. With the development and refinement of microscopic techniques this is no longer the case and mounted hairs are generally observed under 40x-250x magnification. Group affiliation, in the broadest of terms, White, Black, Mongoloid, can often be assigned to an individual using the microscopic study of head hair, noting the density and distribution of pigment granules, hair shaft diameter and variation, cross sectional shape, and cuticle thickness. (Hicks 1977).

A hair sample from Spirit Cave Man was analyzed by Craig Lahren, then of the Office of the Hamilton County Medical Examiner's Office. In his report Lahren (1997:2) states, " . . . density and distribution of the pigment granules in your sample (2064) is typical of a Caucasian individual" and that the " . . . pigment granules in your sample (2064) are brown." The report also states that the hair "... has a moderate shaft diameter with minimal variation, and an oval cross-sectional shape. All of these observations are consistent with hair derived from the head or more specifically the scalp of a Caucasian individual."

A hair sample was also analyzed by Joseph DiZinno of the Federal Bureau of Investigation Laboratories, who observed "...numerous dark reddish-brown, Asian origin head hairs with broken roots, broken tips and much surface debris" (DiZinno 1997:1).

Goodman and Martin note (1999:4) "we now judge the hair to be medium to dark brown and straight. In other words, the hair is exactly the color and form [sic that] is most common in Northern Asian or a Native American."

The hair studies performed to date do not allow the assignment of Spirit Cave Man to an affiliation with a particular tribe.

5. Summary and Evaluation

There is no biological information available at this time, given the state of current scientific technology, methodology and theoretical framework, which would allow the assignment of Spirit Cave Man to an affiliation with a particular tribe. There is no available biological information which clearly supports cultural continuity with contemporary North American Indians. The biological information does not indicate that there is, "a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of the present-day Indian tribe and an identifiable early group," as required by NAGPRA. No biological findings to date indicate by a "preponderance of the evidence" that there is "affiliation" of Spirit Cave Man to an affiliation with a particular tribe.

C. Kinship/Genealogy

In the regulations implementing NAGPRA, 36CFR10.2(5)(b)(1), "Lineal descendant means an individual tracing his or her ancestry directly and without interruption by means of the traditional kinship system of the appropriate Indian tribe or Native Hawaiian organization or by the common law system of descendance to a known Native American individual whose remains, funerary objects, or sacred objects are being claimed under these regulations."

Throughout the consultation process and analysis of the available evidence, there has been no evidence found that identifies any lineal descendants of the individuals buried in Spirit Cave.

Therefore the available genealogical evidence is relevant but inconclusive for establishing affiliation.

D. Geography

In *Northern Paiute Nation v. United States* [7 Ind. Cl Comm 322:337,388 (1959)] the Indian Claims Commission (ICC) found that the Northern Paiute, including the Fallon Paiute-Shoshone Tribe, are, "a clearly defined group of American Indians" within the meaning of the Indian Claims Act. The ICC also found [7 Ind. Cl Comm 322:372-373 (1959)] that "there was an area largely in Nevada . . . which had been exclusively occupied and used in Indian fashion from time immemorial by the bands of groups of Northern Paiute Indians in Nevada who were aboriginally known as Paviotso or Paiute of western Nevada. The Northern Paiute territory (Figure 8) defined by the ICC included Spirit Cave and the BLM used these findings in determining that the Federally recognized Northern Paiute tribes had standing under NAGPRA to make an affiliation claim for the Spirit Cave Remains.

While the spatial geography of these findings was based strongly on expert testimony and historic descriptions of the people encountered by early Euro-American explorers and settlers, other elements were not. For example the phrase "from time immemorial" in a finding is more a term of art stemming from a Supreme Court decision (U.S. v Santa Fe Pacific railroad Company, 314 U.S. 339 (1941)) and did not represent an evidentiary determination of how long the Northern Paiute had actually lived in the region. In finding 10 for example the ICC ([7 Ind. Cl Comm 322:335 (1959)] quoted Omar Stewart, one of the Tribe's expert witnesses as being "of the opinion that the Northern Paiute took possession of their entire territory when they first entered the country and have occupied it to its present limits for a comparatively long time." The length of time is not further documented in the ICC findings, but it is clear that Stewart thought that the Northern Paiute had migrated into the region at some time in the past, rather than having actually occupied the region from time immemorial. Webb (1973:129) has suggested that "perhaps 20 to 50 years [prior to the time of taking] seems judicially acceptable" for establishing Indian title. In the Northern Paiute case, this translates to about 1770. Webb (1973:128-129) also points out that exclusive use and occupancy was based on the "area used for subsistence" and did not imply "formal political hegemony or the power to exclude all members of other tribes."

Therefore, while these findings were binding and conclusive for settling tribal land claims, NAGPRA, as written, recognizes their inherent limitations for determining affiliation and simply requires that ICC findings be considered along with other lines of evidence when determining affiliation for remains discovered prior to its passage [36 CFR 10.14(e)].

NAGPRA makes a clear distinction between human remains discovered before the act was passed and those discovered after (25 USC 3002 Sec 3). For remains discovered after November 16, 1990, location on aboriginal lands as defined by the ICC, in lieu of other contrary evidence, is sufficient to determine affiliation [36 CFR 10.6(a)]. Congress

intended, and the regulations clearly specify a different approach for remains discovered or removed before the Act {36 CFR 10.3; 10.4;10.6,10.14). For remains discovered or removed prior to the act, the affiliation decision must be based on:

1. an overall evaluation of the totality of the circumstances and evidence pertaining to the connection between the claimant and the material being claimed; and

2. the preponderance of the following types of evidence: geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion.

The ICC determined that Northern Paiute occupied the Spirit Cave area at the time of contact and that they hold sole aboriginal title to those lands. However, the available geographic evidence does not, and cannot, demonstrate the existence of either an earlier group or of a shared group identity between any present-day Indian tribe and any earlier group. There is no geographic evidence indicating how long the Northern Paiute have occupied the Spirit Cave area prior to European contact in the early 1800s and none indicating who, if anyone, lived there at any earlier time.

Therefore, the geographic evidence is relevant but inconclusive for establishing affiliation.

E. Linguistics

1. Descriptive Data

The only direct descriptive linguistic data (Figure 9) available shows that Numic speaking Northern Paiute bands occupied the Spirit Cave area at first contact (Goss 1999:7). However, as with the evidence from geography and history, there is no descriptive linguistic evidence indicating how long the ancestors of the contemporary Northern Paiute bands have occupied the Spirit Cave area prior to first contact and none indicating who, or how many different human groups, may have lived there at any earlier time.

2. Numic Expansion

Since 1958, linguists have attempted to explain the spatial distribution of linguistic groups observed in the Great Basin at contact (Figure 7) through various arguments related to what is known as the Numic Expansion model of Great Basin linguistic history (Lamb 1958:95-100; Sutton and Rhode 1994:6-15). Assessing the validity of the Numic expansion model requires an examination of the linguistic and archaeological evidence upon which it is founded. The

archaeological evidence is examined in Section 4(A) and the linguistic evidence is examined here

Lamb (1964:106-125) and Fowler and Fowler (1971) argued that Numic-speaking people recently occupied the Great Basin after having migrated out of the Mojave desert. Sapir (1916) and other linguists have shown that the area with the greatest diversity within a language is the area of longest occupation by that linguistic group. Conversely limited linguistic diversity implies recent occupation. The linguistic data for the Numic in the Great Basin shows limited diversity and thus implies recent occupation (see Foster 1996:93-95 for a data summary and general theoretical justification). Further glottochronology suggests that the occupation occurred no less than 10 centuries and probably no more than 30 centuries ago (Lamb 1964; Lamb quoted in Thomas 1994:56-61).

Miller (1986:98-107) supports an expansion from the southern desert by demonstrating that the closest Numic languages to those spoken in the Great Basin are Hopi, a single language from Arizona; Tubatulabal, restricted to an area in the Central Valley of California; and Takic, spoken in areas of Southern California (Figure 10). Although, mobility among Numic-speaking groups make it difficult to distinguish boundaries within the Numic area (Miller 1970), Jorgensen (1994) argued that his multivariate analysis of synchronic data from 22 Great Basin groups supports the conclusion that Numic speaking peoples spread across the Intermoutain West around 2,000 years B.P.

Since Northern Paiute is one of the languages in the Numic branch of the Uto-Aztecan language family (Figure 10) (Goddard 1996:322) the validity of the Numic Expansion model can be placed in the overall context of the history of the language family (Foster 1996:93-95). In a recent summary of this history, Hill (2000:1) argues for the Uto-Aztecan language family as "a type example of the expansion of primary agriculturalists". Based on her analysis of terms for the maize cultivation complex, Hill (2000:11-21) sees the Proto-Uto-Aztecan speech community as being in Mesoamerica between 5600 years B.P. and 4500 years B.P. (Figure 11). This community split into northern and southern branches sometime after 2900 years B.P. (Hill 2000: 18-21) and the northern branch spread to California, the Southwest, and the Great Basin along with cultivation around 3500 years B.P. According to Hill (2000:6-8), the history of the Uto-Aztecan language family is consistent with non-Uto-Aztecan speaking forager populations in the Southwest and Great Basin being replaced by Uto-Aztecan speaking agricultural populations migrating from Mesoamerica sometime after 3500 years B.P. (Figure 11, Figure 12).

In opposition to the majority linguists who support the Numic Expansion model Goss (1977; 1999) argues that the linguistic evidence does not indicate an

expansion within the last 1000 years and there is no linguistic reason to assume that the historic Numic speakers have not occupied the Spirit Cave area since the early Holocene. Aikens (1998:2-5) argues for great adaptive diversity, cultural continuity, and time depth among Uto-Aztecan peoples through out Western North America and Central America.

3. Summary and Evaluation

Given the unresolved controversy over the chronological issues associated with the Numic expansion model, the available linguistic evidence, taken by itself is relevant, but inconclusive for determining affiliation. However, the available linguistic evidence coupled with the available archaeological and biological evidence related to the Numic expansion(see Hill 2000; and this document), suggest that these lines of evidence do not support the argument for affiliation.

F. Anthropology

1. Ethnographic Burial Practices

Most of the limited archaeological evidence, other than textiles, available from Spirit Cave relates to burial practices. If practices suggested by this evidence can be linked to historic or ethnographic burial practices, then this line of evidence would indicate continuity between the people living in the early Holocene and historic groups. If these practices cannot be linked, then the data suggest significant cultural discontinuity since the early Holocene. Archaeological evidence relating to burial practices is evaluated in Section 4(A) and ethnographic burial practices are discussed here.

In a summary of general Northern Paiute ethnography, Fowler and Liljeblad (1986:450) describe their death practices as follows:

> "The body of the deceased was removed from the house, wrapped in skins with the legs flexed in front or behind, and taken to the hills. It might be placed in a rock crevice or cave, or it might be buried on a hillside. The persons's personal goods were interred as well. Seeds and beads were often sprinkled over the grave. At Walker River and Mono Lake, the possessions of the deceased might be burned at the graveside. Burning of the deceased was reserved for individuals suspected of witchcraft."

In a more detailed later account of specific practices among the Norther Paiute from Stilllwater Marsh, Fowler (1992:163-4) reports that when someone died:

> "Members of the family gathered in or near the home of the deceased. A male relative wrapped the remains in his/her robe, or in crossed layers of pond moss and/or algae collected from a dry pond, and prepared to remove them from the house. With one or two additional persons to help carry the remains, this person selected a burial area, preferably in the sand hills west and north of Stillwater or in a rocky area in the foothills to the east. A hole was dug in the sand, or the rocks were removed in such a way as to receive the deceased. Digging sticks and other pieces of wood were used in excavating. The remains were interred in either an extended or flexed position. The personal property of the deceased, such as his bow and arrows, or her gathering baskets, was interred as well. Sagebrush was piled over the grave and a fire started and allowed to burn completely. This was felt to disguise the grave from predators. The remains themselves were not cremated in this fire, that practice being attributed on occasion by Wuzzie George and Alice Steve to people at Walker River, and also to the Sai'i, enemies of the Cattail-eaters. People purposefully forgot the exact location of these graves, and never visited them on purpose."

Fowler (1992:163) goes on to report that:

> "Both Mrs. George and Mrs. Steve were aware that there were burials in the caves in the Stillwater district, but they were uncertain as to whether the remains were of their people. They felt that they could be Paiute people from long ago, but were doubtful about them being persons from relatively recent times."

While general description of Northern Paiute burial practices, quoted here, could be interpreted as having several similarities with the burials from Spirit Cave, the more specific description for the people from Stillwater Marsh bears almost no resemblance to the Spirit Cave Burials. These ethnographic descriptions are also different from the burials reported from Elephant Mountain Cave and Lovelock Cave, but may be similar to those reported for the Stillwater Marsh area. If they are similar to those from Stillwater Marsh, the ethnographic burial pattern could as old as 1,500 years, some 8,000 years more recent than the oldest burials from Spirit Cave. In addition, Fowler's informants did not recognize the cave burials in the Stillwater district, which includes Spirit Cave, as being affiliated with their people, but thought that they could be Paiute people from long ago.

Unfortunately, there is no direct way to project ethnographic burial practices into the past and determine how long the people who buried their dead in a particular manner have lived in the area.

Therefore, since the ethnographic evidence on burial practices is not consistent with the burials from Spirit Cave, and there are at least two chronologically intermediate sets of burials (Lovelock Cave, and Elephant Mountain Cave) representing different burial traditions, known ethnographic practices cannot provide evidence of the existence of a shared group identity between a present-day Indian tribe and an earlier group or to establish that a present-day Indian tribe has been identified from prehistoric times to the present as descending from an earlier group.

Overall, the available anthropological and ethnographic evidence related to burial practices does not support the argument that the ancient remains from Spirit Cave are affiliated with any modern individuals or groups.

2. Folklore/Oral Tradition

Ethnographic people in the Great Basin attached great importance to storytelling as a source of entertainment and educational value and the storyteller was an indispensable member of the local group (Liljeblad 1986:650. Great Basin storytellers do not distinguish between verifiable historical memories and legendary fiction (Liljeblad 1986:651) and a storyteller would not normally place his or her story in a historic context (Liljeblad 1986: 655). Anthropologists and folklorists have identified two narrative forms in the Great Basin oral tradition: Historical Legends or stories about events in times still remembered; and mythological tales or stories about events in a timeless mythological age (Liljeblad 1986:650).

Historical legends generally refer to: stories of privation, hardship, or misfortune; ghost stories; shamanistic tales; and tales of individuals or families in conflict with hostile groups (Liljeblad 1986:651). According to Liljeblad (1986:651), historical legends are distinguished from legendary tales because "they are epic in a realistic sense and told at some length in a matter-of-fact manner." Given the lack of direct historical context in historical legends, their content cannot be attributed to events before the introduction of the horse, some time in the late seventeenth century (Liljeblad 1986:651). Liljeblad (1986:651) notes that: "personal history [in the oral tradition] coincided with the time depth of known genealogy. In most cases this is the grand parental generation of the speaker. Most historical legends recorded by 1900 would therefore refer to early postcontact time [about 1830]."

Mythological Tales are relatively short stories that generally refer to creation, cosmology, origins, culture heros, religious concepts, supernatural beings, visions, shamanism, and life-cycle events (Hultkrantz 1986:630-637). Mythological tales connect present circumstances to a former mythological age which "preordained once and for all happenings in nature and set bounds on man's capabilities." (Liljeblad 1986:657). In other words, Great basin mythological tales explain why the world is as it is and why people behave as they do.

Sai' stories in Northern Paiute oral tradition are identified by Liljeblad (1986:655) as historical legends and may have some historical validity. These tales are discussed in detail here because they are relevant to assessing cultural continuity between the People who buried their dead at Spirit Cave in the early Holocene. and the contemporary Northern Paiute. In contrast, Great Basin mythology about death beliefs is discussed to provide a contrast with historical legends, such as the Sai' stories.

a. Death Beliefs

Traditional Great Basin religion can be structured on five principal levels: cosmology, the beliefs is supernatural beings supposed to control nature and man, social and individual rites connected with collective and individual survival, visions and shamanism, and crisis rites with practices and beliefs referring to life after death (Hultkrantz 1986:631). According to Hultkrantz (1986:631):

> "These patterns were sometimes interconnected, sometimes, not. In any case there were no unitary religious system and no world view that provided a dogma of supernatural sanctions. Religious ideas and practices were diffused through the culture but did not constitute a set of defined beliefs, values, and rites."

While religious beliefs surrounded all life crisis rituals, they are particularly well represented at death (Hultkrantz 1986:636). In the Great Basin, death rituals were aimed at preventing the return of a person who has died, because of a fear of the wandering soul of the dead person and of ghosts. Ghosts appeared as forms of human beings, animals and whirlwinds in dreams as well as everyday life because they want to take the living permanently into the domain of the dead (Hultkrantz 1986:636-

637). According to Hultkrantz's sources, the domain of the dead, a happy and delightful place, could lie in the North, South, or West, either on the other side of the ocean, or most frequently up in the sky (Hultkrantz 1986:637). Because of the fear of ghosts and wandering souls, the destruction of the dead person's remains as well as his or her personal property and their dwelling was a standard practice as was moving the entire camp away from where the death occurred (Hultkrantz 1986:636).

b. Other People

Fowler and Fowler (1971) have researched the earliest version of the Sai'dukai as it was told to John Wesley Powell by Natches in 1873. In this early version, the Sai-dukai lived at Humboldt lake and the Pa-vi-ot-so drove them into the water among the tules. They stayed in the water several days trying to make bows out of tules when they were driven out by their enemies, and they fled to a cave in the mountains by the side of the lake. The Pa-vi-ot-sos brought sagebrush and piled it up at the mouth of the cave and as they came running out they were all killed except two who were left alive to carry the tale of the Pa-vi-ot-so victory at their home (Natches told Powell that the bones of the Sai' dukai could still be seen in the cave). The two survivors were also told to tell the Sai' dukai to come and make friends with the Pa-vi-ot-so. A few years after the war the Sai'dukai returned and in spite of attempts at peace by the Pa-vi-ot-sos, the Sai refused and were again, all killed except one who was sent home to tell his people of the power of the Pa-vi-ot-sos. There are numerous other versions, some examples are:

> A. In 1912 James H. Hart and David Pugh, two guano miners, excavated a set of human remains from Lovelock Cave. These remains were thought to belong to "a giant, six to a seven-and-a-half foot tall mummy." According to the author, the local Native Americans living near Lovelock Nevada were not surprised by the discovery and several related accounts of a great battle between the Paiute and the Sai'dukai, a race of giants who had once waged war against each other. According to the local accounts, the Paiute finally vanquished the Sai'dukai in a fierce battle culminating in the fiery extermination of the giants in a local cave. (Charles Hillinger 1972 Giant Cannibals in Nevada. 10/9/72. San Francisco Punch).
>
> B. The following are excerpts of R.F. Heizer's unpublished field notes from 1932, on file in the Bancroft Library, UC Berkeley:

Heizer collected a large body of ethnographic accounts about the Sai' from Northern Paiute individuals and all accounts dealing with the Northern Paiute of the Humboldt Sink area refer to a group of people living in the region when the Northern Paiute migrated into the area in the earlier time and who were driven out by the ancestor's of the Kupa'dokado band of Northern Paiute. The core narrative of this account is so persistent that it may well be based in fact, i.e. at some time in the past, another group occupied the area and were evicted by the ancestors of the Northern Paiute.

Heizer collected several accounts from local Paiute which in essence tells of a different people, both in language and customs living on Pyramid Lake (Loud and Harrington 1929:163 and Stewart 1941). Several Northern Paiute remembered stories about the legendary red-haired people who lived on Humboldt Lake and Pyramid Lake. Black hair of human burials commonly turns red as the result of the chemical action of bat guano when the remains are exposed to air and sunlight. One of Heizer's major informants, Bo-E-Ann, told of these people, called Sai' dukai (two translations of Sai-dukai are given - "tule-eaters" or "people eaters") as "chased out a long time ago, about 200 years B.P. Bow-E-Ann claims that the Sai' dukai were created at Humboldt Lake while the Numa were created at Stillwater. The Paiute fought with the Sai' dukai and drove them away into the west, where they became the Klamath. He described several differences between in traits and culture of the Paiute and the Sai'dukai including noting that the Sai'dukai used obsidian arrow points while the Paiute used a greasewood foreshaft hafted onto an arrow. The Sai' used a metate, while the Numa did not. The Sai' used a round flat coiled winnowing plaque and the Numa used a flat pyramid shaped curved woven winnower. Bow-E-Ann also noted that the two groups spoke different languages. Mr. Sam Dick, another Heizer informant, related that the Sai' dressed in"coats and pants" and the Numa did no; the Sai' wore eagle feathers but the Sai' did not.

Heizer's field notes also records several Numa place names, including describing "Nah-bu-aht-an-n" a sand dune in the northwest corner of the Taylor ranch three miles

> north of Lovelock, Nevada. This is the place where an informant (Bow-E-Ann) remembered that a big peace talk occurred there between the Numa and the Sai'. The Sai' arrived in tule boats and met with the Paiute who had three interpreters "who could talk Paiute and Sai'dukai . . . make peace . . . shake hands." Baumhoff and Olmstead (1964) found neither archaeological nor linguistic evidence that the Sai'dukai displaced Northern Paiute.
>
> Heizer proposed that these narratives may have an ecological basis. Specifically, certain southern subgroups seem to have been centered around several lakes (Carson, Pyramid, Walker, and Humboldt) while the northern subgroups lived in considerably drier, more arid country. The regional subgroups may be a reflection of ecological adjustments. He suggests that the northern group of five bands may have shifted from the further south, and that the present southern groups were the source of the pressure. The account may represent the recollection of a forced migration in which the Paiute who lived in and around Walker Lake moved north displacing the inhabitants into northern California.

C. Most of the informants' testimonies are vague as to the time of the Paiute-Sai'dukai wars. Informants' accounts in the 1880s spoke of these taking place three or four generations previously. Loud suggested that these accounts might be regarded as attempts by the Northern Paiute to explain the archaeological materials from a cultural period preceding their own, he did not believe that it was the only explanation. Instead, he believed that the tale may be historically founded and refer to a local population shift by one Northern Paiute band at the expense of another, or if taken literally, to a replacement, by the Northen Paiute of the Humboldt/Carson Sinks (and perhaps Pyramid Lake) of a non-northern Paiute speaking group.

D. The late Edward Johnson (1975) provided an origin account for his Walker River Paiute Tribal History. In his narrative Johnson states that "In the beginning, all the land was covered by water and the Numa (The People or Northern Paiute) came to the Great Basin in boats. When the water went down the People moved down from the mountain tops into the valleys to look for food. The

People were named for the plants or animals that grew or lived in their area."

E. The Northern Paiute who live near Lovelock, Nevada call themselves Koop Ticutta, meaning ground squirrel eaters. This group has an oral tradition recalling a conflict with the Numa Ticutta (People Eaters) and how that group was destroyed by forcing them into the cave and lighting a fire which destroyed them. (Inter-Tribal Council of Reno 1976 A Northern Paiute History).

F. Sarah Winnemucca (1883) provided a detailed account of this legend in which her people, the Paiute, vanquished a group of cannibalistic barbarians, who trapped her people in "pits". According to Winnemucca, "these people lived along the Humboldt River a long time ago. After years of depredations on the Paiute and intergroup warfare the Paiute herded the redheaded cannibals into a cave and set it on fire, killing all inside. " Winnemucca claimed to have a lock of this red hair in her possession.

G. Loud and Harrington (1929) referenced an 1887 account by John T. Reid, a mining engineer with an interest in Paiute folklore. Reid recorded a story told to him by Captain Natches, a Northern Paiute elder. In this story, handed down to Natches through four generations, the Northern Paiute lived alongside another group in the area north of Humboldt Lake. These "Others" spoke a different language and competed with them for available resources. The Northern Paiute were repeatedly attacked by this group whenever they hunted in the marshes. Warfare between the Northern Paiute and "the Sai" lasted for years culminating in a great battle in which the other group was wiped out by the Paiute.

H. Harrington and Loud collected another version of this account in 1929 from a Paiute elder from Stillwater, Nevada. This informant claimed to have participated in a battle with the Sai and to have lost an eye as a result. In his narrative, the Sai dukai lived in "a hole" and were so poor that they wore robes made from the skin of mud hens. The elder's account concludes with the Paiute exterminating the other group in a long and fierce battle.

I. Loud and Harrington (1929) reported that the Northern Paiute informants associated these extinct "others" to the Pit River

> people. Their informants described these ancient people as"mean, contemptible, foolish, degraded cannibals who had red hair and were so poor that they wore robes made out of the skins of mud hens. Loud and Harrington also added that the ancient Sa'i comprised two bands. One band was conceived like any band or family and consisted of a few hundred individuals living at Humboldt Lake until the Northern Paiute exterminated them. The second band lived on Pyramid Lake and was later driven toward the Pit River. Park also identifies the Sai' as Pit River people (Fowler 1989).

Bath (1977) summarized the elements from 33 separate informant accounts in the ethnographic literature. Statements naming the Sai as the original owners or residents at Humboldt Lake are to be found in all of these sources. Steward's informant "Cth" of Mill City, near Winnemucca, said that in his grandfather's time people speaking a different language lived near Lovelock, and were either killed or driven into the cave and smoked to death by the Paiute. He tentatively identified them as Pit River Indians (Stewart 1941). Gilbert Natches, in 1936, stated again that the original owners of Humboldt River and Humboldt Sink were Sai', and that the only real war the Paiute ever had was against these people (Stewart 1941). He also added a new element to the account stating that the real Paiute lived at Stillwater and that the war started because the Sai killed several Paiute who were hunting at Humboldt Lake. In retaliation, the Paiute drove the Sai out of the country. These same elements are found in the statements of Maggie and Goggles Wright of the Tovusi-dikadi band, who said the Tovusi joined the Toe of the Carson Sink in driving the Sai' into Lovelock Cave. In addition "Little Pete" of the Toe Band stated that the Paiute killed the Sai in Lovelock Cave (he also claimed to have a Sai' grandmother) (Stewart 1941).

According to Bath's analysis although numerous discrepancies are obvious in Sai'dukai accounts certain elements are retained throughout two significant versions of the Sai legends, as follows:

A. The first is the warfare version:

1. The Sai'dukai lived at Humboldt Lake
2. There was at least one Sai' dukai group living elsewhere
3. The Sai'dukai took refuge in a cave.
4. Most, if not all, were killed getting out o the cave.
5. The Paiute set fires at the mouth of the cave.
6. The Paiute set fire to the tules.

7. The Sai' dukai were Numic Speakers
8. The Sai' had reddish hair.

B. The second is the invasion versions:

1. The Sai' dukai were not residents of the Humboldt, and they came in from another area.
2. The Sai'dukai tribal identities are given as Pit Rivers, Modoc, and Umatilla.
3. The were battles in the San Hills in Carson Sink, at Pyramid Lake, and at Humboldt Lake.
4. The Sai' took refuge in a cave.
5. The Paiute set fires at the mouth of the cave.
6. The Sai' survivors departed elsewhere.
7. The approximate date occurs around 1750.

Bath (1977) and Fowler and Fowler (1971) assume that the Sai dukai legends are based in fact. The accounts they discuss are provided in three versions which retain certain common elements: (1) the Sai'dukai were the original residents of the Humboldt Sink; (2) the Sai dukai were invaders from somewhere else; and (30 the mythological creation legend. The ethnological evidence obviously supports the legends. The physical evidence from the available remains lays to rest the issue of gigantism. However, it is not helpful in identifying different racial characteristics. In Bath's study she noted that none of the thirty-three ethnographic respondents ever denied the legend.

In closing, Bath suggests the archaeological evidence is strong for a continuous cultural sequence dating to at least 4,000 years in the caves surrounding the Humboldt Sink. Although the case for the Sai dukai legend has not been proven, the evidence in her study of 33 independent informant accounts points unmistakably to core elements in the legend as demonstrating the presence of another group of people living in the area either before or at the same time as the ancestors of the Northern Paiute.

These accounts relating the presence of the Sai'dukai clearly point to the existence of another population occupying the western Great Basin at the same time as the Numa. Analysis of these accounts does not clarify whether this population preceded the Numa. What the narratives demonstrate however, is the clear presence of "the Other"; a group that was culturally distinct from the Northern Paiute in the western Great Basin. The Sai' accounts unanimously describe this group as different in appearance, behavior and cultural practices and provide a testament either to the extermination of this group or of their banishment from the area.

3. Summary and Evaluation

> Using the available evidence from the oral tradition, there is no way to know how many more or how many different groups lived in the region in late prehistoric times, and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants who survived to become the historic occupants of the region. There is enough available information from the oral tradition to say that there were at least two groups in the area and this means that this line of evidence does not support the argument for affiliation.

G. Historic

The first recorded European contact with Indians in the physiographic Great Basin occurred early in 1776 (Figure 13), when the de Anza/Garcés party entered the southern Great Basin (Cline 1988:36-38). Later in 1776, the Dominguez/Escalante party, led by Ute guides, entered the Great Basin near Utah Lake (Cline 1988:37,43-48). The Dominguez/Escalante party traveled through Utah to the Cedar City area before leaving the Great Basin to the south and then turning east to return to Santa Fe (Cline 1988:37, 43-48). Escalante described Ute and Southern Paiute lifeways. The first definite record of trade between Hispanics and Indians in the eastern Great Basin (Utah Lake area) dates from 1813 and there has been continuous contact in the eastern and southern Great Basin since then.

In the northern Great Basin, contact cannot be documented before1818, when Donald Mackenzie began leading large parties of the North West Company (Hudson's Bay Company) trappers into the northern Basin (Cline 1988:93). British contact in the northern Basin continued with the Peter Skene Ogden expeditions from 1824 through 1830 and American contacts began with the Jedediah Strong Smith expeditions for the Rocky Mountain Fur Company from 1826 through 1830 (Cline 1988:101-107,133). Ogden located the Humboldt River and followed it from the Humboldt sink near Lovelock to its source at Wells, Nevada (Cline 1988:116-118) . In May 1829, Ogden and his party encountered Indians at Lovelock, Nevada (the Humboldt Sink) who were clearly the ancestors of the modern Northern Paiute (Cline 1988123-124). In 1833-1834, Joseph Walker explored and trapped in Western Nevada and John C. Fremont discovered Pyramid Lake and explored routes to Sacramento in 1843-1845 (Cline 1988:208-216). Fremont is credited with labeling the region as the Great Basin (Cline 1988:208-226). There has been continuous Euro-Americans residential occupation of the northern Great Basin since the United States acquired it from Mexico in 1848 and gold was discovered in California in 1849 (Malouf and Findlay 1986:499).

This contact resulted in a rapid decrease in native populations and the destruction of native lifeways (Malouf and Findlay 1986:499-516). It also led to the removal of free-roaming Indian bands to various reservations throughout the region (Clemmer and Stewart 1986:525-557). Reservations set aside for Northern Paiute in Nevada include: the Pyramid Lake and Walker River Reservations created in 1859; the Fallon Reservation

in 1902 and the Fallon Colony in 1917; the Lovelock Colony in 1910; Summit Lake Reservation in 1913; Yerington Colony in 1917 and the Yerington Reservation in1941; Reno-Sparks Colony in 1917; and Winnemucca Colony in 1928 (Clemmer and Stewart 1986532-533).

BLM's evaluation of the available historic record shows that the ancestors of contemporary Northern Paiute bands occupied the Spirit Cave area at first contact on or before 1818. There is no historic evidence indicating how long the ancestors of contemporary Northern Paiute bands had occupied the Spirit Cave area prior to first contact and none indicating who, or how many different human groups, lived there at any earlier time.

Since the historic record documents that the Northern Paiute occupied the Spirit Cave area at first contact, it is relevant, however, the historic record lacks sufficient time depth to be conclusive for determining affiliation in this case.

H. Expert Testimony

Expert testimony from contemporary tribal elders asserts that the Northern Paiute have been in the Spirit Cave area from "time immemorial" and that this means that there is a relationship of shared group identity between the Northern Paiute and the people who interred the remains from Spirit Cave. However, this testimony does not provide sufficient detail to trace this asserted relationship historically or prehistorically from the present back to the early Holocene.

Other relevant evidentiary expert testimony is summarized in this document and in its associated references. Additional expert testimony would vary across the spectrum of opinions already presented and would not contribute additional new evidence applicable to this decision.

I. Other

All applicable and available categories of evidence have been considered.

5. SUMMARY OF THE EVIDENCE

As required by NAGPRA, The BLM has reviewed the relevant available evidence from geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion. The results of this review can be summarized as follows:

1. Culture History: There is no evidence from the early Holocene that one can use to identify a human group that is distinct from other human groups that may

have lived in the area. There is no evidence showing which language or languages were spoken in the early Holocene and no evidence suggesting details of social or political organization, territorial boundaries, kinship patterns, religious beliefs, or world view.

The culture history of the middle Holocene does not provide evidence of the existence of a shared group identity between any present-day Indian tribe and any earlier group, nor does it establish that any present-day Indian tribe has been identified from prehistoric times to the present as descending from any earlier group. In other words, the available evidence from the middle Holocene indicates significant cultural discontinuity between the early Holocene and the late Holocene and therefore, does not support affiliation with any contemporary group.

However, as with earlier periods in the Holocene, there is no evidence to show how many different groups lived in the region during the late Holocene and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants. Near the end of the period, ceramics appear in some parts of the Great Basin for the first time, as does bow hunting technology and coiled basketry. These may have been brought in by migrants from elsewhere. There is no evidence showing which language or languages were spoken in the late Holocene and no evidence suggesting details of social or political organization, territorial boundaries, kinship patterns, religious beliefs, or world view.

In summary, the culture history of the Spirit Cave area shows significant cultural changes through time, possible in response to significant environmental change, and little evidence for cultural continuity throughout the Holocene. Instead there is evidence of discontinuity in material culture, settlement patterns, and subsistence strategies. While it is difficult to associate ethnicity or language with archaeological materials, the BLM's review of the available evidence indicates sufficient discontinuity such that it is unlikely that the tribes occupying the Spirit Cave area in historic times are from same culture as the people who buried their dead in Spirit Cave in the early Holocene or that they are the direct descendants of that group.

Therefore, BLM's review of the available evidence indicates that the culture history of the western Great Basin shows a pattern of changes in cultural adaptations that does not support cultural continuity over the last 10,000 years. The level of discontinuity is sufficient to warrant the conclusion that the remains from Spirit Cave cannot be reasonably affiliated with any modern tribe or individual.

2. Textiles: Between 4500 B.C. and A.D. 1000 coiled parching trays were characteristic and dominated other forms of basketry. After A.D. 1000 they are conspicuously eclipsed by twined textiles. An example of a distinct technological change is that the pre-Paiute occupants constructed three rod foundation coiled bowls, caps, and round flat trays. Northern Paiute constructed twined parching trays, twined baskets, and twined caps. Lawrence Dawson suggests those pitched water bottles, characteristic of the Northern Paiute, are not known in the archaeological record before A.D. 1000. Lovelock Wickerware is present between 1000 B.C. and A.D. 1000 in the form of burden baskets. The Northern Paiute constructed twined burden baskets. Z-twisted twined technology dominates archaeological textiles dated before A.D. 1000. After the postulated arrival of the Numic speakers, twining predominates. Ethnographic accounts demonstrate that Northern Paiute women did not make coiled baskets until relatively late (Fowler 1989:83-4 and footnotes) and some, including those from the Spirit Cave area never adopted the practice (Stewart 1941:386). Park's informant from Pyramid Lake said that "In the old days coiled baskets were not made. Women learned to make them after they saw them in stores." (Fowler 1988:83-84).

Based on the available evidence, the BLM determined that the textile evidence does not show cultural continuity throughout the Holocene. Burials #1 and 2 from Spirit Cave were associated with sophisticated warp-face-plain-weave (diamond plaited) textiles that disappeared around 8800 years BP and there was at least one textile tradition (Lovelock Wickerware) in the area between 3000 and 1000 years BP that was different from both the Spirit Cave textiles and ethnographic textiles. Other textiles, clearly associated with the Northern Paiute do not appear in the archaeological record before about 1000 years B.P. and coiled baskets may not have been made until the turn of the century. Therefore the available textile evidence does not support affiliation between the Spirit Cave remains and any contemporary group.

3. Burial Practices: To the extent that Sprague (1999:14-15) is correct that burial practices reflect cultural identity, the available burial evidence does not support affiliation. The direct evidence from Spirit Cave; the tightly-flexed bundle burials from Elephant Mountain Cave (about 2,000 years B.P.), the mixed burials from Lovelock Cave (around 3,400 years B.P.), and the Stillwater Marsh burial population (1,250-650 years B.P.) indicate that there have been at least four different burial traditions among groups in the Spirit Cave area between when Burial #1, Burial #2, and the cremation (formerly Cremation #1 and Cremation #2) were interred at Spirit Cave in the early Holocene and when the Northern Paiute occupied the area in ethnographic times. Based on the available evidence, the people practicing these traditions did not bury their dead in a manner that was consistent with the ancient burials from Spirit Cave or with ethnographic descriptions of Northern Paiute burial practices [see Section 4(F)(1)].

Therefore, the BLM's review of the available archaeological evidence related to burial patterns in the region surrounding Spirit Cave throughout the Holocene shows significant cultural discontinuity and does not support the argument that the ancient remains from Spirit Cave are affiliated with any modern individuals or groups.

4. Biological: There is no biological information available at this time, given the state of current scientific technology, methodology and theoretical framework, which would allow the assignment of Spirit Cave Man to an affiliation with a particular tribe. There is no available biological information which clearly supports cultural continuity with contemporary North American Indians. The biological information does not indicate that there is, "a relationship of shared group identity which can reasonably be traced historically or prehistorically between members of the present-day Indian tribe...and an identifiable early group," as required by NAGPRA. No biological findings to date indicate by a "preponderance of the evidence" that there is "affiliation" of Spirit Cave Man to an affiliation with a particular tribe

5. Kinship/Genealogy: Throughout the consultation process and analysis of the available evidence, there has been no evidence found that identifies any lineal descendants of the individuals buried in Spirit Cave. Therefore the available genealogical evidence is relevant but inconclusive for establishing affiliation.

6. Geography: The ICC determined that Northern Paiute occupied the Spirit Cave area at the time of contact and that they hold sole aboriginal title to those lands. However, the available geographic evidence does not, and cannot, demonstrate the existence of either an earlier group or of a shared group identity between any present-day Indian tribe and any earlier group. There is no geographic evidence indicating how long the Northern Paiute have occupied the Spirit Cave area prior to European contact in the early 1800s and none indicating who, if anyone, lived there at any earlier time. Therefore, the geographic evidence is relevant but inconclusive for establishing affiliation.

7. Descriptive Linguistics: The only direct descriptive linguistic data available shows that Numic speaking Northern Paiute bands occupied the Spirit Cave area at first contact. However, as with the evidence from geography and history, there is no descriptive linguistic evidence indicating how long the ancestors of the contemporary Northern Paiute bands have occupied the Spirit Cave area prior to first contact and none indicating how many different human groups lived there at any earlier time.

8. Numic Expansion (Archaeology and Linguistics): The available archaeological evidence related to the Numic Expansion model indicates at least

one period of cultural, and possibly linguistic discontinuity between when Burial #1, Burial #2, and the cremation (formerly Cremation #1 and Cremation #2) were interred at Spirit Cave in the early Holocene and when the Numic speaking ancestors of the Northern Paiute occupied the area, sometime in the late Holocene. Therefore, this line of evidence does not support the argument that the ancient remains from Spirit Cave are affiliated with any modern individuals or groups.

Given the unresolved controversy over the chronological issues associated with the Numic expansion model, the available linguistic evidence, taken by itself is relevant, but inconclusive for determining affiliation. However, the available linguistic evidence coupled with the available archaeological and biological evidence related to the Numic expansion (see Hill 2000; and this document), suggest that these lines of evidence do not support the argument for affiliation.

9. Anthropology: Using the available evidence from the oral tradition, there is no way to know how many different groups lived in the region in late prehistoric times, and no way to determine which of these groups, if any, died out, migrated away, or survived to have descendants who became the historic occupants of the region. There is enough available information from the oral tradition to say that there were at least two groups in the area and this means that this line of evidence does not support the argument for affiliation.

10. Historic: BLM's evaluation of the available historic record shows that the ancestors of contemporary Northern Paiute bands occupied the Spirit Cave area at first contact on or before 1818. There is no historic evidence indicating how long the ancestors of contemporary Northern Paiute bands had occupied the Spirit Cave area prior to first contact and none indicating who, or how many different human groups, lived there at any earlier time. Since the historic record documents that the Northern Paiute occupied the Spirit Cave area at first contact, it is relevant, however, the historic record lacks sufficient time depth to be conclusive for determining affiliation.

11. Expert Testimony: Expert testimony from contemporary tribal elders asserts that the Northern Paiute have been in the Spirit Cave area from "time immemorial" and that this means that there is a relationship of shared group identity between the Northern Paiute and the people who interred the remains from Spirit Cave. However, this testimony does not provide sufficient detail to trace this asserted relationship historically or prehistorically from the present back to the early Holocene. Other relevant evidentiary expert testimony is summarized in this document and in its associated references. Additional expert testimony would vary across the spectrum of opinions already presented and would not contribute additional new evidence applicable to this decision.

12. Other: All applicable and available categories of evidence have been considered.

6. DETERMINATION

Based on a review of the evidence from the tribe, as well as the evidence gathered from other sources, the BLM has concluded that the preponderance of the available evidence demonstrates that the human remains from Spirit Cave are appropriately considered to be unaffiliated with the Northern Paiute, i.e., the remains predate contemporary Northern Paiute tribes and cannot reasonably be culturally affiliated with any of them. Thus, the BLM has determined that the remains from Spirit Cave are unaffiliated with any modern individual, tribe, or other group and are therefore culturally unidentified.

ILLUSTRATIONS

Table 1: Human Remains from Spirit Cave

REMAINS	**DATES (BP)**	**COMMENT**
Burial#1 (No AHUR)	9270+/-60	Disarticulated, Wheelers reburied at Site
Burial#2 (AHUR 2064)	9415+/-25	Spirit Cave Mummy
Young adult woman(?) Cremation	9040+/-50	Formerly Cremation #1 (AHUR 773) and Cremation#2 (AHUR 752)
30-35 year-old Woman(?) (AHUR 770)	9300+/-70	May represent up to 5 individuals May include fragments of Burial #1
Adolescent Boy (AHUR 748)	4640+/-50	

Source: Tuohy and Dansie 1997; Owsley 1996; Larsen 1985; AHUR = NSM Human Remains Inventory Number

Table 2: Textile Chronology

LOCATION	TECHNIQUE	TEXTILE TYPE	DATE (years B.P.)
Stick Cave	Plaiting	Burden basket with tump-line	1595+/-50
Spirit Cave,	Plaiting	Warp face plain weave mat	9460
Spirit Cave	Coiling	Basket fragment	2200+/-60
Spirt t Cave	Twining	Grass mat	1700+/-60
Spirit Cave	Twining	Hemp bag	9040+/-50
Spirit Cave	Twining	Tule mat	9410+/-60
Spirit Cave	Plaiting	Warp face plain weave mat	9270+/-60
Shinners Site I	Coiling	Basket	1150+/-100
Shinners Site I	Twining	Cache bag	400+/-80
Shinners Site F	Plaiting	Lovelock wickerware	580+/-100
Shinners Site F	Twining	S-twined basketry	3325+/-90
Shinners Site D	Twining	Z-twined mat	5100+/-180
Shinners Site C	Coiling	Basket	1860+/-70
Shinners Site C	Coiling	Basket	2440+/-100
Shinners Site C	Plaiting	Lovelock wickerware	1240+/-80
Shinners Site A	Coiling	Basketry	2175+/-80
Shinners Site A	Plaiting	Lovelock wickerware	1190+/-80
Shinners Site A	Twining	Tule mat	595+/-80
Shinners Site A	Twining	Z-twined basketry	1725+/-120
Shinners Site A	Twining	Z-twined basketry	9540+/-120
Shinners Site A	Twining	Z-twined mat	8380+/-120
Pyramid Lake	Twining	Mat	1950+/-100
Nicolarsen Cave	Twining	Basket	7980+/-610
Mogoose Cave	Twining	Open work	2430+/-100
Mogoose Cave	Twining	Open work-basket	2140+/-110
Lovelock Cave	Twining	Tule mat	180+/-50
Kramer Cave	Twining	Basketry	3890+/-55
Kramer Cave	Plaiting	Lovelock wickerware	900+/-45
Kramer Cave	Twining	S-twined basketry	3900+/-100
Kramer Cave	Twining	Z-twine mat	3660+/-100
Kramer Cave	Twining	Z-twined basketry	3620+/-80

LOCATION	TECHNIQUE	TEXTILE TYPE	DATE (years B.P.)
Kramer Cave	Twining	Z-twined basketry	3660+/-80
Kramer Cave	Twining	Z-twined mat	3700+/-80
Kramer Cave	Twining	Z-twined mat	3745+/-90
Kramer Cave	Twining	Z-twined mat	3850+/-100
Hidden Cave	NONE	Mat	3520+/-120
Hidden Cave	NONE	Tule bag	3850+/-110
Hidden Cave	Plaiting	Warp face plain weave mat	9329
Hidden Cave	NONE	Wheeler fiber bundle	810+/-80
Hanging Rock Cave	Twining	Tule mat	1700+/-100
Guano Cave	Twining	Bag (Catlow twine)	6795+/-55
Grimes Burial Shelter	Plaiting	Warp face plain weave mat	9470+/-60
Empire Cave	Coiling	Basket	1610+/-80
Empire Cave	Plaiting	Lovelock wickerware	1400+/-150
Empire Cave	Twining	Z-twined basketry	1480+/-155
Elephant Mountain	Twining	Basket	2030+/-60
Elephant Mountain	Twining	Basket	855+/45
Elephant Mountain	Plaiting	Warp face plain weave	8830+/-70
Crypt Cave	Coiling	Basket	2400+/-200
Crypt Cave	Plaiting	Warp face plain weave mat	9129
Crypt Cave	Plaiting	Warp face plain weave mat	9120+/-60
Cowbone Cave	Twining	Juniper bark mat	5670+/-150
Chimney Cave	Twining	Juniper/sagebrush bark mat	2040+/-250: Cat#198
Chimney Cave	Twining	Juniper/sagebrush bark mat	2590+/-80 redate of 198
Chimney Cave	Plaiting	Warp face plain weave mat	9220+/-50
Brown Cave	Twining	Z-twist tule mat	910+/-80
Blazing Star Cave	Twining	Open work	2410+/-90

Table 3: Chronological Patterns

Time (years B.P.)	**Burials**	**Textiles**	**Culture History**
500	Ethnographic pattern	Ethnographic pattern	Ethnographic pattern
1,000	Last SWM burials, last lc burials	Last coiled trays; 1st. Pitched water bottles; three rod coil rare	1st. ceramics; Desert Series arrow points; Numic expansion (?)
1,500		Last Lovelock wicker; SC twined mat	1st. Bow/arrow (Rosegate points) Gatecliff/Elko dart points end
2,000	EMC burials	SC coiled basket	Washoe in Tahoe basin (?)
2,500	HLS cremation		
3,000		three-rod coil common	
3,500	Lc burial 35; 1st. SWM burials	1st. Lovelock wicker	Elko dart points begin
4,000	KC occupied		1st. HLS occupation; HC occupied; Washoe in Tahoe basin (?)
4,500	SC -15 year-old male; 1st. LC burial	1st. coiled trays; S-twist twining	Late Holocene; marshes recover
5,000			Gatecliff dart points
5,500	LRS Infant Burial; 1st LC occupation		Central uplands occupied; earliest known houses
6,000			population increase
6,500			1st. Piñon in Great Basin
7,000		GC Catlow Twined bag	Modern Climate-flora-fauna
7,500			middle Holocene; 1st. Ground stone; rock art; dart points; start population decline
8,000			Last spear points
8,500			Lake Lahontan dry; marshes dry
9,000	SC Cremation (formerly Cremation #1 and #2)	Last warp-face-plain-weave textiles-HC	
9,500	SC Burial #1, Burial #2	1st. SC warp-face-plain-weave textiles	
10,000 years B.P.		Twined mats; sandals; Z-twist twining	early Holocene

LC = Lovelock Cave; SC = Spirit Cave; EMC = Elephant Mountain Cave; SWM = Stillwater Marsh; CHS = Carson-Humboldt Sinks; HLS = Humboldt Lakebed Site; LRS = Leonard Rockshelter; HC = Hidden Cave; GC = Guano Cave

Figure 1: Spirit Cave Location Map

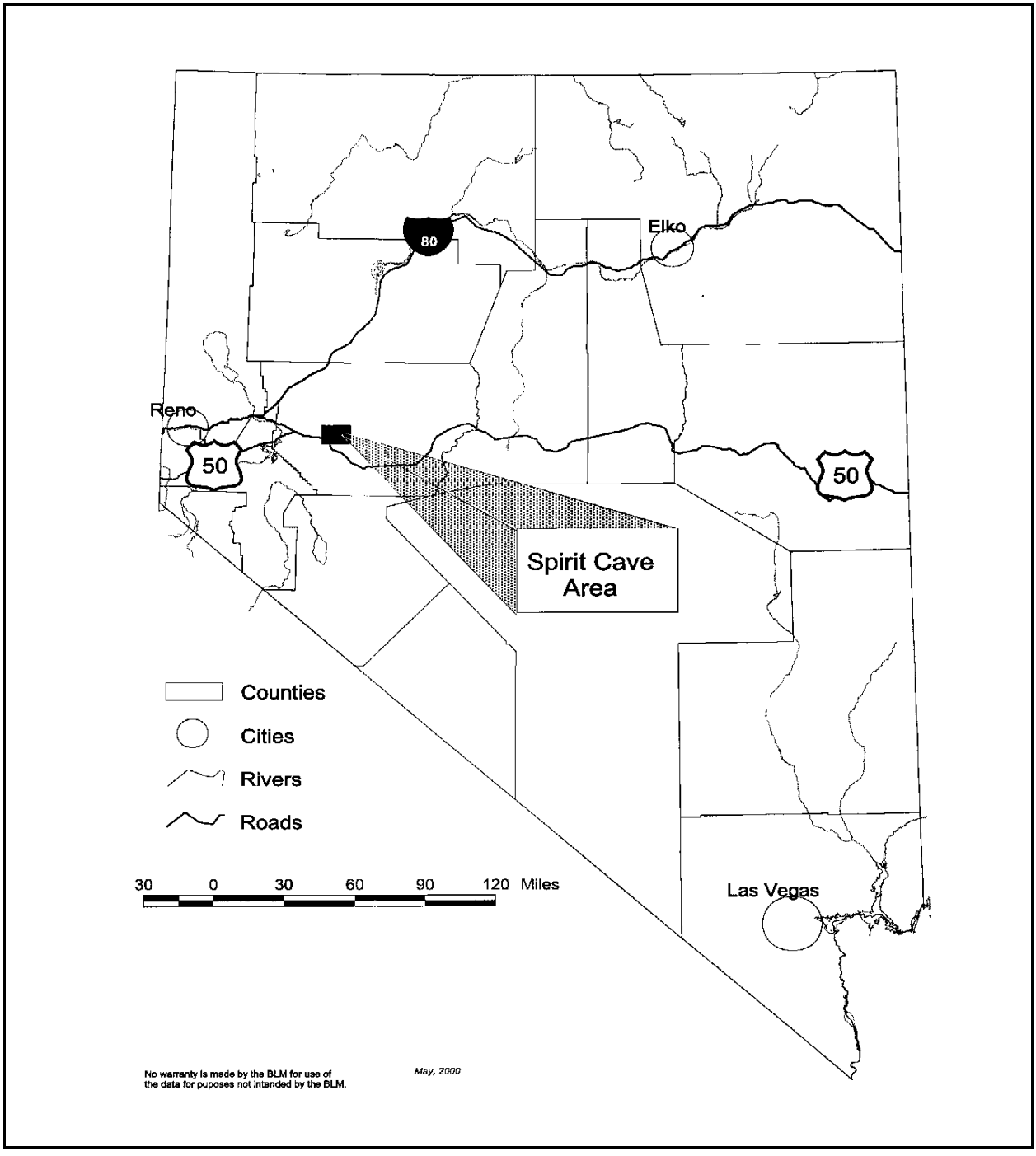
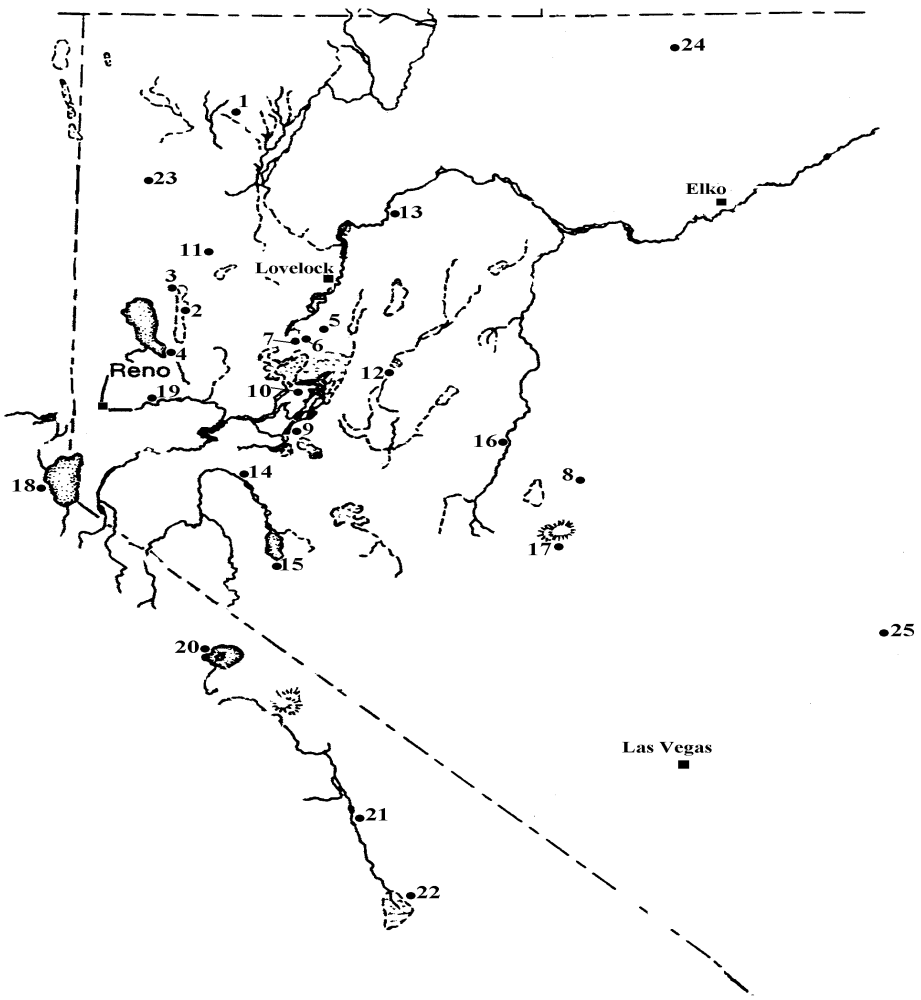


Figure 2: Map of Sites Referenced



1. Elephant Mountain Cave; 2. Winnemucca Lake: Crypt Cave, Chimney Cave, Cowbone Cave, Guano Cave, Stick and Nicolarsen Cave; 3. Falcon Hill: Kramer Cave, Empire Cave, and Shinners Cave Sites; 4. Pyramid Lake: Mogoose Cave, Blazing Star Cave, and 26Wa291; 5. Leonard Rock Shelter; 6. Lovelock Cave; 7. Humboldt Lake Site; 8. Gatecliff Shelter; 9. Grimes Point: Spirit Cave, Grimes Burial Shelter, Hanging Rock, and Hidden Cave; 10. Stillwater Marsh; 11. Lahontan Basin; 12. Carson/Humboldt Sink; 13. Humboldt River; 14. Walker River; 15. Walker Lake; 16. Reese River; 17. Mt. Jefferson; 18. Lake Tahoe; 19. Truckee River; 20. Mono Lake; 21. Owens River; 22. Owens Lake; 23. Western Great Basin; 24. Northern Great Basin; 25. Southern Great Basin.

Figure 3: Spirit Cave Plan View (Wheeler and Wheeler 1940)

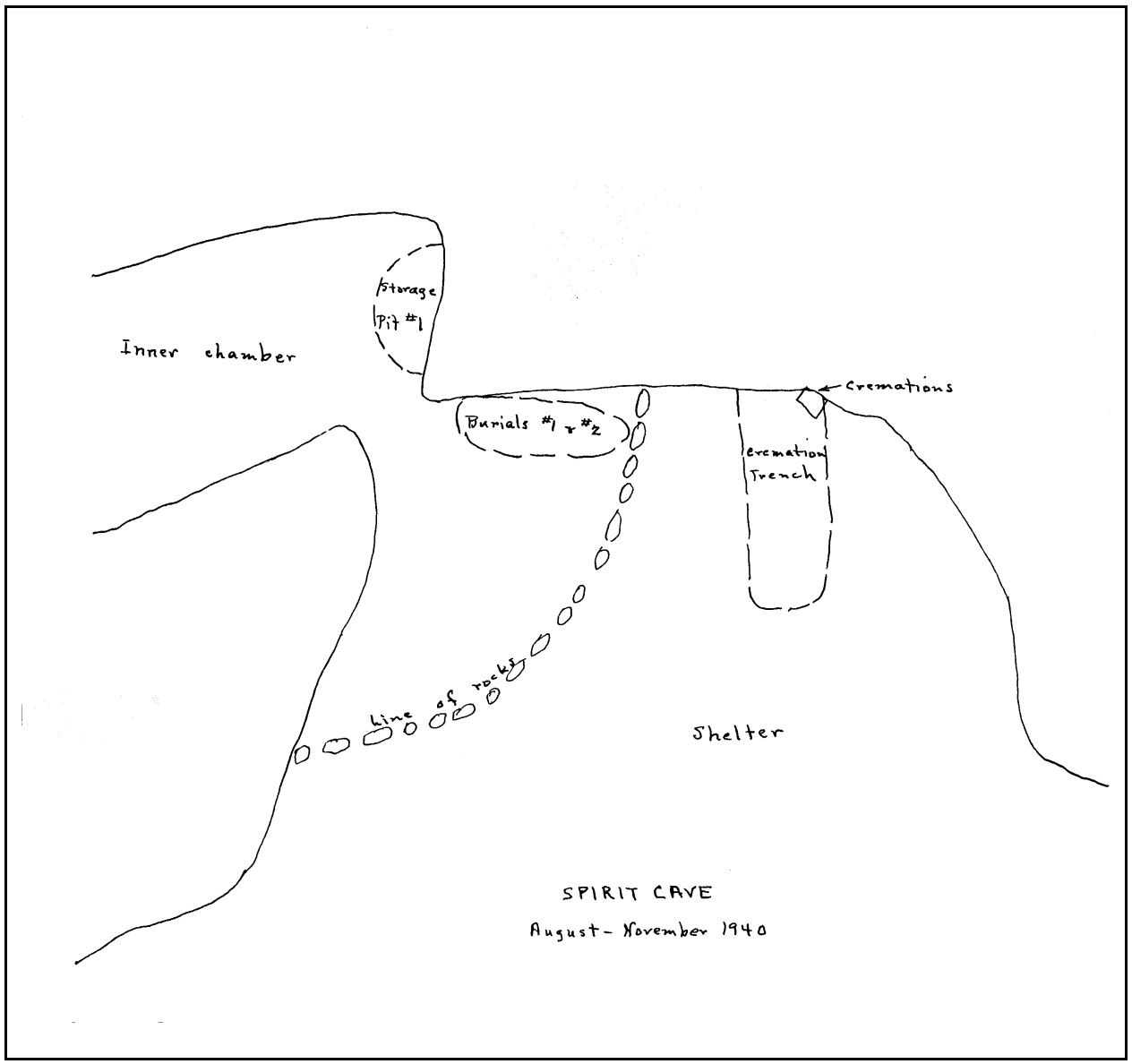


Figure 4: Spirit Cave Cross Section, Burials (Wheeler and Wheeler 1940)

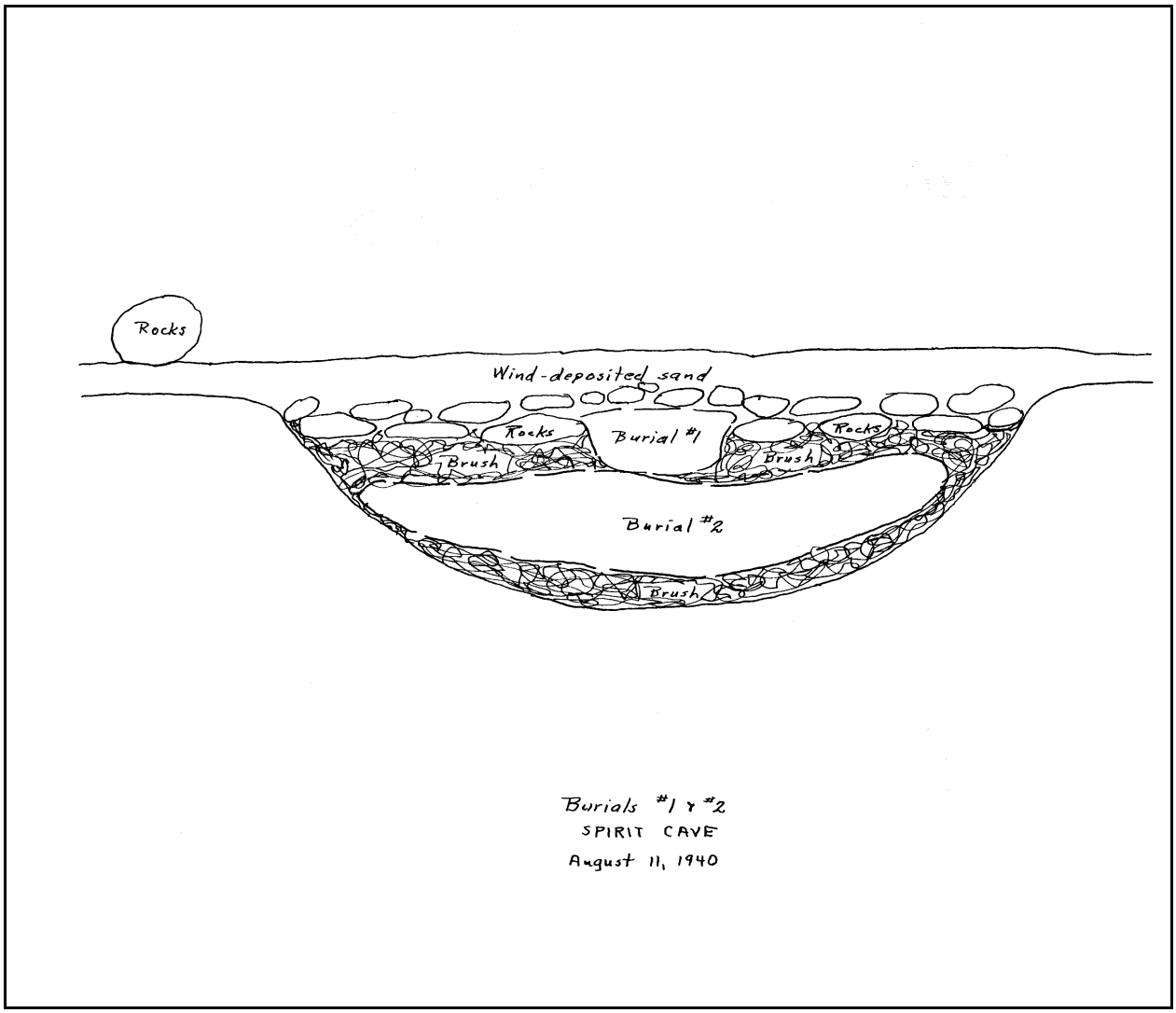


Figure 5: Spirit Cave Cross Section, Cremations (Wheeler and Wheeler 1940)

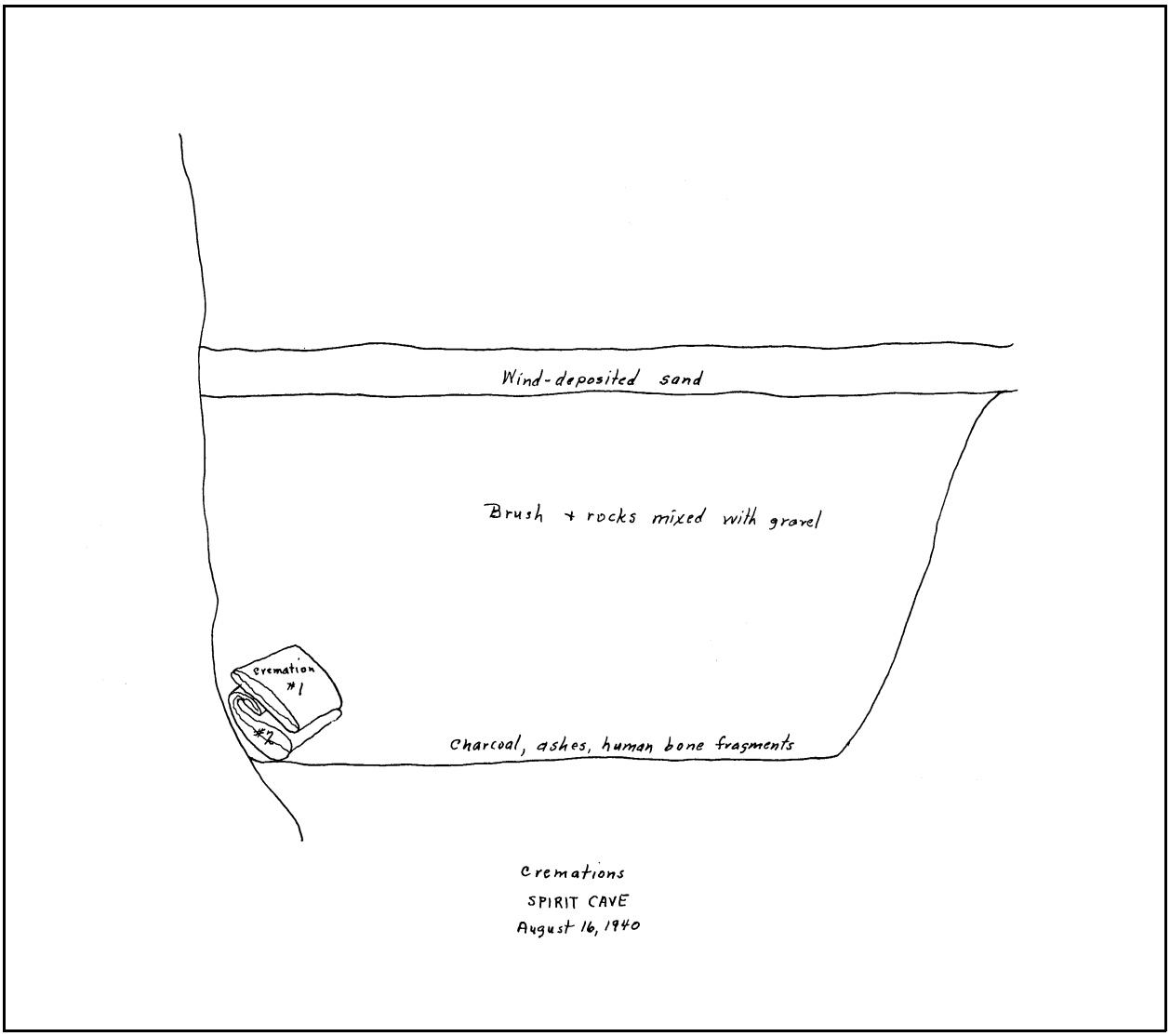


Figure 6: Textile Evolution (Hattori1982; Adovasio1970)

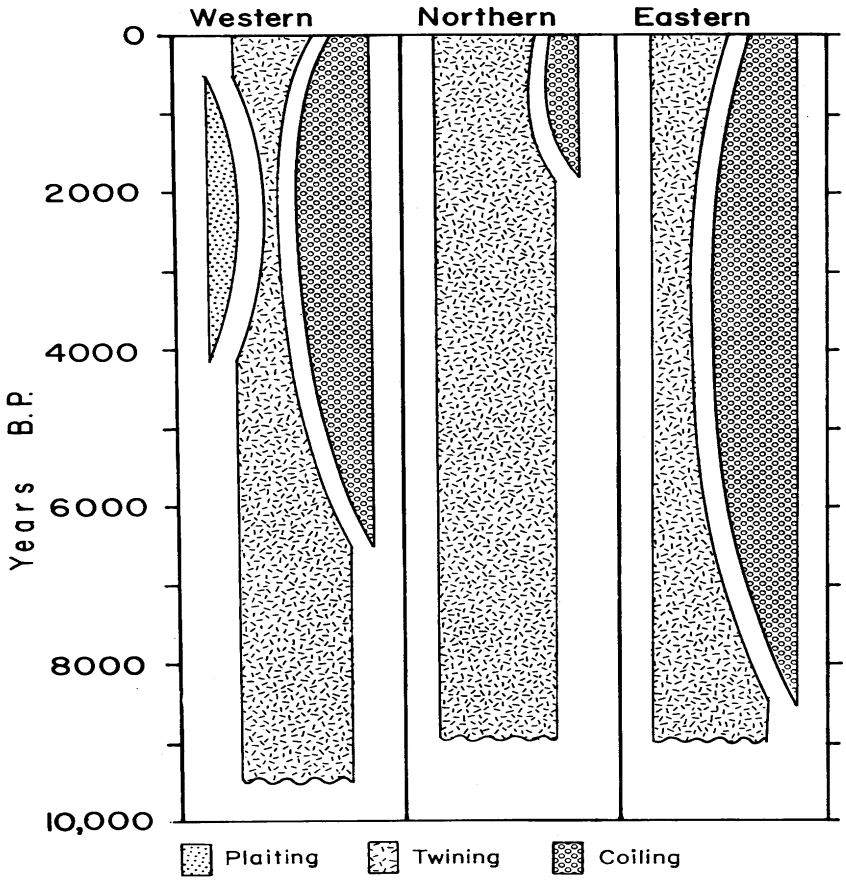


Figure 7: Modern Distribution of Numic Speakers (Madsen and Rhode 1994)

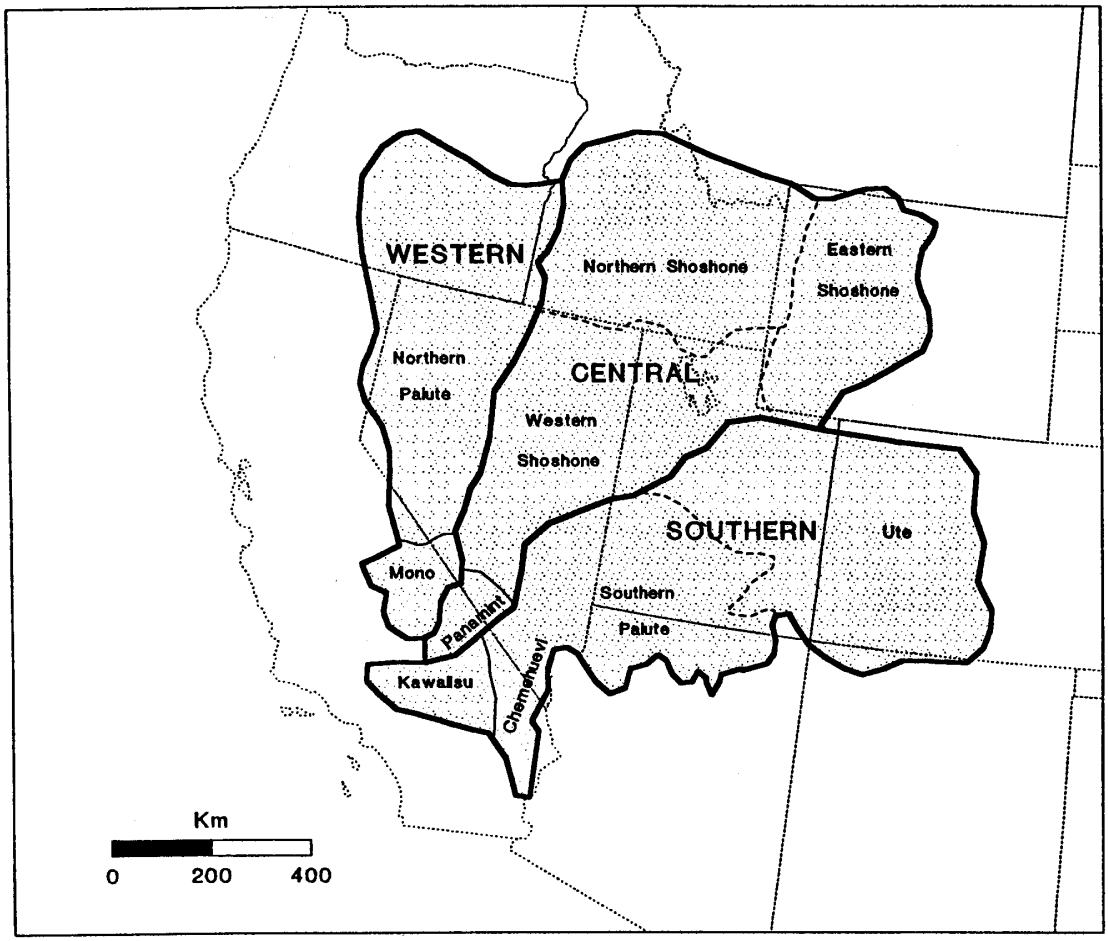


Figure 8: ICC Territories (Clemmer and Stewart 1986)

Figure 9: Northern Paiute Territory (Fowler and Liljeblad 1986)

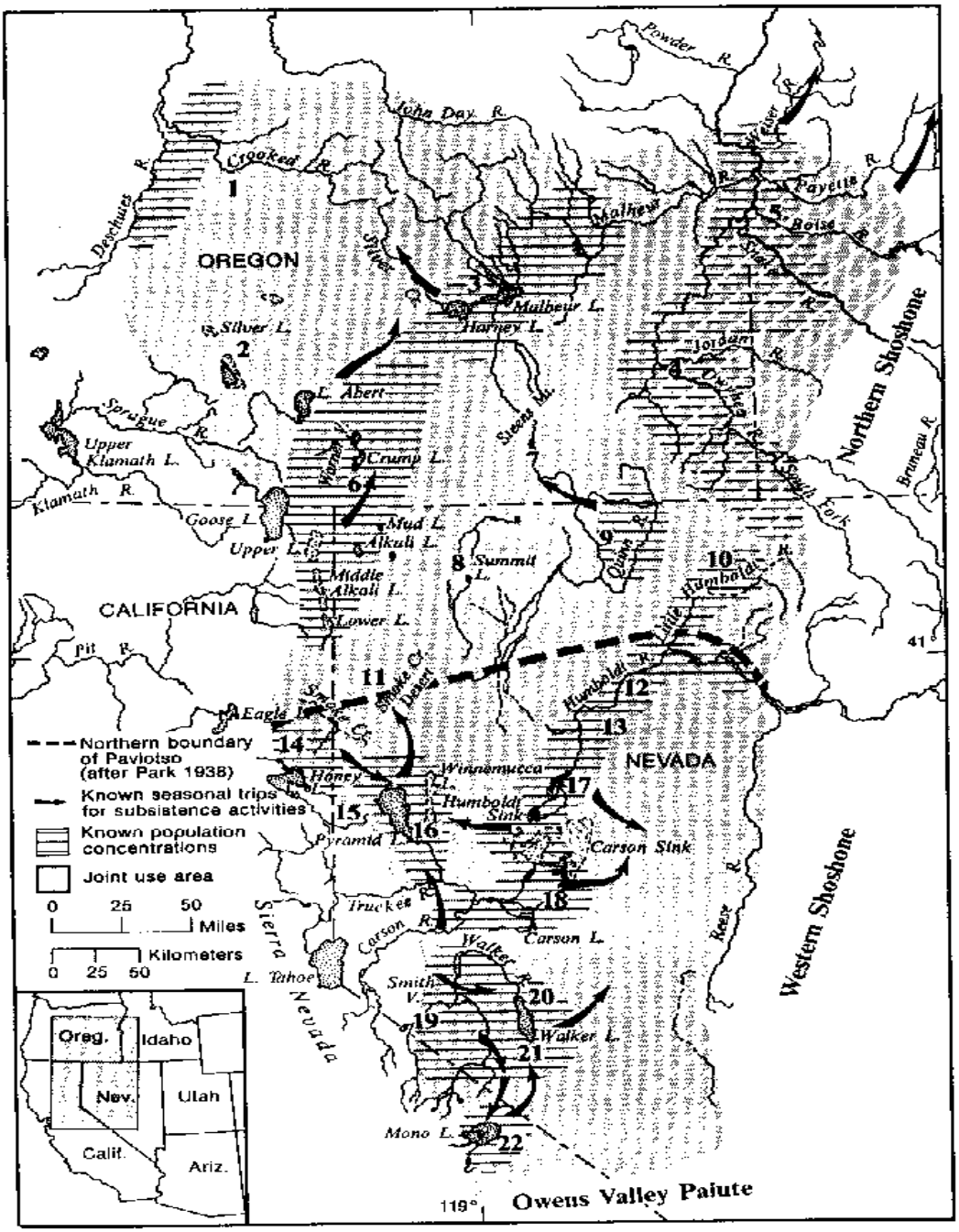


Figure 10: Modern Distribution of Uto-Aztecan Language (Hill 2000)

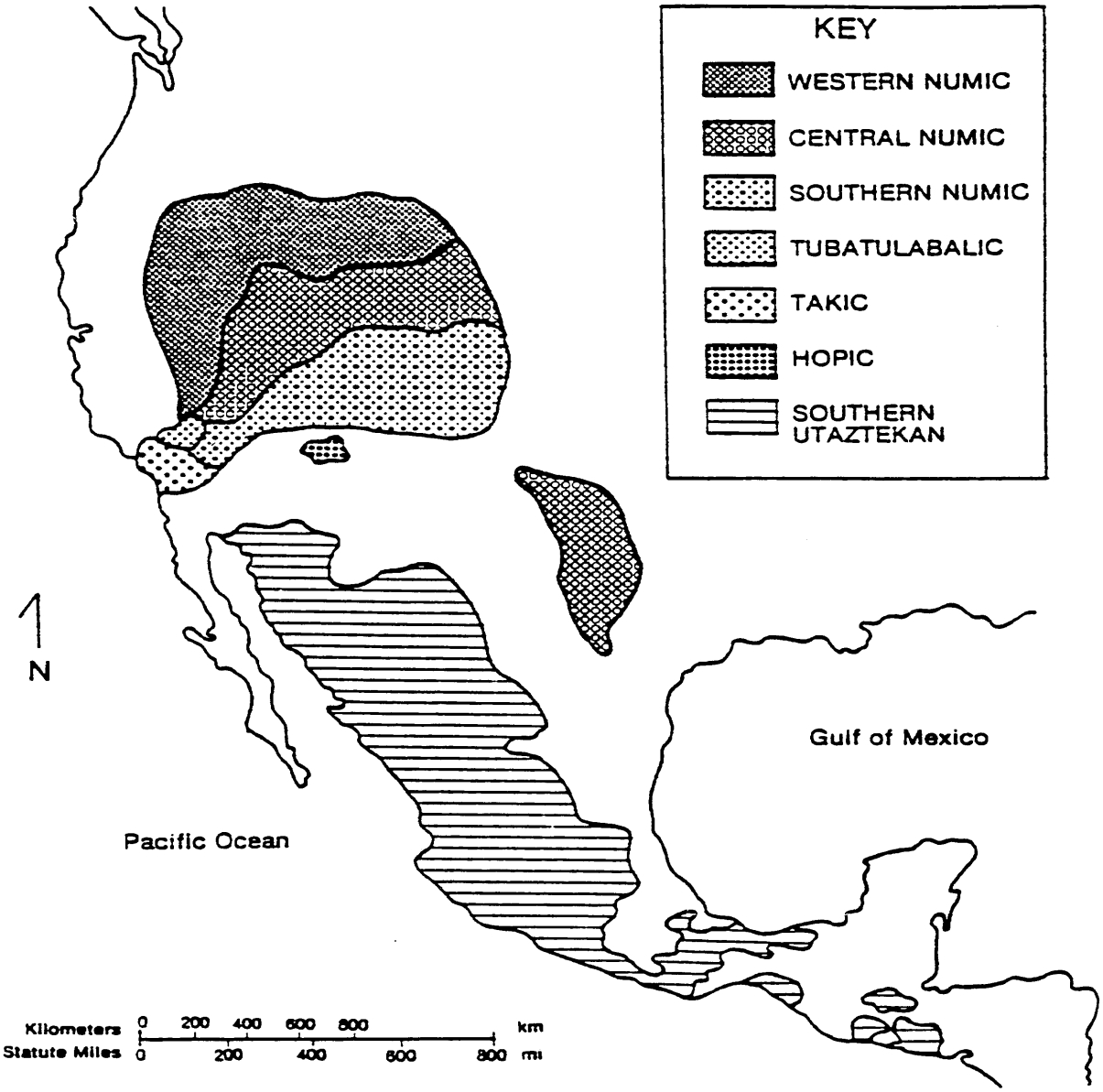


Figure 11: Proto-Uto-Aztecan Dialect Chain, ca. 5,000B.P. (Hill 2000)

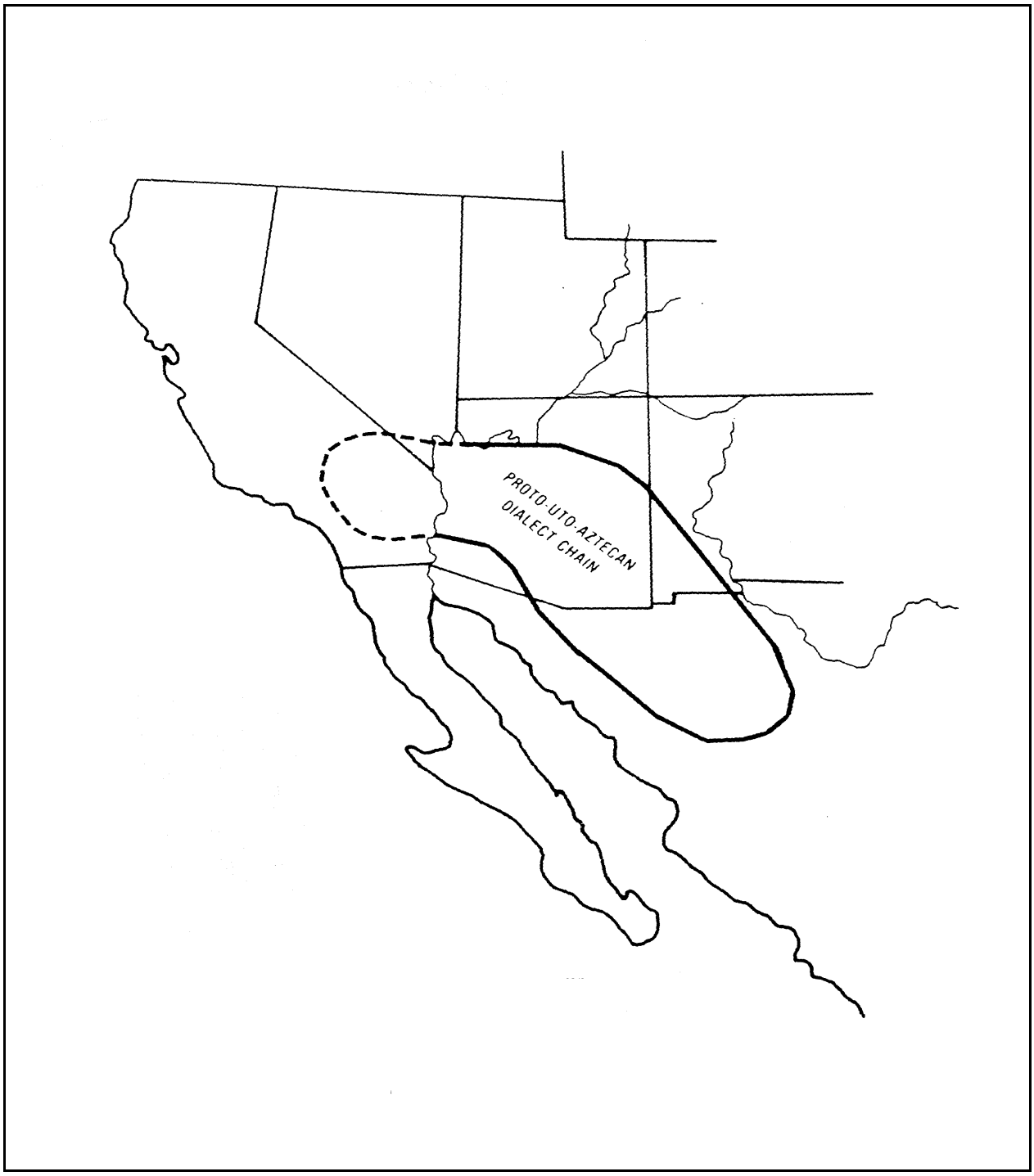


Figure 12: Desert, Lacustrine, and Horticultural Adaptations (Hill 2000)

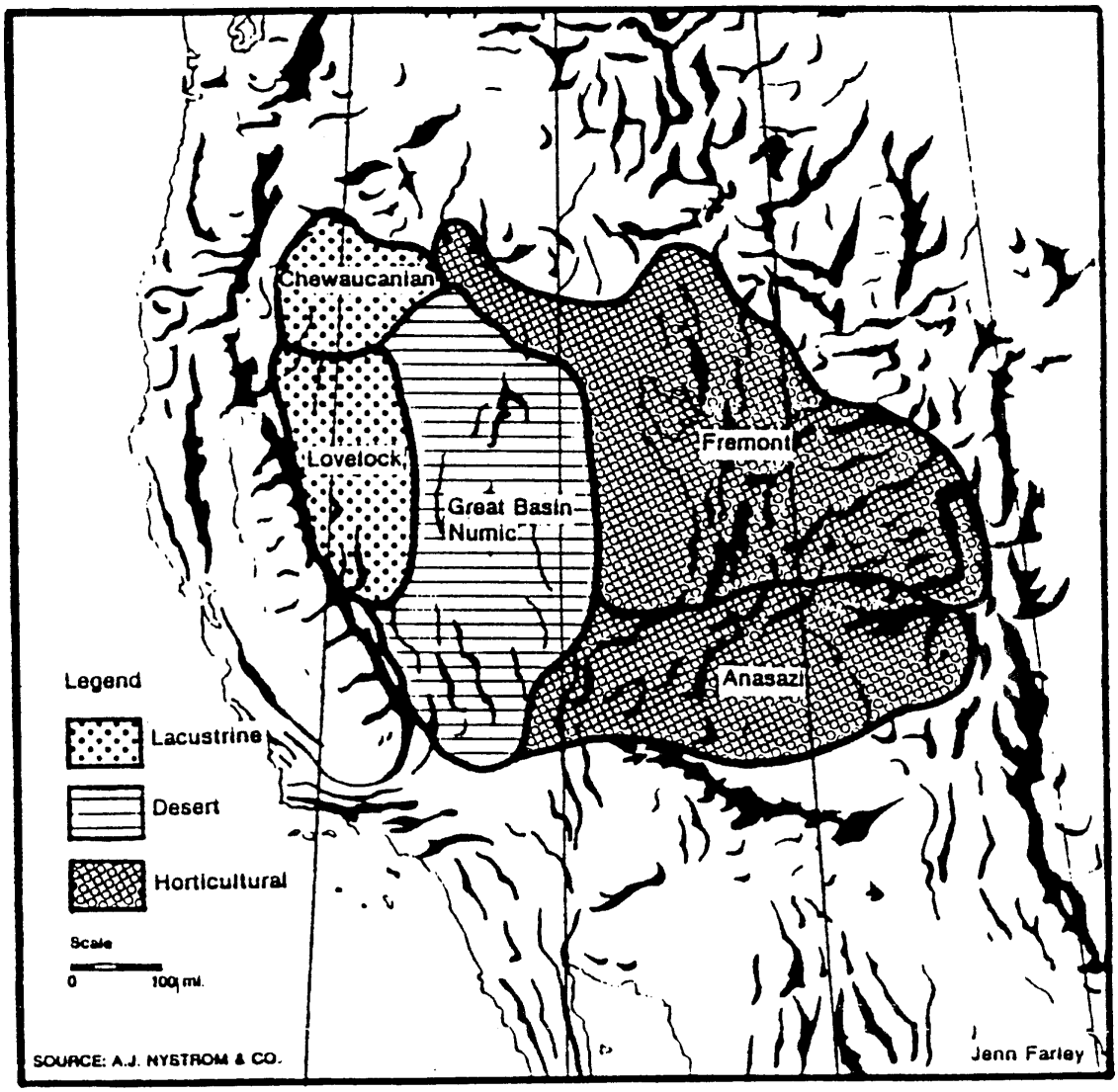
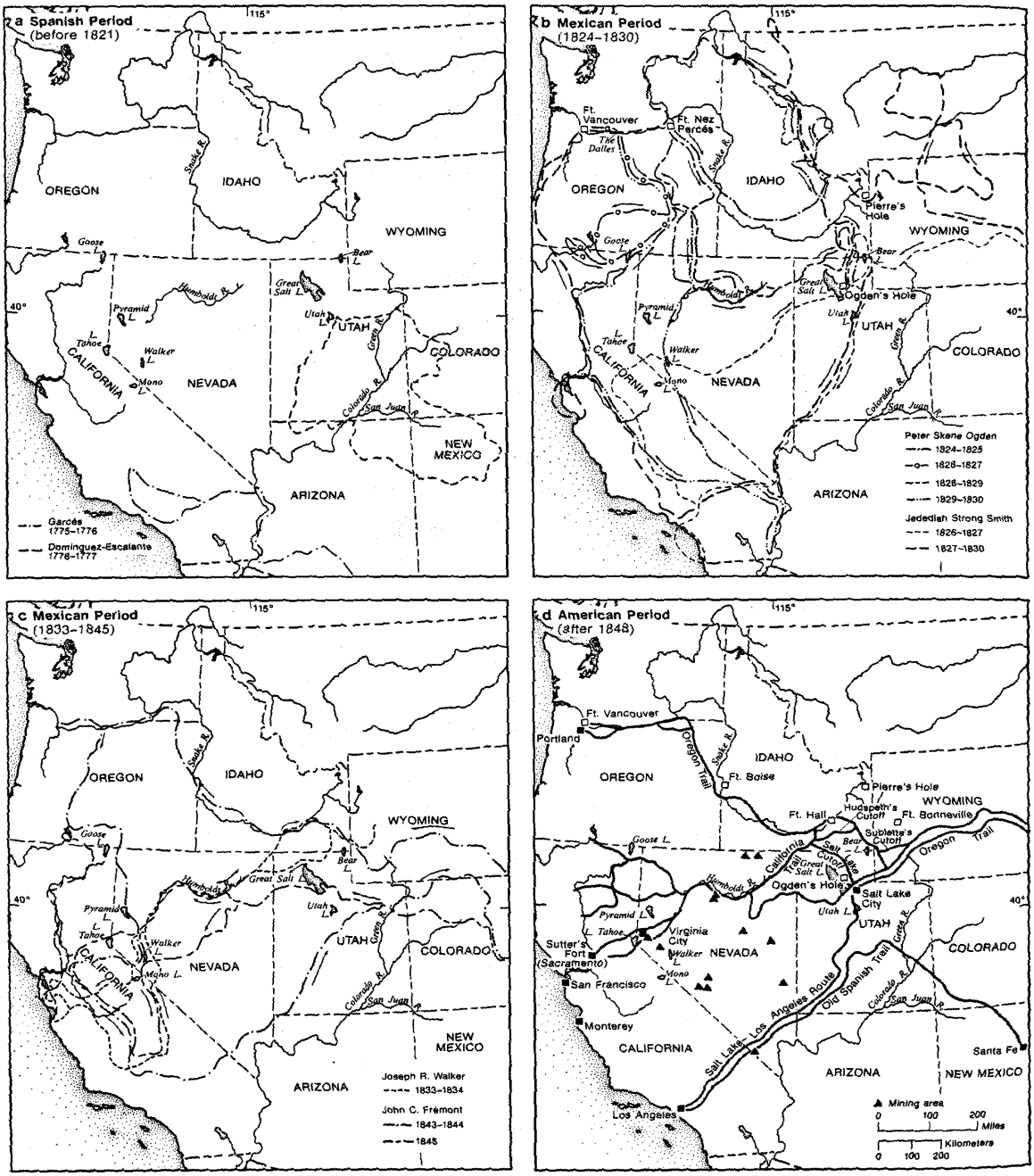


Figure 13: Early European/American Exploration (Malouf and Findlay 1986)



REFERENCES CITED: GENERAL

Adovasio, J.M.

1970 The Origin, Development, and Distribution of Western Archaic Textiles. *Tebiwa*13(2):1-40.

1986a Prehistoric Basketry. *Handbook of North American Indians* 11:194-205.

1986b Artifacts and Ethnicity: Baskets as an Indicator of Territoriality and Population Movement in the Prehistoric Great Basin. *University of Utah Anthropological Papers* 110:43-88.

Adovasio, J.M., and D.R. Pedlar

1994 A Tisket, a Tasket: Looking for the Numic Speakers through the "Lens" of a Basket. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa.* Salt Lake City: University of Utah Press, pp. 114-123.

Aikens, C.M.

1994 Adaptive Strategies and Environmental Change in the Great Basin and Its Peripheries as Determinants of the Migrations of Numic-Speaking Peoples. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa*. Salt Lake City: University of Utah Press, pp.35-43.

1998 *Uto-Aztecan Cultural Continuity and Adaptive Diversity in the Desert West of North America: Reaching into Deep Time from the Edge of History*. Ms on file at the BLM Nevada State Office, Reno, Nevada.

Barker, P.

1995 *Site Damage Assessment: Elephant Mountain Cave (NV-020-02-95-001-008)*. Report on file at the BLM Nevada State Office, Reno, Nevada.

Barker, P., and C. Pinto (Ellis)

1994 Legal and Ethnic Implications of the Numic Expansion. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa.* Salt Lake City: University of Utah Press, pp. 16-19.

Bath, J.

1977 *The Red Headed Giants of Lovelock Cave: Fact or Fiction?* Report on file at the BLM Nevada State Office, Reno, Nevada.

Bettinger, R.L.
1994 How, When, and Why Numic Spread. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa*. Salt Lake City: University of Utah Press, pp. 44-55.

Bettinger, R.L., and M.A. Baumhoff
1982 The Numic Spread: Great Basin Cultures in Competition. *American Antiquity* 47(3):485-503.

1983 Return Rates and Intensity of Resource Use in Numic and PreNumic Adaptive Strategies. *American Antiquity* 48(4):830-34.

Brooks, S.T., et al.
1988 *Osteological Analysis of the Stillwater Skeletal Series, Stillwater Marsh, Churchill County, Nevada.* USDI/FWS-Stillwater National Wildlife Refuge, Cultural Resource Series, Number 2.

Clemmer, R.O., and O.C. Stewart
1986 Treaties, Reservations, and Claims. *Handbook of North American Indians* 11:525-557.

Cline, G.G.
1988 *Exploring the Great Basin.* Reno: University of Nevada Press.

Damadio, S.
2000. *Spirit Cave Man: Biological Aspects*. Bureau of Land Management Report.

Dansie, A.
1997 Early Holocene Burials in Nevada: Overview of Localities, Research and Legal Issues. *Nevada Historical Society Quarterly* 40(1): 4-14.

Dean, P.A., and K. Heath
1990 Form and Function: Understanding Gray Pottery in the Northeastern Great Basin. *Nevada State Museum Anthropological Papers 23:19-28*.

Delacorte, M.G.
1994 *Late Prehistoric Resource Intensification in the Numic Heartland.* Great Basin Anthropological Conference Paper, on file at the BLM Nevada State Office, Reno, Nevada.

Driver, H.
1941 Culture Element Distributions, XXI: Girls' Puberty Rights in Western North America. *University of California Anthropological Records*. 6(2):21-90.

Elston, R.G.

1982 Good Times, Hard Times: Prehistoric Culture Change in the Western Great Basin. *Society for American Archaeology Papers.* Number 2:186-206.

1986 Prehistory of the Western Area. *Handbook of North American Indians* 11:135-148.

Fallon Paiute-Shoshone tribe
1999 *Memorandum in Support of repatriation of Spirit Cave Man and Associated Funerary Objects*. Report on file at the BLM Nevada State Office, Reno, Nevada.

Ferguson, T.J.
1996 *Human Remains and Associated Grave Goods From Lovelock Cave, Nevada, Final Research Report Prepared for the National Museum of the American Indian, Smithsonian Institution Department of Repatriation.* Report on file at the BLM Nevada State Office, Reno, Nevada.

Foster, M.K
1996 Language and the Culture History of North America. *Handbook of North American Indians 17:64-110.*

Fowler, C.S., Ed.
1989 Willard Z. park's Ethnographic Notes on the Northern Paiute of Western Nevada, 1933-1944, Vol. 1. *University of Utah Anthropological Papers* 114.

1992 *In the Shadow of Fox Peak: An Ethnography of the Cattail-Eater Northern Paiute People of Stillwater Marsh.* USDI/FWS-Stillwater National Wildlife Refuge, Cultural Resource Series, Number 5.

1994 Material Culture and the Numic Expansion. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa.* Salt Lake City: University of Utah Press, pp. 103-113.

Fowler, C.S. and L. Dawson
1986 Ethnographic Basketry. *Handbook of North American Indians* 11:746-823.

Fowler, C.S., et al.
1997 *Plaited Matting from Spirit Cave, NV: Technical Implications*. Paper presented at the SAA annual Meeting, on file at the BLM Nevada State Office, Reno, Nevada.

2000 *Ancient Matting from Spirit cave, NV: Technical Implications*. Revision of a paper presented at the 1997 SAA annual Meeting, on file at the BLM Nevada State Office, Reno, Nevada.

Fowler, C.S., and S. Liljeblad
1986 Northern Paiute. *Handbook of North American Indians* 11:435-465.

Fowler, D.D.
1986 History of Research. *Handbook of North American Indians* 11:15-30.

Fowler, D.D. and C.S. Fowler
1971 Anthropology of the Numa: John Wesley Powell's Manuscripts on the Numic Peoples of Western North America, 1868 - 1880. *Smithsonian Contributions to Anthropology* 14.

Goodman, A.H., and D.L. Martin
1999 *Biological Analysis of the Spirit Cave Human Remains (AHUR 2064): Implications for Cultural Affiliation.* Report on file at the BLM Nevada State Office, Reno, Nevada.

Goss, J.A.
1977 Linguistic Tools for the Great Basin Prehistorian. *Desert Research Institute Publications in the Social Sciences*12:49-70.

1999 *Fallon Paiute Shoshone Tribe: Repatriation of the Spirit Cave Mummy and Associated Artifacts*. Report on file at the BLM Nevada State Office, Reno, Nevada.

Grayson, D.K.
1993 *The Desert's Past: A Natural Prehistory of the Great Basin.* Washington DC: Smithsonian Institution Press.

1999 *An Archaeological Perspective on the Spirit Cave Remains.* Report on file at the BLM Nevada State Office, Reno, Nevada.

Hattori, E.
1982 *The Archaeology of Falcon Hill, Winnemucca Lake, Washoe County, Nevada*. Nevada State Museum Anthropological Papers, Number 18.

Hill, J.H.
2000 *Why is Uto-Aztecan So Big?*. Paper on file at the BLM Nevada State Office, Reno, Nevada.

Holmer, R.N., and D.G. Weder
1980 Common Post-Archaic Projectile Points of the Fremont Area. *Utah State Historical Society Antiquities Section Selected Papers* 7:55-68.

Holmer, R.N., and B.L. Ringe
1986 Excavations at Wahmuza. In R.N. Holmer, Ed., *Shoshone-Bannock Culture History*. Swanson-Crabtree Anthropological research Laboratory. Reports of Investigations 85-16:39-203.

Hopkins, S.W.H. (Sarah Winnemucca)
1883 *Life Among the Paiute: Their Wrongs and Claims*. (Reprint: Chalfant Press, Bishop, California, 1969).

Hultzkrantz, A.
1986 Mythology and Religious Concepts. *Handbook of North American Indians* 11: 630-640.

1951 The Concepts of the Soul Held by the Wind River Shoshone. *Ethnos* 16(1-2): 18-44.

Inter-Tribal Council of Nevada
1976 *Numa: A Northern Paiute History*. Reno: Inter-Tribal Council of Nevada.

Janestski, J.C.
1990 Ethnicity and Post-Formative Ceramics in the Eastern Great Basin. *Nevada State Museum Anthropological Papers 23:54-66*

Jantz, R.L., and D.W. Owsley
1997 Pathology, Taphonomy, and Cranial Morphometrics of the Spirit Cave Mummy. *Nevada Historical Society Quarterly* 40(1): 62-84.

Johnson, E.C.
1975 *Walker River Paiute: A Tribal History*. Schurz, Nevada: Walker River Paiute Tribe. (Reprint 1978).

Jorgensen, J.G.
1994 Synchronic Relations among Environment, Language, and Culture as Clues to the Numic Expansion. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human*

Population Movement and the Expansion of the Numa. Salt Lake City: University of Utah Press, pp. 84-102.

Kelly, R.L.
1995 Hunter Gatherer Lifeways in the Carson Desert: A Context for Bioarchaeology. In C.S. Larsen and R.L. Kelly, Eds. *Bioarchaeology of the Stillwater Marsh: Prehistoric Human Adaptation in the Western Great Basin.* American Museum of Natural History, Anthropological Papers 77:12-32.

Kobori, L.S.
1981 Human Skeletal Remains from the Carson-Humboldt Sinks. In J. A. Bard, et al., Eds. *A Cultural Resources Overview of the Carson and Humboldt Sinks, Nevada*. BLM, Nevada Cultural resources Series 2:188-195.

Kirner, D.L., et al.
1997 Dating the Spirit Cave Mummy: The Value of Reexamination. *Nevada Historical Society Quarterly* 40(1): 54-56.

Lamb, S.
1958 Linguistic Prehistory in the Great Basin. *International Journal of American Linguistics*24(2):95-100.

1964 The Classification of Uto-Aztecan Languages: A Historical Survey. *Studies in California Linguistics*34:106-125.

Larsen, C.S.
1995 Prehistoric Human Biology of the Carson Desert: A Bioarchaeological Investigation of a Hunter-Gatherer Lifeway. In C.S. Larsen and R.L. Kelly, Eds. *Bioarchaeology of the Stillwater Marsh: Prehistoric Human Adaptation in the Western Great Basin.* American Museum of Natural History, Anthropological Papers 77:33-40.

Liljeblad, S.
1986 Oral Tradition: Content and Style of Verbal Arts. *Handbook of North American Indians* 11: 641-659.

Loud, L.L., and M.R. Harrington
1929 Lovelock Cave. *University of California Publications in American Archaeology and Ethnology* 25 (1):1-183.

Lowie, R.
1909 The Northern Shoshone. *Anthropological Papers of the American Museum of Natural History* 2 (2): 165-306. New York

1924 Notes on Shoshonean Ethnography. *American Museum of Natural History Anthropological Papers* 20(3).

Madsen, D.B.
1986 Prehistoric ceramics. *Handbook of North American Indians* 11: 206-214.

Madsen, D.B., and D. Rhode
1994 Where Are We?. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa.* Salt Lake City: University of Utah Press, pp. 213-222.

Malouf, C.
1966 Ethnohistory of the Great Basin. The Current Status of Anthropological Research in the Great Basin. Warren D'Azevedo, et al., Eds. *University of Nevada, Reno. Desert Research Institute Publications.* Number 1.

Malouf, C., and J. Findlay
1986 Euro-American Impacts Before 1870. *Handbook of North American Indians* 11:499-516.

Mehringer, P.J., Jr.
1986 Prehistoric Environments. *Handbook of North American Indians* 11:135-148.

Miller, W.R.
1986 Numic Languages. *Handbook of North American Indians* 11:98-107.

Nevada State Museum (NSM)
1996 *NAGPRA Inventory Report for BLM Lands in Nevada.* Report on file at the BLM Nevada State office, Reno, Nevada.

Owsley, D.W.
1997 *Laboratory Notes*. On file at the BLM Nevada State Office, Reno, Nevada.

Rozaire, C.E.
1969 The Chronology of Woven Materials from the Caves at Falcon Hill, Washoe County, Nevada. *Nevada State Museum Anthropological Papers* 14:182-186

1974 Analysis of Woven Materials from Seven Caves in the Lake Winnemucca Area, Pershing County, Nevada. Nevada State Museum Anthropology Papers 16:60-97.

Sapir, E.
1916 Time Perspective in Aboriginal American Culture: A Study in Method. *Canada Geological Survey Memoir* 90.

Simms, S.R.
1990 Fremont Transitions. *Utah Archaeology 1990* 3:1-19.

Sprague, R.
1999 *Great Basin Burial Pattern Change.* Report on file at the BLM Nevada State Office, Reno, Nevada.

Steward, J.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin*. Number 120.

Stewart, O.
1939 The Northern Paiute Bands. *University of California Anthropological Records* 2(3):127-49.

1941 Northern Paiute. Culture Element Distribution 14. *University of California Anthropological Records* 4(3):361-446.

1942 Ute-Southern Paiute. Culture Element Distributions 18. *University of California Anthropological Records* 6(4):231-356.

Sutton, M.Q., and D. Rhode
1994 Background to the Numic Problem. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa*. Salt Lake City: University of Utah Press, pp. 6-15.

Thomas, D.H.
1973 An Empirical Test for Steward's Model of Great Basin Settlement Patterns. *American Antiquity* 38(2):155-176.

1982 An Overview of Central Great Basin Prehistory. *Society for American Archaeology Papers.* Number 2:156-171.

1994 Chronology and the Numic Expansion. In D.B. Madsen and D. Rhode, Eds. *Across the West: Human Population Movement and the Expansion of the Numa.* Salt Lake City: University of Utah Press, pp. 56-62.

Tuohy, D.R., and A. Dansie

1997 New Information Regarding Early Holocene Manifestations in the Western Great Basin. *Nevada Historical Society Quarterly* 40(1):24-53.

Webb, H.E., Jr

1973 Preface. In N.A. Ross, Comp/Ed. *Index to the Expert Testimony Before the Indian Claims Commission: The Written Reports*. New York: Clearwater Publishing.

Wheeler, S.N., and G.N. Wheeler

1940 Field Notes. On file at the BLM Nevada State Office, Reno, Nevada.

1969 Cave Burials Near Fallon, Churchill County, Nevada. *Nevada State Museum Anthropological Papers* 14:70-78.

Young, D.A., and R.L. Bettinger

1992 The Numic Spread: A Computer Simulation. *American Antiquity* 57(1):85-99.

REFERENCES CITED: BIOLOGICAL

Albrecht, G.
1992. Assessing the affinities of fossils using canonical variates and generalized distances. *Human Evolution* 7:49-69.

Anderson, S., A. Bankier, B. Barrell, M. de Bruijn, A. Coulson, J. Drouin, I. Eperon, D. Nierlich, B. Roe, F. Sanger, P. Schreier, A. Smith, R. Staden, and I. Young.
1981. Sequence and organization of the human mitochondrial genome. *Nature* 290:457-465.

Anderson, D., and J. Gillam.
2000. Paleoindian colonization of the Americas: Implications from an examination of physiography, demography, and artifact distribution. *American Antiquity* 65:43-66.

Andrews, D.
1994. Molecular approaches to the isolation and analysis of ancient nucleic acids. In: *Method and Theory for Investigating the Peopling of the Americas*, R. Bonnichsen and D.G. Steele, editors, pp. 165-175. Center for the Study of the First Americans, Corvallis.

Avise, J., J. Neigel, and J. Arnold.
1984. Demographic influences on mitochondrial DNA lineage survivorship in animal populations. *Journal of Molecular Evolution* 20:99-105.

Bailliet, G., F. Rothhammer, F. Carnese, C. Bravi, and N. Bianchi.
1994. Founder mitochondrial haplotypes in Amerindian populations. *American Journal of Human Genetics* 54:27-33.

Bettinger, R.
1999. Faces in Prehistory, Great Basin Wetlands populations. In: *Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors, pp. 321-332. Univ Utah Press, Salt Lake City.

Bonatto, S., and F. Salzano.
1997. Diversity and age of the four major mtDNA haplogroups, and their implications for the peopling of the New World. *American Journal of Human Genetics* 61:1413-1423.

Borja, C., M. Garcia-Pacheco, E. Olivares, G. Scheuenstuhl and J. Lownstein.
1997. Immunospecificity of albumin detected in 1.6 million-year-old fossils from Venta Micena in Orce, Granada, Spain. *American Journal of Physical Anthropology* 103:433-441.

Brace, C., and K. Hunt.
1990. A nonracial craniofacial perspective on human variation: A(ustralia) to Z(uni). *American Journal of Physical Anthropology* 82:341-360.

Brooks, S., and R. Brooks.
1990. Who were the Stillwater Marsh People? *Halcyon* 12:63-74.

Brooks, S., and R. Brooks.
1979. Pyramid Lake in situ burial analysis. In: *Excavations at Marble Bluff Dam and Pyramid Lake Fishway Nevada*, D. Tuohy and D. Clark editors, pp. 449-460. U.S. Bureau of Reclamation Contract Report, Contract #C2520.

Brooks, S., M. Haldeman, and R. Brooks.
1988. *Osteological Analyses of the Stillwater Skeletal Series, Stillwater Marsh, Churchill County, Nevada*. US Fish Wildlife Svc, Reg 1, Cult Res Ser 2.

Brooks, S., R. Brooks and D. France.
1990. Alveolar prognathism contour, an aspect of racial identification. In: *Skeletal Attribution of Race*, G. Gill and S. Rhine, editors, pp. 41-46. Anthropol Papers 4, University of New Mexico, Maxwell Museum of Anthropology, Albuquerque.

Brooks, S., M. Galliher, and R. Brooks.
1977. A proposed model for paleodemography and archaeology in the Great Basin. In: *Models and Great Basin Prehistory: A Symposium*, D. Fowler, editor. Desert Research Institute Publications in the Social Sciences, 12:169-194, Reno.

Brown, T., and K. Brown.
1994. Ancient DNA: Using molecular biology to explore the past. *Biological Essays* 16:719-726.

Brown, M., S. Hosseini, A. Torroni, H. Bandelt, J. Allen, T. Schurr, R. Scozzari, F. Cruciani, and D. Wallace.
1998. mtDNA haplogroup X: An ancient link between Europe, western Asia and North America? *American Journal of Human Genetics* 63:1852-1861.

Brues, A.
1990. The once and future diagnosis of race. In: *Skeletal Attribution of Race,* G. Gill and S. Rhine, editors, pp. 1-8. Anthropol Papers 4, University of New Mexico, Maxwell Museum of Anthropology, Albuquerque.

Conroy, G.
1997. What do the Molecules say? All about "Eve." In: *Reconstructing Human Origins: A Modern Synthesis*, WW Norton & Co., New York.

Crawford, M.
1998. *The Origins of Native Americans: Evidence from Anthropological Genetics*. Cambridge U Press, United Kingdom.

Damadio, S.
2000. *Spirit Cave Man: Biological Aspects*. Bureau of Land Management Report.

Dansie, A.
1997. Early Holocene burials in Nevada. *Nevada Historical Society Quarterly* 40:4-14.

Dansie, A.
1997. Note on textiles associated with the Spirit Cave Mummy. *Nevada Historical Society Quarterly* 40:17-18.

Dansie, A.
1974. An eagle watches over her. *Nevada Archaeologist* 2:10-13.

Darroch, J., and J. Mosimann.
1985. Canonical and principal components of shape. *Biometrika* 72:241-252.

DiZinno, J.
1997. Informal report to Douglas Owsley.

Dongoske, K.
1996. The Native American Graves Protection and Repatriation Act:A new beginning, not the end, for osteological analysis-a Hopi perspective. *American Indian Quarterly* 20:287-296.

Easton, R., D. Merriwether, D. Crews and R. Ferrell.
1996. MtDNA variation in the Yanomami: Evidence for additional New World founding lineages. *American Journal on Human Genetics* 59:213-225.

Edgar, H.
1997. Paleopathology of the Wizards Beach Man (AHUR 2023) and the Spirit Cave Mummy (AHUR 2064). *Nevada Historical Society Quarterly* 40:57-61.

Edgar, H.
1996. Data recording forms, AHUR 2064, January 18, 1996.

Ferguson, T.

1996. *Human Remains and Associated Grave Goods From Lovelock Cave, Nevada*. Final Research Report, submitted to Dept Repatriation, National Museum of the American Indian, Smithsonian Institute.

Forster, P., R. Harding, A. Torroni and H. Bandelt.
1996. Origin and Evolution of Native American mtDNA Variation: A Reappraisal. *American Journal of Human Genetics* 59:935-945.

Galliher, M.
1978. Anthropometry and Paleodemography of Selected Great Basin Sites. MA thesis, University of Nevada, Las Vegas.

Gifford, E.
1926. California Anthropometry. *University of California Publications in American Archaeology and Ethnology 2* 22:217-390. Berkeley.

Gill, G.
1998. Spirit Cave Skeleton: General Observations. Wizard's Beach Skeleton: General Observations. Note to Nevada State Museum.

Gill, G.
1998. Craniofacial criteria in the skeletal attribution of race. In: *Forensic Osteology: Advances in the Identification of Human Remains*, K. Reichs editor, pp. 293-317. Second edition: C. Thomas, Springfield.

Gill, G.
1984. A forensic test case for a new method of geographical race determination. In: *Human Identification: Case Studies in Forensic Anthropology,* T. Rathbun and J. Buikstra, editors, pp. 329-339. Charles C. Thomas, Springfield, IL.

Gill, G., and S. Rhine.
1990. *Skeletal Attribution of Race*. Anthropological Papers 4. University of New Mexico, Maxwell Museum of Anthropology, Albuquerque

Goodman, A., and D. Martin.
1999. *Biological Analysis of the Spirit Cave Human Remains (AHUR 2064): Implications for Cultural Affiliation*. Report submitted to BLM by Fallon Paiute-Shoshone Tribe.

Haas, J., J. Buikstra and D. Ubelaker.
1994. *Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History*. Arkansas Archaeological Survey.

Hagelberg, E.
1994. Mitochondrial DNA from Ancient Bones. In: *Ancient DNA*. B. Herrmann and S. Hummel, editors, pp.195-204. Springer-Verlag, New York.

Hagelberg, E., L. Bell, T. Allen, A. Boyde, S. Jones and J. Clegg.
1991. Analysis of ancient bone DNA: Techniques and applications. *Philosophical Transactions of the Royal Society of London*, Series B, 333:399-407.

Hagelberg, E. and J. Clegg.
1993. Genetic polymorphisms in prehistoric Pacific islanders determined by analysis of ancient bone DNA. *Proceeding of the Royal Society of London*, B, 252:163-170.

Hagelberg, E., and J. Clegg.
1991. Isolation and characterization of DNA from archeological bone. *Proceeding of the Royal Society of London*, B, 244:45-50.

Handt, O., M. Hoss, M. Krings and S. Paabo.
1994. Ancient DNA: Methodological challenges. *Experientia* 50:524-529.

Handt, O., M. Krings, R. Ward and S. Paabo.
1996. The retrieval of ancient human DNA sequences. *American Journal of Human Genetics* 59:368-376.

Hardesty, D.
1969. A salvaged burial from Fallon. *Nevada Archaeologist Survey Reporter* 3:10.

Hattori, E., L. Armentrout, C. Larsen and D. Hutchinson.
1987. *An Ethnohistoric Infant Burial from Western Nevada*, BLM Nevada, Contrib Study of Cultural Resources, Tech Rep 16.

Heizer, R.
1951. Preliminary report on the Leonard Rockshelter Site, Pershing County, Nevada. *American Antiquity* 17:89-98.

Hemphill, B.
1999. Wear and tear: Osteoarthritis as an indicator of mobility among Great Basin hunter-gatherers. In: *Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors, pp. 241-289. University of Utah Press, Salt Lake City.

Hemphill, B., and C. Larsen.
1999. Bioarchaeological perspectives on precontact lifeways in the Great Basin wetlands. In: *Prehistoric Lifeways in the Great Basin Wetlands*. B. Hemphill and C. Larsen, editors, pp.1-7. Univ Utah Press, Salt Lake City.

Herrmann, B., and S. Hummel.
1994. *Ancient DNA*. Springer-Verlag, New York.

Heyer, E.
1995. Mitochondrial and nuclear genetic contribution of female founders to a contemporary population in northeast Quebec. *American Journal of Human Genetics* 56:1450-1455.

Hicks, J.
1977. *Microscopy of Hairs: A Practical Guide and Manual*. FBI Laboratory Technical Supplement Issue 2, Washington, D.C.

Holliday, T.
1997. Body proportions in Late Pleistocene Europe and modern human origins. *Journal of Human Evolution* 32:423-448.

Horai, S., R. Kondo, Y. Nakagawa-Hattori, S. Hayashi, S. Sonoda, and K. Tajima.
1993. Peopling of the Americas, founded by four major lineages of the mitochondrial DNA. *Molecular Biology and Evolution* 10:23-47.

Hoss, M.
2000. Ancient DNA: Neanderthal population genetics. *Nature* 404:453-454.

Howells, W.
1989. *Skull shapes and the map. Craniometric analysis in the dispersion of modern Homo*. Papers Peabody Mus Archeology Ethnol. Harvard University Press, Cambridge.

Howells, W.
1973. *Cranial variation in man: A study of multivariate analysis of patterns of difference among recent human populations*. Papers Peabody Museum Archeology Ethnol. Harvard University Press, Cambridge.

Howells, W.

1969. The use of multivariate techniques in the study of skeletal populations. *American Journal of Physical Anthropology* 31:311-314.

Jantz R., and D. Owsley.
In press. Variation among early North American crania. *American Journal of Physical Anthropology.*

Jantz, R., and D. Owsley.
1998. How many populations of early North Americans were there? *American Journal of Physical Anthropology,* Suppl 26:128.

Jantz, R., and D. Owsley.
1997. Pathology, Taphonomy, and Cranial Morphometrics of the Spirit Cave Mummy. *Nevada Historical Society Quarterly* 40:62-84.

Johnston, F., B. Blumberg, S. Agarwal, L. Melartin and T. Burch.
1969. Alloalbuminemia in Southwestern U.S. Indians: Polymorphisms of albumin Naskapi and albumin Mexico. *Human Biology* 41:263-270.

Johnston, F., and L. Schell.
1979. Anthropometric Variation of Native American Children and Adults. In: *The First Americans: Origins, Affinities, and Adaptations*. W. Laughlin and A. Harper, editors, pp. 276-290. Gustav Fischer, New York.

Kaestle, F.
1999. *Comment on the Repatriation of the "Spirit Cave Man."* Report submitted to BLM by Fallon Paiute-Shoshone Tribe.

Kaestle, F.
1998. Molecular Evidence for Prehistoric Native American Population Movement: The Numic Expansion. Unpublished dissertation, U Calif, Davis.

Kaestle, F.
1997. Molecular analysis of ancient Native American DNA from Western Nevada. *Nevada Historical Society Quarterly* 40:85-96.

Kaestle, F.
1995. Mitochondrial DNA Evidence for the Identity of the Descendants of the Prehistoric Stillwater Marsh Population. In: *Anthropological Papers, American Museum of Natural History*. Bioarchaeology of Stillwater Marsh. C. Larsen and R. Kelley, editors. 77:73-80.

Kaestle, F., J. Lorenz and D. Smith.

1999. Molecular Genetics and the Numic Expansion: A Molecular Investigation of the Prehistoric Inhabitants of Stillwater Marsh. In: *Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors, pp. 167-183. Univ of Utah Press, Salt Lake City.

Kelley, M., and C. Larsen.
1991. *Advances in Dental Anthropology*. Wiley-Liss:New York.

Kennedy, K.
1959. *The Aboriginal Population of the Great Basin*. Reports of the University of California Archaeological Survey 45, Berkeley.

Kirner, D., R. Burky, K. Selsor, D. George, R. Taylor and J. Southon.
1997. Dating the Spirit Cave Mummy. *Nevada Historical Society Quarterly* 40:54-56.

Kirner, D., R. Burky, R. Taylor, D. Tuohy and A. Dansie.
1996. AMS radio carbon dates from Spirit Cave, Nevada: Implications for Early Holocene occupation of western Great Basin. Paper presented, Society for American Archaeology Meeting.

Klein, R.
1999. Genetic evidence for modern human origins. In: *The Human Career: Human Biological and Cultural Origins*, Second edition, pp. 505-511. Univ Chicago Press, Chicago.

Kobori, L., R. Miller, C. Stevens, M. Galliher, S. Brooks, and D. Morris.
1980. Great Basin occurrence of a Southwestern dental trait: Uto-Aztecan premolar. *Nevada Historical Society Quarterly* 23:236-245.

Kobori, L.
1981. Human skeletal remains from the Carson-Humboldt Sinks. In: *A cultural resources overview of the Carson and Humboldt Sinks*, *Nevada.* J. Bard, C. Busby and J. Findlay, 188-95. U.S. Department of Interior Bureau of Land Management Cultural Resource Series 2. Basin Research Associates, Berkeley.

Kolman, C., and N. Tuross.
2000. Ancient DNA Analysis of Human Populations. *American Journal of Physical Anthropology* 111:5-23.

Labuda, D., E. Marini, V. Succa, G. Vona, and A. Torroni.
1997. MtDNA and Y chromosome-specific polymorphisms in modern Ojibwa: Implications about the origin of their gene pool. *American Journal of Human Genetics* 60:241-44.

Lahr, M.
1995. Patterns of modern human diversification: Implications for Amerindian origins. *Yearbook of Physical Anthropol*ogy 38:163-198.

Lahren, C.
1997. Report letter on hair sample 2064 to Dr. Doug Owsley, January 23, 1997.

Larsen, C.
1997. *Bioarchaeology: Interpreting Behavior from the Human Skeleton*. Cambridge Univ Press.

Larsen, C.
1985. Human Remains From the Carson Sink. In: *The Archaeology of Hidden Cave, Nevada,* D. Thomas, editor. Anthropological Papers, American Museum of Natural History 61:395-409.

Larsen, C.
1985. Human Remains From Hidden Cave. In: *The Archaeology of Hidden Cave, Nevada*, D. Thomas, editor. Anthropological Papers, American Museum of Natural History 61:179-182.

Larsen, C.
1985. Dental modifications and tool use in the Western Great Basin. *American Journal of Physical Anthropology*. 67:393-402.

Larsen, C., and D. Hutchinson.
1999. Osteopathology of Carson Desert Foragers. *In Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors, pp. 184-202. Univ of Utah Press, Salt Lake City.

Larsen, C., R. Kelley, C. Ruff, M. Schoeniger and D. Hutchinson.
1996. Bio-behavorial adaptation in the Western Great Basin. In: *Case Studies in Environmental Archaeology (Interdisciplinary Contributions to Archaeology)* E. Reitz, L. Newsom and S. Scudder editors, pp. 149-174. Plenum Publish, NY.

Larsen, C., C. Ruff and R Kelley.
1995. Structural analysis of the Stillwater postcranial human remains: Behavioral implications of articular joint pathology and long bone diaphyseal morphology. In: *Bioarchaeology of*

Stillwater Marsh. C. Larsen and R. Kelley editors. Anthropological Papers, American Museum of Natural History 77:107-133.

Larsen, C., K. Russel and F. Hutchinson.
1995. The Human Skeletal Field Survey. In: *Bioarchaeology of Stillwater Marsh,* C. Larsen and R. Kelley editors. Anthropological Papers, American Museum of Natural History 77:41-67.

Leavitt, C.
1974. The physical anthropology of an aboriginal burial from Goodsprings, Nevada. *Nevada Archaeologist* 2:19-22.

Lindah, T.
1993. Instability and decay of the primary structure of DNA. *Nature* 362:709-15.

Lorenz, J., and D. Smith.
1994. Distribution of the 9-bp mitochondrial DNA region V deletion among North American Indians. *Human Biology* 66:777-88.

Lorenz, J., and D. Smith.
1996. Distribution of four founding mtDNA Haplogroups among Native North Americans. *American Journal of Physical Anthropology* 101:307-323.

Loud, L., and M. Harrington.
1929. Lovelock Cave. *University of California Publications in American Archaeology and Ethnology 2* 25.

Loveland, C.
1991. Osteological analysis of Great Salt Lake skeletons. In: *Prehistoric human skeletal remains and the prehistory of the Great Salt Lake wetlands*. S. Simms, C. Loveland and M. Stuart, editors, pp. 62-80. Utah State Univ Contrib Anthropol 6, Logan, UT.

Mayhall, J.
1992. Techniques for the Study of Dental Morphology. In: *Skeletal Biology of Past Peoples: Research Methods*, S. Saunders and M. Katzenberg, editors, pp. 59-78. Wiley-Liss, New York.

Merriwether, D., F. Rothhammer and R. Ferrell.
1995. Distribution of the four founding lineage haplotypes in Native Americans suggests a single wave of migration for the New World. *American Journal of Physical Anthropology* 98:411-430.

Milner, G., and C. Larsen.

1991. Teeth as artifacts of human behavior: Intentional mutilation and accidental modification. In: *Advances in Dental Anthropology*, M. Kelley and C. Larsen, editors, pp.357-378. Wiley-Liss, New York.

Molleson, T.
1994. The eloquent bones of Abu-Hureya. *Scientific American* 271:70-75.

Morbeck, M.
1970. Description of skeletal material found in Lovelock Cave (NV-Ch-18) in 1969. In: *Archaeological Investigations in Lovelock Cave, Nevada*. R. Heizer and L.Napton, Contrib U Calif Archaeol Res Facility 10:191-197.

Neves, W., and M. Blum.
2000. The Buhl burial: A comment on Green et al. *American Antiquity* 65:191-193.

O'Rourke, D., S. Carlyle and R. Parr.
1996. Ancient DNA: Methods, progress, and perspectives. *American Journal on Human Biology* 8:557-71.

O'Rourke, D., S. Carlyle and R. Parr.
1999. Molecular Genetic Variation in Prehistoric Inhabitants of the Eastern Great Basin pp. 84-102. In: *Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors. University of Utah Press, Salt Lake City.

O'Rourke, D., S. Carlyle and R. Parr.
1997. Ancient DNA analysis in the Eastern Great Basin: Northern Utah Fremont and their neighbors. *American Journal of Physical Anthropology Suppl* 24:181.

Orr, P., and R. Berger.
1965. Radiocarbon age of a Nevada mummy. *Science* 148:1466-67.

Ossenberg, N.
1994. Origins and affinities of the Native Peoples of Northwestern North America: The evidence of cranial nonmetric traits. In: *Method and Theory for Investigating the Peopling of the Americas*. R. Bonnichsen and D. Steele, editors, pp. 79-115. Center for the Study of the First Americans, Corvallis.

Ovchinnikov, I., A. Gotherstrom, G. Romanova, V. Kharitonov, K. Liden and W. Goodwin.
2000. Molecular analysis of Neanderthal DNA from the northern Caucasus. *Nature* 404:490-493.

Owsley, D.
1996. Lab notes, 1996 at Nevada State Mus.

Owsley, D., and R. Jantz.
1999. Nearsightedness in Paleoamerican research: Historical perspective and contemporary analysis. Paper, Clovis and Beyond Conference, Sante Fe, New Mexico, Oct 29-30 1999.

Owsley D., and R. Jantz.
1999. Databases for Paleoamerican skeletal biology research. In: *Who Were the First Americans*. R. Bonnischsen, editor, pp. 79-96. Center for the Study of the First Americans, Oregon State University, Corvallis, OR.

Ozolins, E.
1999. Are Paleoindians too variable to be from one population: A test of a single migration origin. *American Journal of Physical Anthropology Suppl* 28:216.

Ozolins, E., V. Stefan, M. Rhoads and J. Powell.
1997. Craniofacial morphometric similarity between modern and late Pleistocene human populations. *American Journal of Physical Anthropology Suppl* 24:182-183.

Paabo, S.
1987. Molecular genetic methods in archaeology: A prospect. *Anthropologischer Anzeiger* 45:9-17.

Paabo, S.
1986. *Molecular genetic investigations of ancient human remains*. Cold Spring Harbor Symposia on Quantitative Biology, 51:441-446. Plainview, New York.

Paabo, S., J. Gifford and A. Wilson.
1988. *Mitochondrial DNA sequences from a 7,000-year-old brain*. Nucleic Acids Research 16:9775-9787.

Parr, R., S. Carlyle and D. O'Rourke.
1996. Ancient DNA Analysis of Fremont Amerindians of the Great Salt Lake Wetlands. *American Journal of Physical Anthropology* 99:507-518.

Pendleton, L., A. McLane and D. Thomas.
1982. *Cultural Resource Overview, Carson City District, West Central Nevada*. Cultural Resources Series Monograph 5.

Powell, J.
1999. New craniofacial and dental perspectives on Native American origins. *American Journal of Physical Anthropology Supp* 28:224-225.

Powell, J.
1993. Dental evidence for the peopling of the New World: Some methodological considerations. *Human Biology* 65:799-819.

Powell, J., and W. Neves.
1999. Craniofacial morphology of the First Americans: Pattern and process in the peopling of the New World. *American Journal of Physical Anthropology Yearbook* 42:153-188.

Powell, J., and W. Neves.
1998. Dental diversity of early New World populations: Taking a bite our of the tripartite model. *American Journal of Physical Anthropology* Suppl 26:179-180.

Powell, J., and J. Rose.
2000. Report on the Osteological assessment of the "Kennewick Man" skeleton (CENWW.97.Kennewick). In: *Report on the Non-destructive Examination, Description, and Analysis of the Human Remains from Columbia Park, Kennewick, Washington* (Oct. 1999). Report submitted to US Department of the Interior and the Department of Justice.

Powell, J., and D. Steele.
1992. *A multivariate craniometric analysis of North American Paleoindian remains*. Current Research in the Pleistocene 9:59-62.

Reed, E.
1967. *An unusual human skull from near Lovelock, Nevada*. Anthropological Papers, University of Utah 89, Misc Paper 18:63-70.

Reichlen, P., and R. Heizer.
1966. *The Ophir skull from Virginia City, Nevada*. University of California Archaeological Survey Report 66:85-99.

Relethford, J.
1998. Mitochondrial DNA and ancient population growth. *American Journal of Physical Anthropology* 105:1-7.

Relethford, J., and H. Harpending.
1994. Craniometric variation, genetic theory and modern human origins. *American Journal of Physical Anthropology* 95:249-270.

Rhine, S.

1990. Non-metric skull racing. In: *Skeletal Attribution of Race*, G. Gill and S. Rhine, editors, pp. 9-20. Anthropol Papers 4, University of New Mexico, Maxwell Museum of Anthropology, Albuquerque.

Rogan, P., and J. Salvo.
1994. High-fidelity amplification of ribosomal gene sequences from South American Mummies. In: *Ancient DNA*. B. Herrmann and S. Hummel, editors. Springer-Verlag, New York.

Romney, A.
1957. The Genetic Model and Uto-Aztecan Time Perspective. *Davidson Journal of Anthropology* 3:35-41.

Ruff, C.
1999. Skeletal structure and behavioral pattern of prehistoric Great Basin populations. In: *Prehistoric Lifeways in the Great Basin Wetlands*, B. Hemphill and C. Larsen, editors, pp. 290-320. University of Utah Press, Salt Lake City, UT.

Sauer, N.
1992. Forensic anthropology and the concept of race: If races don't exist, why are forensic anthropologists so good at identifying them? *Social Science and Medicine* 34:107-111.

Schell, L., and B. Blumberg.
1988. Alloalbuminemia and the migrations of Native Americans. *Yearbook of Physical Anthropology* 31:1-13.

Schurr, T.
2000. Mitochondrial DNA and the Peopling of the New World. *American Scientist* 88:246-253.

Schurr, T.
2000. The story in the genes: Genetic research finds more, older options for First Americans. *Discovering Archaeology* 7:59-60.

Schurr, T., S. Ballinger, Y. Gan, J. Hodge, D. Merriwether, D. Lawrence, W. Knowler, K. Weiss and D. Wallace.
1990. Amerindian mitochondrial DNAs have rare Asian mutations at high frequencies, suggesting they derived from four primary maternal lineages. *American Journal of Human Genetics* 46:613-623.

Scott, G., and C. Turner.
1997. *The Anthropology of Modern Human Teeth: Dental Morphology and its Variation in Recent Human Populations*. Cambridge U Press, Cambridge.

Scozzari, R., F. Cruciani, P. Santolamazza, D. Selletto, D. Cole, L. Rubin, D. Labuda, E. Marini, V. Succa., G. Vona and A. Torroni.
1997. MtDNA and Y chromosome - specific polymorphisms in modern Ojibwa: Implications about the origin of their gene pool. *American Journal of Human Genetics* 60:241-244.

Shearin, N., E. King, and D. O'Rourke.
1989. DNA preservation in pre-Columbian remains from the American Southwest. *Human Evolution* 4:263-270.

Shields, G., K. Hecker, M. Voevoda and J. Reed.
1992. Absence of the Asian-specific region V mitochondrial marker in native Beringians. *American Journal of Human Genetics* 50:758-765.

Shields, G., A. Schmiechen, B. Frazier, A. Redd, M. Voevoda, J. Reed and R. Ward.
1993. MtDNA sequences suggest a recent evolutionary divergence for Beringian and northern North American populations. *American Journal of Human Genetics* 53:549-562.

Smith, D., J. Lorenz, B. Rolfs, R. Bettinger, B. Green, J. Eshleman, B. Schultz and J. Malhi.
2000. Implications of the distribution of Albumin Naskapi and Albumin Mexico for New World prehistory. *American Journal of Physical Anthropology* 111:557-572.

Smith, D., R. Malhi, J. Eshleman, J. Lorenz and F. Kaestle.
1999. Distribution of mtDNA haplogroup X among Native North Americans. *American Journal of Physical Anthropology* 110:271-284.

Smith, D., R. Bettinger and B. Rolfs.
1995. Serum Albumin Phenotypes at Stillwater: Implications for population history in the Great Basin. In: *Bioarchaeology of Stillwater Marsh. Anthropological Papers*, C. Larsen and R. Kelley, editors. American Museum of Natural History 77:68-72.

Starikovskaya, Y., R. Sukernik, T. Schurr and D. Wallace.
1998 Mitochondrial DNA diversity in Chukchi and Siberian Eskimos: Implications for the genetic prehistory of ancient Beringia. *American Journal of Human Genetics* 63:1473-1491.

Stark, C., and S. Brooks.
1985. A survey of prehistoric paleopathology in the Nevada Great Basin. In: *Health and Disease in the Prehistoric Southwest*, C. Merbs and R. Miller, editors. Anthrop. Res Paper 34. Arizona State Univ, Tempe.

Stark, C.
1983. The Determination of Variation in Skeletal remains in Nevada Through the Use of Discrete Morphological Traits and Anthropometry. Masters thesis, U Nevada: Las Vegas.

Steele, G.
1997. Letter to Nevada State Museum dated February 14, 1997.

Steele, G.
2000. The skeleton' tale: Old skulls are painting a complex picture of American origins. *Discovering Archaeology* 7:61-62.

Steele, G., and J. Powell.
1999. Peopling of the Americas: A historical and comparative perspective. In: *Who were the First Americans*, R. Bonnichsen, editor, pp. 97-126. Center for the Study of the First Americans, Oregon State University, Corvallis, OR.

Steele, G., and J. Powell.
1994. Paleobiological evidence of the peopling of the Americas: A morphometric view. In: *Method and Theory for Investigating the Peopling of the Americas*, R. Bonnichsen and D. Steele, editors pp. 141-163. Center for the Study of the First Americans, Corvallis, OR.

Steele, D., and J. Powell.
1992. Peopling of the Americas: Paleobiological evidence. *Human Biology* 64:303-336.

Stone, A., and M. Stoneking.
1998. mtDNA analysis of a prehistoric Oneota population: Implications for the peopling of the New World. *American Journal of Human Genetics* 62:1153-1170.

Stone, A., and M. Stoneking.
1993. Ancient DNA from a pre-Columbian Amerindian population. *American Journal of Physical Anthropology* 92:463-471.

Swedlund, A., and D. Anderson.
1999. Gordon Creek Woman meets Kennewick Man: New interpretations and protocols regarding the peopling of the Americas. *American Antiquity* 64:569-576.

Szathmary, E.

1994. Modeling ancient population relationships from modern population genetics. In: *Method and Theory for Investigating the Peopling of the Americas*, R. Bonnichsen and D. Steele, editors, pp. 117-130. Center for the Study of the First Americans, Corvallis.

Taylor, P.
1996. Reproducibility of ancient DNA sequences from extinct Pleistocene fauna. *Molecular Biology and Evolution* 13:283-285.

Torroni, A., Y. Chen, O. Semino, A. Santachiara-Beneceretti, C. Scott, M. Lott, M. Winter and D. Wallace.
1994. MtDNA and Y-chromosome polymorphisms in four Native American populations from southern Mexico. *American Journal of Human Genetics* 54:303-318.

Torroni, A., T. Schurr, M. Campbell, M. Brown, J. Neel, M. Larsen, D. Smith, C. Vullo and D. Wallace.
1993. Asian affinities and continental radiation of the four founding Native American mtDNAs. *American Journal of Human Genetics* 53:563-590.

Torroni, A., R. Sukernik, T. Schurr, Y. Starikovskaya, M. Campbell, M. Crawford, A. Comuzzie and D. Wallace.
1993. MtDNA variation of aboriginal Siberians reveals distinct genetic affinities with Native Americans. *American Journal of Human Genetics* 53:591-608.

Torroni, A., T. Schurr, C. Yang, E. Szathmary, R. Williams, M. Schanfield, G. Troup, W. Knowler, D. Lawrence, K. Weiss and D. Wallace.
1992. Native American mitochondrial DNA analysis indicates that the Amerind and the Nadene populations were founded by two independent migrations. *Genetics* 130:153-162.

Tuohy, D.
1994. DNA research on Stillwater Native Americans attempts to match ancestors to their descendants. *Nevada State Museum Newsletter* 4-5.

Tuohy, D., and A. Dansie.
1997. New Information regarding early Holocene manifestations in the western Great Basin. *Nevada Historical Society Quarterly* 40:24-53.

Tuohy, D., and D. Clark.
1979. *Excavations at Marble Bluff Dam and Pyramid Lake Fishway, Nevada*, US Bureau of Reclamation Contract Report, Contract #C2520.

Tuohy, D., and M. Haldeman.

1987. *Stillwater human skeletal remains.* In: Final Report on the excavations in the Stillwater Marsh Archaeological District, Nevada. D. Tuohy, A. Dansie and M. Haldeman. Nevada State Museum Archaeological Scvs Rep.

Tuohy, D., and M. Stein.
1969. *A Late Lovelock Shaman and his grave goods.* Nevada State Mus Anthropol Papers 14, Misc. paper 5:96-130.

Turner, C.
1998. *Spirit Cave* (AHUR 2064). Dental data sheet.

Turner, C.
1994. Relating Eurasian and Native American populations through dental morphology. In: *Method and Theory for Investigating the Peopling of the Americas*, R. Bonnichsen and D. Steele, editors, pp. 131-140. Center for the Study of the First Americans, Corvallis.

Turner, C.
1990. Major features of sundadonty and sinodonty, including suggestions about east Asian microevolution, population history, and Late Pleistocene relationships with Australian Aboriginals. *American Journal of Physical Anthropology* 82:295-317.

Turner, C.
1985. The dental search for Native American origins. In: *Out of Asia: Peopling the Americas and the Pacific*. R. Kirk and E. Szathmary, editors, pp. 31-78. Journal of Pacific History, Canberra, Australia.

Turner, C., C. Nichol and G. Scott.
1991. Scoring procedures for key morphological traits of the permanent dentition: The Arizona State University dental anthropology system. In: *Advances in Dental Anthropology*, M. Kelley and C. Larsen, editors, pp. 13-31. Wiley-Liss, New York.

Tuross, N.
1994. The biochemistry of ancient DNA in bone. *Experientia* 50:530-535.

Tuross, N., and C. Kolman.
2000. *Potential for DNA testing of the human remains from Columbia Park, Kennewick, Washington*. Report to the US Department of Interior and Department of Justice.

Van Vark, G., and W. Schaafsma.
1992. Advances in the quantitative analysis of skeletal morphology. In: *Skeletal Biology of Past Peoples: Research Methods*, S. Saunders and M. Katzenberg, editors, pp. 225-257. Wiley-Liss, New York.

Walker, D.
1999. *Spirit Cave* - Memorandum #1 mtDNA, Ute-Axtecan Prehistory, and the Kaestle Research. Memorandum submitted to BLM by Fallon Paiute-Shoshone Tribe.

Walker, P., G. Dean and P. Shapiro.
1991. Estimating age from tooth wear in archaeological populations. In: *Advances in Dental Anthropology,* M. Kelley and C. Larsen, editors, pp. 169-178. Wiley-Liss, New York.

Wallace, D., and A. Torroni.
1992. A review of *American Indian prehistory as written in the mitochondrial DNA*. Human Biology 64:403-416.

Wallace, D., K. Garrison and W. Knowler.
1985. Dramatic founder effects in Amerindian mitochondrial DNAs. *American Journal of Physical Anthropology* 68:149-55.

Ward, R., B. Frazier, K. Dew-Jager and S. Paabo.
1991. Extensive mitochondrial diversity within a single Amerindian tribe. *Proceedings of the National Academy of Science* 88:8720-8724.

Warren, C.
1974. A prehistoric burial from Goodsprings, Nevada. *Nevada Archaeologist* 2:14-18.

Wheeler, S.
1997. Cave burials near Fallon, Nevada. *Nevada Historical Society Quarterly* 40:15-23.

Wheeler, S., and G. Wheeler.
1969. *Cave Burials near Fallon, Churchill County, Nevada*. Misc Papers 3:71-78. In Nevada State Museum Anthropological Papers 14.

Williams, R., A. Steinberg, H. Gershowitz, P. Bennett, W. Knowler, D. Pettitt, W. Butler, R. Baird, L. Dowda-Rea, T. Burch, H. Morse and C. Smith.
1985. GM allotypes in Native Americans: Evidence for three distinct migrations across the Bering land bridge. *American Journal of Physical Anthropology* 66:1-19.

Wilson, A., R. Cann, S. Carr, M. George, U. Gyllensten, K. Helm-Bychowski, R. Higuchi, S. Palumbi, E. Prager, R. Sage and M. Stoneking.
1985. Mitochondrial DNA and two perspectives on evolutionary genetics. *Biological Journal of the Linnean Society* 26:375-400.

Wright, K.
1999. First Americans. *Discover*, Feb:52-63.

Yang, D., B. Eng, J. Wayne, J. Dudar and S. Saunders.
1998. Technical Note: Improved DNA extraction from ancient bones using silica-based spin columns. *American Journal of Physical Anthropology* 105:539-543.

Zierdt, H., S. Hummel and B. Herrmann.
1996. Amplification of human short tandem repeats from Medieval teeth and bone samples. *Human Biology* 68:185-99.

ADDITIONAL REFERENCES CONSULTED

Bard James C. et al.
1981 *A Cultural Resources Overview of the Carson and Humboldt Sinks, Nevada*. USDI Bureau of Land Management, Nevada, Cultural Resource Series, Number 2.

Cavalli-Sforza, L.L.
2000 *Genes, People, and Languages*. New York: North Point Press.

Cavalli-Sforza, L.L., and F. Cavalli-Sforza
1995 The Great Human Diaspora: The History of Diversity and Evolution. Reading, Mass: Perseus Books.

Cavalli-Sforza, L.L., et al.
1994 *The History and Geography of Human Genes*. Abridged Paperback Edition. Princeton: Princeton University Press.

Crum, S.J.
1994 *The Road on Which We Came: A History of the Western Shoshone*. Salt Lake City: University of Utah Press.

D'Azevedo, W. L., Ed.
1986 *The Handbook of North American Indians, Volume 11, Great Basin*. Washington: Smithsonian Institution.

Dillehay, T.D., and D. Meltzer, Eds.
1991 *The First Americans: Search and Research*. Boca Raton, Fl: CRC Press.

Goddard, I.
1996 *The Handbook of North American Indians, Volume 17, Languages*. Washington: Smithsonian Institution.

Hemphill, B.E., and C.S. Larsen, Eds.
1999 *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation*. Salt Lake: University of Utah Press.

Inter-Tribal Council of Nevada
1976 *Newe: A Western Shoshone History*. Reno: Inter-Tribal Council of Nevada.

Knack, M.C., and O.C. Stewart
1984 *As Long as the River Shall Run: An Ethnohistory of Pyramid Lake Indian Reservation*. Berkeley: University of California Press.

Larsen, C.S. and R. Kelley, Eds.
1995 *Bioarchaeology of the Stillwater Marsh: Prehistoric Human Adaptation in the Western Great Basin*. American Museum of Natural History, Anthropological Papers, Number 77.

Madsen, D.B., and J.F. O'Connell
1982 *Man and Environment in the Great Basin*. SAA Papers 2.

Madsen, D.B., and D. Rhode, Eds.
1994 *Across the West: Human Population Movement and the Expansion of the Numa*. Salt Lake City: University of Utah Press.

Nevada State Museum (NSM)
1974 *Collected Papers on Aboriginal Basketry*. Nevada State Museum, Anthropological Papers, Number 16.

Raven, C., and R. Elston
1988 *Preliminary Investigations in Stillwater Marsh: Human Prehistory and Geoarchaeology, Volume 1*. USDI Fish and Wildlife Service, Region 1, Stillwater National Wildlife Refuge, Cultural Resource Series Number 1.

Smith, A.M.
1993 *Shoshone Tales*. Salt Lake City: University of Utah Press.

Thomas, D.H.
1985 *The Archaeology of Hidden Cave*. Anthropological Papers of the American Museum of Natural History 61(1).

Tuohy, D.H., and A. Dansie, Eds.
1997 *Papers on Holocene Burial Localities Presented at the Twenty-Fifth Great Basin Anthropological Conference, October 10-12, 1996.* Nevada Historical Society Quarterly, 40:1.

Willing, J. A., Et al.
1988 *Early Human Occupation in Far Western North America: The Clovis-Archaic Interface*. Nevada State Museum Anthropological Papers, Number 21.