

Paiute-Shoshoni Resources and Settlement Patterns in Banner Ridge, California

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This paper developed out of a three year project undertaken by the Inyo National Forest, to survey all the off-highway vehicle tracks and trails, otherwise referred to as the OHV Heritage Resources project (USDA Forest Service 2004). The author thanks Dr Linda Reynolds, Forest Archaeologist, Dr Michael Hilton, Assistant Forest Archaeologist and Penelope Spears forest archaeologist and crew chief. In addition to the author, other valued members of the field crew were Barry Olsen, and Jose Alvarez.

Geography and Geology

Banner Ridge is in a unique location. Geographically, it is half way between the Sierra Mountains 15 km to the west and the White Mountains 10 km to the east. Pinyon forest covering Banner Ridge provided pinyon nuts, a food staple, unlike the alpine resources of the Sierras, and the meadows of Owen's Valley, or the arid sagelands of the White Mountains. There is a great variety of lithic materials on Banner Ridge, quartz, tuff, granite, slate; chert and chalcedony; and, the ridge is close to the largest obsidian sources in the United States from Long Valley Caldera. The accessible location between a wide variety of resources has contributed to the unique archaeological record of Banner Ridge described in this paper.

Driving north from Bishop along Highway 395, take a right turn at Tom's Place onto Owen's Gorge road, and another right onto Benton Crossing road. At the point where the road takes a

ninety degree left turn at a sheep encampment, you will see Banner Ridge. It rises from the valley floor to elevations around 7,500 feet or 2,500 meters, separated from the Sierras and White Mountains by desert valleys.

Banner Ridge runs north-south, to the west the Sierra Mountains rise out of Owen's Valley, to the right the White Mountains rise up like a white buffalo's back. (USGS 1994). Both of these mountain ranges are a formidable obstacle to movement either east into Nevada's desert or west to the Pacific Ocean.

Banner Ridge is a complex combination of volcanic, sedimentary and metamorphic deposits of quartz, granite, greenstone, volcanic tuff, obsidian, rhyolite, basalt, shale and chert. Many sources of obsidian from the Long Valley caldera are nearby (Hall 1991).

At the north end of Owens Valley, Long Valley was created by eruptions of basalt and andesite from 3.8 - 2.8 Ma, eruptions of rhyodacite at 3.1 to 2.5 Ma followed by high-silica rhyolite around 2.1 to 0.8 Ma. The trend through time is toward more silica-rich rock extruding (Map 1).

Glass Mountain, on the northeast rim of the caldera, was formed by a cataclysmic eruption of magma from 4 miles beneath the surface 760,000 years ago. It deposited high-silica rhyolite and Bishop Tuff in the northern Owens Valley area. The magma chamber subsided more than 1 mile forming Long Valley Caldera, 17 by 32 km. Later, smaller, eruptions of crystal-free rhyolite followed 700,000 to 600,000 years ago. Cooler, crystal-rich rhyolite was extruded in clock-wise succession around the resurgent dome at 500,000, 300,000 and 100,000 years BP (USGS 2003).

The Mono-Inyo volcanic chain is more recently active, extending from south of Mammoth Mountain west along Long Valley caldera to the north shore of Mono Lake. Eruptions of basalt and andesite began 400,000 – 60,000 years ago and in Mono Basin 40,000 – 13,000 years ago. Mammoth Mountain was formed by repeated eruptions of dacite and rhyodacite on the southwest rim of the caldera from 220,000 – 50,000 years ago. Dacite and rhyodacite erupted in the Mono Basin 100,000 – 6,000 years ago. Mono craters formed by eruptions of high-silica rhyolite 40,000 – 600 years ago, and the Inyo craters formed by eruptions of low-silica rhyolite 5,000 – 500 years ago.

The Mono-Inyo Craters have erupted every 700 to 250 years through the past 3,000 years. The most recent volcanic eruptions in the area occurred in Mono Lake sometime between the mid-1700's and mid-1800's. Since 1980 the central part of the Long Valley caldera has been rising and frequent earthquakes are reminders of continuing seismic activity. (USGS 1999).

The soils at the lower elevations, in meadows and in the valleys surrounding Banner Ridge are very loose, sandy and silty; easily eroded on slopes and when vegetation is removed. At higher elevations, basalt, granite or tuff bedrock is exposed in boulder outcrops and ridges.

Seney and Gallegos have classified the soils of the Inyo National Forest. The soils on Banner Ridge are light to brown gravelly, sandy loam with granitic rock outcrops. The USDA soil survey maps indicate most of Banner Ridge 335 Neuske-Basket families complex on the hillsides with 30-60% slopes covered with pinyon pine and sage. The substrate is

metasedimentary bedrock and soft weathered granite. Across the southern end of Banner Ridge 326 Basket-Mascamp families complex extends. It covers hillsides of 30 to 60 % slopes with pinyon pine vegetation. The substrate is soft weathering marine sediments in the Basket family, and hard granitic bedrock in the Mascamp family. The valley along the west of Banner Ridge and the valley basin north of the ridge, with 0 to 15% slopes, are 331 Koehler-Stacy families complex. This is over 60 inches of brown sand, with extremely cobbly sand and gravels in the substrate. The vegetation cover is big sage and bitterbrush (Seney and Gallegos 1995).

Rainfall, Fire and Flora in the Landscape

The climate is arid with low precipitation, mainly in the form of snowmelt in spring, March to May. Summers are hot and dry, with occasional thunderstorms bringing light rainfall and frequent lightning strikes causing forest fires. Temperatures range from 97.2 F (36.2 C) in July to 22.1 F (-5.5 C) in January (World Climate . The National Weather Service's station at Bishop records 12.5 cm yearly rainfall. Most rain falls November through February 14.3 – 25.7 mm (0.6-1 inch). Bishop Creek intake records at least double the rainfall each month ranging from November to March 38.2 – 49.6 mm (1.5-2 inches) (Reynolds 1997).

The flora of Banner Ridge is arid montaine, delineated by elevation and secondarily by available moisture. The lowest valley elevations 2000 meters (6561 ft) to 2300 m (7545 ft) are sage covered (*Artemisia tridentata*) meadows. Higher moisture levels result in great sage standing 6 to 12 feet high in dense impenetrable thickets. It is the same species, *Artemisia tridentata*, changed only by greater available moisture. Less moisture results in short sage landscapes that range from

a mixed sage-bitterbrush-rabbitbrush dominated cover (*Artemisia tridentata*, *Purshia tridentata*, *Chrysothamnus nauseosus*) to almost 100% short sage cover (Blackwell 2002).

At the upper limit of the sagebrush meadows where the sage declines and pinyon (*Pinus monophylla*) forest begins, there are dense pockets of perennial grasses, including food grasses. The boundary elevation can vary from 2100 to 2380 meters. This zone where sage, pinyon and grassland converges forms a small but rich resource area for both animals and people.

California single-leaf pinyon series or collection of series exist where pinyon is the sole or dominant tree in the canopy with Jeffrey pine, canyon live oak, California juniper, mountain juniper or Utah juniper. Pinyon forest extends from 1000 to 2300 meters (2808-7545 ft) elevation in well-drained soils on upland alluvial fans, slopes and ridges. The canopy is intermittent or open with trees less than 15 meters in height. Shrubs are common, ground cover is open or grassy in places. The upper limit of pinyon-juniper is determined by low temperature, and the lower limit by available moisture.

Mountain juniper series grows from 900 to 3000 meters on slopes, alluvial fans and steep rocky escarpments (Sawyer and Keeler-Wolf 1995). On Banner Ridge, mountain juniper (*Juniperus occidentalis* var. *australis*) meets the pinyon around 2135 m (7,000 ft) elevation and continues mixed at mid elevations to 7,750, and is the dominant species to the highest elevations of Banner Ridge, around 2560 m (8,400 ft). Black oak *Quercus kelloggii*, black sagebrush *A. nova*, mountain mahogany *Cercocarpus ledifolius* and antelope bitterbrush *Purshia tridentate* var. *tridentate*, are also present in areas. Another food plant that is only plentiful in localized areas at

higher elevations is *Orobanche fasciculata* 'tu'a' a parasitic, small, tuberous plant with no chlorophyll. The tubers are eaten.

Banner Ridge is an environment shaped by fire, as the fire scars on older pinyon and juniper trees attest. The living vegetation's internal moisture levels are so low, due to almost no rainfall during the summer months that trees and shrubs burn very easily. During July and August summer storms bring cooler temperatures, sparse rainfall and a lot of lightning. Lightning strikes hit the trees, cracking them open like dry twigs and bringing fire. And, human-caused fires are an increasing fact of forest management. Part of forest management is the controlled burning of deadfall to prevent catastrophic fires. Based on patterns of regrowth fire cycles vary for different vegetation series. The following information suggests some guidelines for burn and vegetation regrowth cycles, but each localized region is different and soils, moisture levels and elevation all play a part (Wright et al 1979).

Sage brush burns and recovers to prior levels every 32-70 years; 17 to 41 years and 20 to 25 years in smaller study areas. The shorter cycles indicate that sagebrush communities will become rabbitbrush dominated. Big sagebrush does not sprout and is highly susceptible to fire injury, after 30 years vegetation levels return to near pre-burn levels. Big sagebrush may invade burned areas if the moisture levels are suitable. Seed spread from parent plant is up to 42 feet from one plant.

Antelope bitterbrush is severely damaged by burning, less so if burned during the wet season just prior to rain. Fifteen years after a burn, regrowth is 50 to 60% of pre-burn levels. Mountain

mahogany *Cercocarpus ledifolius* is also severely damaged by burning, and tends not to resprout, but *Cercocarpus montanus* is not damaged by fire. Rabbitbrush *Chrysothamnus* sp. is common in sagebrush communities, it is usually enhanced by fire with 90% vigorous resprouting. Growth is only reduced for 1 to 3 years then doubles, and after 12 years it triples. In communities 40 to 50 years old big sagebrush dominates and rabbitbrush is reduced.

The effect of fires on grasses increases with dense perennial culms such as *E. condensatus*.

Dense culms will burn 2 to 3 hours after a fire has passed and temperatures up to 1,000 F (538 C) are reached 45 minutes after the fire. The heat, not the fire kills many grasses, and late summer, fall fires are least damaging. Frequent fire cycles every few years will deplete perennial grass stands and annual grasses may overtake perennials. *A. hymenoides* is only slightly damaged by fire. This is because the culms are small and there is almost no other vegetation around them to assist in burning.

Pinyon woodlands are very susceptible to fire damage, more so with a heavy under storey fuel load. Wright *et al* (1979) summarize some statistics indicating that trees less than 4 ft tall could be killed by a spotty burn that killed crowns. Taller, and presumably older trees were harder to kill if the crown was burned. Pinyon woodlands with no under storey are more difficult to kill because fires do not carry as easily. These statistics were gathered from regions with 14 to 18 inch rainfall per year. The extreme aridity of the White Mountains with 5.4 inches at Bishop, and 15.6 inches per year at Bishop Creek suggest that living trees with a lower moisture content would catch fire more easily.

Succession in the juniper woodland occurs over 100 to 300 year time period: juniper woodland exposed to fire then becomes a skeleton forest with dead trees and bare soil then annual stage to perennial grass-forb stage to perennial grass-forb-shrub stage then perennial grass forb-shrub-young juniper stage then shrub-juniper stage to juniper woodland. There may be three more stages where the open shrub stage becomes a thicket until the trees begin to overtop the shrubs and gradually suppress the shrubs. After several centuries, the under storey is a sparse shrub-grass-forbs. Climax pinyon-juniper forest occurs after about 300 years. The life span of *Juniperus occidentalis* may be 1000 years and may be as long as 3000 years. The life span of *Pinus monophylla* is 900 years, The maximum age of *A. tridentate* is 800 years (Elliott-Fisk and Ryerson 1987).

In Banner Ridge, the sage stands show signs of fire, from fire-blackened stumps of old sage, to black smudged sage stems and lower branches. Bitterbrush shows less evidence of old fires, except very old and very large bushes. This woody bush can grow to almost 2 meters in height with a diameter of 3 to 4 meters. These old, dense, woody shrubs show signs of fire damage. The pinyon trees show old signs of fire blackening on the trunks of mature trees. Nowhere is there evidence of any recent fires. The deadfall buildup of pine needles has formed mats several decimeters thick under the pinyon and juniper, even where there are no grasses and forbs among the trees. This suggests that it has been many decades since fire burned through Banner Ridge and a fire, human or lightening caused, would have a large fuel load to burn both long and hot.

One additional outcome of this continuing fire-shaped landscape is the destruction of archaeological evidence. Spalling of rock features and artifacts has been caused by freeze-thaw

and possibly by fire in the past. Erosion of areas of sparse vegetation on upper slopes has shifted artifacts downslope.

Food Grasses

Two food grasses stood out during survey, due to their large distribution and the potential quantity of food available. The food grasses documented in this study are *Achnatherum hymenoides*, commonly called ‘rice grass’, and *Elymus condensatus*, ‘giant rye grass’. ‘Rice grass’ is in the tribe Agrostideae, or Timothy grasses. ‘Giant rye grass’ is in the Hordeae or barley tribe that includes cultivars wheat, rye and barley. The Timothy tribe includes grasses that are used throughout the world by traditional people including African and Australian aboriginal people. Some of the Agrostideae genuses include *Aristida*, *Stipa*, *Muhlenbergia*, as well as *Oryzopsis*.

‘Rice grass’ and ‘giant rye’ are perennial bunch grasses, the first is shorter, less than 24” high, the second is very tall, averaging 5 ft in height. The first has a round millet-sized grain, the second a wheat-sized grain with a groove running its length. It is possible for these grasses to have been collected in large enough quantities to have constituted a secondary source of protein and carbohydrate, after the primary harvest of pinyon seed. The seed of both types ripened during the survey time, July and August, photographs and collections of both were made and some observations will be made in this paper. Botanical identifications were confirmed by the Inyo National Forest botanist Barbara Newman.

Achnatherum hymenoides (Roemer & Schultes) Barker, previously *Oryzopsis hymenoides*, (Roemer & Schultes) (Barkworth 2002). It is a tufted erect perennial with narrow, less than 1mm diameter, rolled leaf blades growing 40 – 50 cm tall. The inflorescence is open, branches and spikelet stalks widely spreading. The glumes are 5-9mm \pm equal, with a swollen base, the floret is 3-4.5 mm, the callus is sharp, the lemma \pm spherical covered in hairs 2.5-6mm long with a 3-6 mm awn. The seeds are 3-4 mm, globular pointed at both ends, somewhat shiny, with a smooth, hard, black coat. This species is called *Oryzopsis hymenoides* in the ecological literature, Jepson places it in the genus *Achnatherum* and other manuals place it in *Stipa*.

When ripe, the seeds detach from the glume and fall easily; just before ripe, they can be stripped off the spikelet stalks easily. The traditional method of collecting ‘wai’ seed was to hand strip the seed with glume and awn into a wide, flat basket or to knock the seed into the basket (Stewart 1933:244; Wheat 1967:24). This grass was one of the primary food sources of the Paiute-Shoshoni people.

Elymus condensatus (C. Presl) Á. Löve . This is a tufted, perennial, generated from rhizomous root growth. The leaf is 10-28 mm wide flat to rolled. The inflorescence is panicle-like 17-44 cm the lower nodes with short branches. Spikelets are sessile or stalked, glumes 6-16 mm awl-like, lemmas 7-14 mm, from glabrous to hairy, acute to awn-tipped with a 4mm awn. The grain is 3-5 mm long with a groove, similar in appearance to oats. It hybridizes with *L. triticoides*, growing on dry slopes of open woodland up to 1500 meters (Barkworth 2002). ‘Pawa’ is also a food grain listed in Stewart’s ethnology, however, it is not identified as a staple (Stewart 1933:245). Grain

must be cut with a blade or stripped off the spike that is usually at least 10 cm with densely packed spikelets.

Both bunch grasses add new growth around the edges of the root mass, resulting in older, very large grass bunches with new growth around the outside of the bunch. Both grasses spread by seeding and by root and stolons. Large, older grass bunches are surrounded by smaller, younger grass bunches. *A. hymenoides* grows in dry, well-drained sandy soil such as the sage scrub at the upper boundary with pinyon forest. It can be found growing among open pinyon forest. It thrives in valleys and swales that receive additional moisture through accumulation of run-off from either rainfall or snowmelt. It tends to grow in large expanses extending over many acres. The sage meadow lying along the west side of Banner Ridge from the base sheep camp north to the end of Banner Ridge, and intermittently throughout Banner Ridge in open valleys contain large expanses of *A. hymenoides* that was recorded and samples collected.

It is common in California vegetation series dominated by grasses such as Big Galletta series, Wheatgrass series', needle grass series, needle-and-thread series and Desert sand-verbena series (Sawyer and Keeler-Wolf 1995). These are typified by vegetation height around one meter, cover open, most have sandy soils though some tend to rocky soils. The Indian rice grass series has vegetation height less than 1.5 meters height, open cover and sandy soils from sea level to 3400 m. Generally, rice grass forms stands of up to 40% density of *A. hymenoides*, interspersed among the short sage, bitterbush and rabbitbrush with no ground cover. The other location of 10 to 30% *A. hymenoides* is in the short sage valley meadow along the Barker Mine road that turns off Benton Crossing road to the right, and runs more or less parallel to Benton Crossing road east

of it. The north half of this road, through sections 5, 8 and 17 lies in a sage meadow where moisture collects from the pinyon covered slopes, and where the ephemeral washes converge. Here, stands of *A. hymenoides* were documented and photographed.

Many of the same California vegetation series include *Elymus* spp. Wild rye grass is a large component in the Ashy rye grass series, California Oatgrass series, creeping rye, various introduced grasses series, and the wedgeleaf buck bush *Ceanothus cuneatus* shrub series, it is also found in open forest with little or no ground cover. In all these series vegetation cover is less than one meter in height, soils tend to sandy although they can be rocky, and cover is open, from sea level to 3500 meters asl. Rye prefers marshy, seasonal wetland conditions so it is found on flat bottomlands and along seasonal stream beds. *E. condensatus* stands out clearly from the other vegetation, as it is a light, bright green stemmed grass, growing to around 5 ft or 1.7 meters tall. On Banner Ridge it was found growing at the upper boundary of sage, lower boundary of pinyon: the stands are often located just below and just above the lower pinyon tree line in open pinyon forest, as long as the moisture requirements are met. Densities vary from almost 100% stands in seasonal marshes along the banks of ephemeral washes in low-lying basins and valleys to less-dense stands varying from 10 to 50 % *E. condensatus* found along the banks of ephemeral washes on slopes of 1-7% (Sawyer and Keeler-Wolf 1995).

The Archaeological Record

Archaeological surveys have extended over portions of Banner Ridge since the 1960's. The husband and wife team of Rollin and Grace Enfield recorded a total of 1200 prehistoric sites in

eastern California, including Banner Ridge. They surveyed areas where they thought late prehistoric inhabitants would locate (Reynolds 1996). They were the first to record many of the sites and make surface collections of artifacts. Information, artifact drawings, site sketches, plant lists and water sources were recorded on Unisort Cards. Copies of the site cards and site forms derived from them have been retained by the Inyo National Forest Office at Bishop, California, with the originals housed at the Eastern California Information Center, University of California, Riverside (Enfield Field Notes).

Richard Cowan and Kurt Wallof directed a survey for the large power transmission line that runs northwest to southeast across the southern half of Banner Ridge. This survey was a co-operative effort with University of California Riverside students. A copy of the report is part of the Inyo National Forest records (Cowan and Wallof 1974). The Cowan and Wallof survey included some site excavation on the hills to the west of Banner Ridge, on the other side of the narrow valley.

Eight sites from Cowan and Wallof's transmission line survey were located on Banner Ridge and west, sites 14, 13 $\frac{3}{4}$, 13 $\frac{1}{2}$, 13, 9, 8 $\frac{1}{2}$, 8 and 7 in Cowan and Wallof's numbering system, corresponding to Inyo National Forest sites 23-24 (combined by the Forest Archaeologist and considered together, in this report labeled 23), 22, 21, 20, 19, 18, 17 and 16. Site 8 $\frac{1}{2}$ has two loci, Inyo Forest sites 19 and 18. The OHV survey relocated sites 16, 17, 18, 19 and 20. Sites 21, 22, 23 and 24 are outside the OHV survey area but have been included in this report because they are immediately adjacent to Banner Ridge and the report includes the only obsidian hydration, radiocarbon dating and excavation results available for the area.

The purpose of the OHV survey was to inventory all heritage resources, prehistoric and historic within the Inyo National Forest, for improved management prior to any suggested development (USDA Forest Service 2004). Survey began in the summer of 2004 and finished in the summer of 2006. 100 % survey extended 30 meters either side of all the off-highway vehicle trails, two-tracks and dirt roads that had been located in the Inyo National Forest and mapped using GPS. Survey crews used standard Inyo National Forest archaeological site recording forms digitizing artifact, feature and site data with a Motorola GPS hand held unit. One or more photographs were taken of every site. The definition of site follows the convention of 15 artifacts within a 10 meter square area.

A total of 103 sites were recorded in Banner Ridge situated along county roads or OHV trails. The majority of the ridge was not, and has not been archaeologically surveyed. The sites up to 1893, thirty-three of them, were recorded prior to this survey. The sites from 1915 to 2000 were recorded during this survey. Historic sites consist of mining-related activities such as test pits, shafts, adits, sluices, cabins or the remains of old cabins, shacks and camping. Historic sites are not included in this paper: they include sites 1917, 1918, 1919, 1923, 1927, 1940, 1945, 1950, 1967, 1987, 1990 and 1995. Sites 17, 1961 and 1966 have historic components and are included in this paper. In addition, there are many indications of historic, continued use by Paiute families of archaeological sites that will be discussed in this paper.

The isolates that were recorded on Banner Ridge include one bedrock mortar with three slicks, and two portable metates, I-1, I-2 and I-3, and projectile points and blades I-4, I-5, I-6, I-7 and I-8, included in Table 1 - Sites of Banner Ridge.

Lithic Sources

The OHV survey did not include any materials testing. Obsidian varied in appearance from opaque black with crystalline inclusions, very similar to rhyolite, to brown, grey and red clear glassy and solid glassy obsidian. Some obsidian was streaked brown and black. It is suggested that the opaque obsidian originates from Casa Diablo, nearby and south, while the clear glassy obsidian originates from Glass Mountain just to the northwest. Sites in eastern central Banner Ridge had increased amounts of a various colors of chert flakes and very dense chert lithic concentrations. The source or sources has not been located. One chert source has been located, Hanging Rock green-grey chert source is from the Last Chance Range east of Eureka Valley. It varies in color from banded olive green to pale grey and from exceptionally fine and glassy texture to very coarse (Delacorte 1988). There were some grey chert flakes and artifacts that may have been from this source.

Map 2 shows the known obsidian sources on the eastern side of the Long Valley Caldera; Mono Craters, Casa Diablo, Glass Mountain, and Queen -Truman Meadows (Arkush 1995). No obsidian sourcing has been done on the Banner Ridge obsidian artifacts; however, it is suggested that Casa Diablo and Glass Mountain are the two sources most commonly present in the Banner Ridge sites (Reynolds, pers. comm.).

Very little quartz flakes were documented. We did locate a knoll of quartz in central eastern Banner Ridge, and noted that attempts had been made to flake quartz cobbles, but due to the large crystalline structure the material was too coarse to be useful. A rock shelter in Nevada

contained heavy quartz debitage and Rosegate cluster points of quartz (Justice 1991). It's interesting that there is demonstrated use of this material, contrary to our findings at Banner Ridge.

Cowan and Wallof included neutron activation analysis of obsidian samples from the surface of site 13 (Inyo Forest 21) and obsidian from sites further west, out of the survey range. Both samples from site 13 are from the Truman-Queen obsidian source.

Projectile Points and Dating Sequences

The typologies for identifying projectile points for the OHV survey followed Thomas (Thomas 1981). We also used Bettinger and Taylor's suggested revisions to typologies in interior California (Bettinger and Taylor 1974). This work has been summarized and updated by Justice 1991, "*Stone Age Spear and Arrow Points of California and the Great Basin*" which was used as a field guide for identifications, as all chronologically sensitive prehistoric artifacts were drawn to scale and included in the site records. The dating of California point sequences has been confirmed through radiocarbon, obsidian hydration, accelerator mass spectrometry, lithic manufacture and residue analysis detailed in Justice' text (Justice 1991). The time periods defined are so broad that it does not really date Banner Ridge sites so much as provide a suggested framework for occupation. Excavation would possibly provide more accurate dating, if organic material were found, which is not always the case (Cowan and Wallof 1974).

Ceramics

Owens Valley brownware is found in east central California and western Nevada. It was a late development and never a large part of the artifact assemblage. Brownware was produced after 1900 (Steward 1933). They were associated with food storage, preparation and cremation burials (Steward 1933; Cowan and Wallof 1974).

Dating of Banner Ridge Sites

Cowan and Wallof's 1974 study includes the only known dating of Banner Ridge obsidian. Obsidian hydration analysis of sites 8 (17), 13 (21) and 14 (24) were not able to assign absolute dates to the samples. Site 13 flourished slightly earlier than site 4 and site 8 was from a later time period. Site 4 is off National Forest lands, it included Pinto, Humboldt, Eastgate, Rose Spring and Pinto points. Cowan and Wallof agree with other point typologies that Pinto and Humboldt series are markers of the same chronological period and indicate early occupation (Cowan and Wallof 1974).

Radiocarbon dates were obtained from site 14 (National Forest 23 – 24). A charcoal sample 25-35 cm below the surface dated at 280 ± 150 B.P. A more diffuse scatter of charcoal tested to less than 150 years old, both dates indicating a recent date of habitation for National Forest site 23-24. Site 13 ½ (NF 22) returned a date of 1300 ± 15 B.P. from charcoal in rock ring 3. Organic material was difficult to find, when a root was tested it returned a date of 250 ± 130 B.P. (Cowan and Wallof 1974).

The dating information given above provides outer limits for the occupation and activities taking place at Banner Ridge. It cannot indicate re-use after extended times of no use, or suggest the

intensity of occupation. Projectile points found on the surface may not have any relation to the site features such as rock rings. Graph 1 illustrates the date range at sites with projectile points.

Graph 1 shows that even such a simple break down provides some dating information. Dates have been converted from B.C. to years before present, (B.P.) used in this paper. Forty-two sites provide dateable diagnostic artifacts; projectile points or Owens Valley brown ware. The largest group of sites have been seasonally occupied over the greatest time period, sites 21, 1972, 1985, 1930, 1946, 1992. 17, 18, 19, 328, 1973, 539, 1980 and 1988, corresponding to the presence of Pinto and Humboldt points, 8000-5000 BP (6000-3000 B.C.). Cottonwood, Desert Side Notch and/or Owens Valley brown ware bring the occupation time for these sites into the protohistoric period ending at 1900 A.D.. Sites 18 and 19 are considered together because they were first documented as site 8½ by Cowan and Wallof. Sites 1932, 352, 1922, 346, 576 form the next cluster of sites dated from Pinto and Humboldt periods to Rose Spring period 8000 -700 BP (6000 B.C.-1300 A.D.). Sites 98, 425, 1999, 1974, 1982, 1976, 1984, 1991 are dated by the presence of Gypsum, Elko to Desert Side Notch 3500-1300 BP (1500 B.C.-1900 A.D.). Sites 433, 1938, 78, 1892, 1924, 1960, 1971 and 1916 are dated to from Rose Spring to Desert Side Notch time periods (500 to 1900 A.D.).

Features

Lithic Scatters

The majority of recorded sites are lithic scatters. There are 53 lithic scatter sites including three sites with historic mining components, sites 17, 1961 and 1966. These are surface distributions of stone debitage and flakes. The lithic scatters vary in density from one artifact per meter to 5-

15 flakes per meter. There may also be lithic tools such as projectile points or blades, flaked bifaces or unifaces (flakes worked on one side only, that have been removed from a biface in the process of flaking) recorded at the site. Lithic materials are obsidian; and chert in grey, mustard yellow, red and white. Cryptocrystalline quartz is found, rarely flaked and no flaked tools of quartz were noted. Some of these sites contained only flakes larger than 1 cm diameter, some with worked edges, such as might indicate re-use and reshaping of a damaged tool. Some sites included very small debitage, less than 1 cm diameter.

Of the 53 lithic scatter sites, 22 sites have projectile points that provide some dating information. Thirty-one sites have no dating information. Looking at Graph 2 and the number of Elko and Rose Spring points, there is a slight emphasis on sites dated from 3500 to 1300 BP. One site has a Pinto point. The 7 sites with Humboldt points dated from 8000 BP to 1400 BP provide little dating information.

Rock Rings

Rock rings are the definitive feature of sites located in pinyon forests of eastern California, traditional land of the western Paiute and Shoshoni tribes. The rock rings have not been mentioned or described by early ethnographers. Steward has described pinenut caches of part of the harvest, and winter villages placed just within the pinyon belt (Steward 1938:52, 58). In the 'Ethnography of the Owens Valley Paiute' he mentions that when the pinenut harvest was bad people wintered in the valley villages (Steward 1933:239). When pinenut harvests were good, every few years, winter villages could be maintained in the mountains. He goes on to describe the winter villages and the storage.

“When crops were good, most Owens Valley people wintered in the mountains, living in “mountain houses” scattered through the timber. Proximity to springs was preferred; but snow could provide water. Cones were stored on sunny hillsides in bins, *ūnaġāunú’n*, which were lined with rocks and covered with needles, boughs, and finally rocks. Nuts fallen from cones were kept in pits lined and covered with grass, *hūki’va*. (from the word *hūki*, *Stipa speciosa* porcupine grass). These were opened as needed, the *hūki’va* first until the loose nuts were exhausted, then the *ūnaġāunú’n*. The cones were sun-dried (sometimes roasted) until open, threshed in a pit, and the nuts winnowed from the dirt in a winnowing basket, *pātsā’*. Nuts remaining when spring came were packed to the valley. Subsequent trips were made for any left behind.” (Steward 1933:242).

Rock rings as found in the pinyon covered hillsides, are made of portable-sized rock native to the area, measuring roughly 30 cm diameter. Angular round or flat slabs, they are laid in rings, occasionally in ovals. The bed rock of Banner Ridge is volcanic tuff and granitic rock decayed by exposure on the soil surface. Banner Ridge rock rings are composed of these rock types. Graph 2 illustrates the variety in size and the number of rings at each site. There is information missing especially from the sites recorded before the OHV survey. In many cases the number of rock rings is recorded but not the dimensions, or the dimensions for some were recorded on the Enfield sketch maps, but not for others. Other site records mention they had rock rings but not the number. In hindsight, it would have been more complete to document the size of the small rock caches attached to approximately 50% of the rock rings discovered on Banner Ridge.

As Graph 2 indicates, there is a trend to round, with some small range off that, and three rings that are oval; one at the small size range and two at the large size range. The small sized oval is 1 X 3 meters, the two large are 5 X 7.5 m, and 5.9 X 7.4 m. An F-test on the 97 rock rings with known dimensions returned a Z-test for length of 0.500001, a Z-test for width of 0.5, and an F-

test 0.851226718 probability that variances in array one--length, and array 2--width are not significantly different.

Running a Pearson's test of product moment correlation coefficient r where the independent variable is length mean, 3.655155, and the dependent variable is width mean, 3.677835; there is a 0.943434151 probability within the range of -1 to 1 that there is a linear relationship between length and width.

This suggests that round structures are the ideal shape with a median of 3.71 meters length and 3.69 meters width. Rock rings vary greatly from just over one meter diameter to 7 meters diameter. One was recorded that was oval with a dividing wall, and one was recorded that was shaped like a 'figure 8'.

House Depressions

This was an exciting find, because it demonstrates that rock rings are a separate feature from habitations. Three were located and measured on Banner Ridge at site 1974. Two were recorded at site 539 but no information is available on their dimensions. The three vary slightly in size, all are round and saucer shaped depressions. Table 1 gives their measurements.

Table 1

HOUSE DEPRESSIONS AT SITE 1974

	Length (m)	Width (m)	Depth (cm)
F. 2	3.6	3.6	29
F. 3	4	4	34
F. 4	4.6	4.6	47

Circular depressions average around four meters diameter gives an idea of habitation area. If rock rings are, as has been suggested, occasionally used as temporary habitation sites, then those with a mean of 4 meters may, possibly be suitable. Those that are smaller than this size, 1 to 2 meters diameter, would not be suitable. The rock rings that are substantially larger, with a diameter of five meters or an oval shape, those with a rock wall midway across the short axis may possibly be temporary seasonal habitations. Systematic excavations would be needed to answer the question completely, were rock rings used for habitation, in addition to being storage features for pinyon cones?

Bedrock Mortars and Ground Stone

This feature is a very large boulder usually embedded in the surrounding soil, but occasionally lying on top of the soil. On Banner Ridge, the rock is either granite or volcanic tuff. The volcanic tuff is soft and grainy, easily eroded, such that it is difficult to see the mortars in heavily eroded tuff boulders, nevertheless the symmetry of the mortar and the consistent size can be seen. Each boulder has one to thirteen mortars in it, very consistent in shape and depth. There are also small flat rocks, even rocks in rock rings with mortar holes.

Different purposes in grinding may be indicated by different shapes. Mortar shapes refer to the cross-section and are classed as either conical, oval, saucer mortars; or milling slick (CO, OM, SM, SL). The conical, oval and saucer mortars are usually of volcanic tuff. The first three are thought to be for pinyon processing, and the slicks for grass seed processing (Steward 1933; Jackson 2002). The manos are usually two-hand and of granite, although volcanic tuff, slate and schist are used occasionally. They exhibit more than one wear surface, up to five wear surfaces

have been recorded. Pestles are expedient pounders worn smooth at the narrow rounded tip. They may also have a ground stone surface for use as a mano. Slicks are usually of granite although there are a few of volcanic tuff, worn very smooth by grinding. This raises a question of why choose a soft, crumbly material like volcanic ashy and sandy rock to process food when granite or other harder volcanic bedrocks are also available at the site? During the survey we were not able to find an answer to this, and it is a topic for future study.

Looking at Graph 3, there are only two sites with both types of food processing mortars; the dish-shaped conical, oval or saucers and mortar slicks, sites 1971, the very big site, and 350. Site 1971 has three granite slicks of a total of forty-five mortars, and site 350 has one volcanic tuff slick of a total of seven mortars.

We did not find bedrock mortars as isolates. Isolate 1 is a large granite bedrock mortar with three slicks on it. This was probably a site, however it has been bulldozed through the middle to make a road and only this boulder, turned on its side, remains with two granite mano fragments. It lies at the confluence of two ephemeral washes above a small reedy and grassy area. This area is now completely covered with the remains of a constantly used sheep camp. Isolates 2 and 3 are portable granite slicks. Isolate 2 was found near site 1928, Isolate 3 near site 20. They may indicate expedient processing of grass seed when out gathering plant foods.

There are 95 conical mortars, almost 4 times more than slicks. The category 'Metate' is unspecified mortars documented from earlier surveys. The category 'na' indicates no information available apart from the fact that it is a groundstone item, also taken from earlier records. Very

few pestles were recorded, probably because they were an expedient tool, a stone with a narrow rounded end. And, the processes of erosion have caused spalling of the smooth usewear surfaces. Manos are more easily recognized as they are sub-rectangular, either small for one hand or two-handed and with many usewear surfaces, from 4 to 7. Each surface has been used for grinding and the ends have been used for pounding and grinding.

Site Types

Briefly, sites are grouped into three types based on the number of rock rings present. Sites with no rock rings are lithic scatters (53 sites). The median number of rock rings is seven. Sites with 0 to 6 rock rings are identified as small sites (46 sites); and large sites are identified as 7+ rock rings, house depressions, petroglyphs and bedrock mortars (6 sites). Bedrock mortar features are found in all three types of sites. They are not found in every instance, however.

Lithic Scatters

These are small sites that range from the minimum of 15 obsidian flakes or debitage in 10 square meters to roughly 30 square meters with very dense clusters of flakes, debitage, cores and core tools. It seems that sites larger than this size tend to have at least one rock ring. Lithic scatters category does not make a distinction between primary flake, secondary, or tertiary flake clusters or numbers. Because of this lack of differentiation, a study of the Banner Ridge in terms of lithic distributions does remain to be completed.

Small Sites with Rock Rings

There are 46 rock ring sites that consist of lithic scatters with one to seven rock rings. They ranged from one rock ring with a few flakes to six rock rings and several lithic scatters and one or more lithic concentrations. These dense lithic concentrations are 15 to 50 flakes per square meter, from debitage less than 1 cm to large flakes 5 to 7 cm diameter in size.

Large Sites with Rock Rings

The third type of site consists of a large number of rock rings with one or more C-shaped stone structures, rockshelters, house depressions, lithic scatters and lithic concentrations with a wide variety of points, blades and bifaces; and bed-rock mortars and portable metates some with manos or pestles found on the bedrock mortars (See Table 1).

The survey located five of these sites on Banner Ridge 1974, 347, 576, 1971 and 23. In 1971 two panels of rock art were found. Dating is based on projectile points found within the site area and on the surface. Four sites, 1974, 347, 576 and 23 are dated from 3500-100 BP by Elko points. Site 1971 with a Cottonwood point, was dated to 1100-100 BP. These five sites all date to later occupations.

Table 2
SUMMARY OF LARGE SITES ON BANNER RIDGE

Site Number	Dating BP	Ground Stone	Rock Ring	House Dep.	Rock Shelter	C-Shape	Brown ware	Rock Art
1974	1500-700	1	16	3	0	0	0	0
347	3500-1300	25	12	0	0	2	0	0
576	3500-1300	2	12	0	0	0	0	0
1971	1100-100	45	6	0	1	1	0	2
23	8000-100	25	0	0	0	0	10	0

	Pinto	Humboldt	Gypsum	Elko	Rose Spring	East gate	Cotton wood	Desert Side Notch
1974	0	0	0	0	1	0	0	2
347	0	0	0	1	0	0	0	0
576	0	0	0	1	1	0	0	0
1971	0	0	0	0	0	0	1	0
23	0	2	0	1	5	2	0	2

As Table 2 shows, the common factor seems to be the large number of rock rings: the amount of ground stone varies from 45 pieces at site 1971 to low numbers, 1 and 2, at 1974 and 576. The artifact counts for site 347 probably do not reflect what was there initially at the time of the first documentation. The OHV survey rechecked site 347 in 2006, but not sites 23 and 576. These sites were initially discovered and documented over 25 years ago by Weller, and the Enfields from 1961 to 1975 (Enfield field notes).

There were three house depressions recorded from Banner Ridge, although more were documented in the Inyo Mountains. It is unknown if the Enfields recorded house depressions, no mention of them could be found on their site cards. With the high number of rock rings and/or

mortars documented at sites, it could be assumed that there should be more evidence of habitation, such as house depressions. It is not clear why more house depressions were not recorded, unless ground movement during the freeze thaw cycle obliterates the older ones. Possibly this means that those recorded are relatively recent.

The OHV survey was not oriented to discover rock art, found on rock slabs, bedrock outcrops and steep terrain. A survey of rocky outcrops would give a more accurate documentation of the location of rock art on Banner Ridge.

The rock shelters are all small overhangs, or shallow caves created by moisture from snowmelt eroding granite or volcanic tuff. The stone rarely shows evidence of charcoal blackening from fires, but there is a higher distribution of lithics in front and nearby the rock shelter. This suggests that these protected areas were used for tool retouching and production.

C-shaped structures are made of stone walls in a large 'C' shape. The walls are stacked rough local rock, granite or volcanic tuff. They are roughly 4 to 6 courses high, between 1 and 2 meters in height. There is no evidence of fallen rock nearby to suggest that they had changed greatly in height and shape. The diameter is larger than the median for rock rings, approximately 5 meters. The median for rock rings is 3.71 meters length and 3.69 meters width. At site 347 one large tuff crescent is associated with a cache, the other is associated with a 9 hole BRM. There is one 'C-shaped' structure at site 1971 4.9 X 6 meters diameter of decomposed granite. The opening faces north 3.3 meters wide.

Settlement Patterns

Large Site Distribution

Map 2 shows the 103 prehistoric sites on Banner Ridge.

Large sites are as Steward has described above, "...scattered through the timber..." (Steward 1933:242). Cowan and Wallof describe Casa Diablo "village sites" as strung out in lines, usually half way up the side of a ridge, and usually within pinyon (Cowan and Wallof 1974:46).

Jackson refers to 'K-sites' as centers of larger populations for longer periods of time, or redundant periodic occupation at a given location, seasonal occupation. Sites with high densities of lithic artifacts and debitage and a minimum of bedrock mortars. He goes on to define K-sites distributed across the landscape a maximum of 3,000 meters from their nearest K-site neighbor, with a minimum of three smaller sites, of 1 to 6 bedrock mortars, less than 1,000 meters from each K-site. K-sites are located not more than 200 meters from a reliable water source (Jackson 2002:311).

The Banner Ridge large sites, Table 1, includes three sites that are not actually on Banner Ridge, however, data from these sites was included to provide as much information as possible in the region. The distance between 1971 in the north of Banner Ridge to 1974 almost due south is 2 km. The distance from site 23 to the west of Banner Ridge to 347 almost due south of it is 2.6 km. The distance from site 347 to 576 is just under 1 km. Large sites appear to be situated at the edge of a slight rise, above a valley, with an elevation range of 2240 m for site 576 at the lowest to 2700 m for site 1971 at the highest elevation. The large sites are located within pinyon forest; there is presently no permanent water, but snowfall would provide a reliable water supply for the

winter months. The distances at Banner Ridge are similar to those Jackson has found, a maximum of 3,000 meters, while we found large sites 1 to 2,000 meters apart. The distribution of smaller sites remains to be studied. While 103 sites have been discovered, these are only sites situated along unpaved roads. With a spatial distance of 1-2 km between large sites, there may be at least two more undiscovered large sites situated along the ridge.

Sites and Bedrock Mortars

Table 3 gives a comparison of sites with bedrock mortars and rock rings. There are 25 sites with bedrock mortars, 21 sites with bedrock mortars and rock rings. There are 8 sites with bedrock mortars and no rock rings. There are 25 sites with rock rings and no mortars. Two sites have very large numbers of bedrock mortars and no rock rings. These are sites 79 with 28 mortars, and site 23 with 25 mortars. The median number of mortars is 2, and the average is 7.08 mortars per site, skewed due to many sites with one or two mortars, and the very large number of mortars at sites 1971 (45), 79 (28), 23 (25) and 347 (25). There are nine sites with just one mortar and either no rock rings or up to five rock rings. There is one site with one mortar and 16 rock rings.

A chi square test of significance was run to test the null hypothesis that there is no relationship between sites with bedrock mortars and sites with rock rings. If rock rings are features for the storage of pinyon seed, and mortars are features for the processing of pinyon the Chi square test should demonstrate if there is a relationship between the location of storage features and mortars.

The chi square test for significance is set up as follows,

Sites	-BRM	+BRM	Totals
+RR	25	16	41
-RR	51	9	60
Totals	76	25	101

$$\chi^2 = \frac{(101)[(25 \times 9) - (16 \times 51) 101/2]}{41 \times 60 \times 76 \times 25}$$

$$\chi^2 = 6.3129 \quad \text{degrees of freedom} = 1$$

The chi square was calculated at a value of 6.3129, with the Yates correction because of the low frequency, less than 10, within a cell.

With 1 degree of freedom, if the calculated value does not meet or beat the table value the null hypothesis holds: there is no relationship between sites with bedrock mortars and sites with rock rings. At a .05 alpha level the table value is 3.84; with an alpha level of .01 the table value is 6.64. The chi square of 6.3129 is not significant at $p < .05$ but with a $p < .05$ it is significant. This indicates that there is a relationship between sites with rock rings and sites with bedrock mortars but it is more complex. There is no simple one to one correspondence such that sites for the collection and storage of pinyon nuts are also the sites for processing pinyon nuts. Some other factors are going on that remain to be studied. All sites with groundstone included bedrock mortars there was no site with just pestles, manos or portable mortars present, without bedrock mortars.

It has also been suggested that rock rings are seasonal habitations perhaps used as habitations and then left as storage caches. Rock rings often include smaller cache rings attached to the larger ring, sometimes the larger rock ring is separated up to a meter from the smaller cache ring. This OHV survey did not record the number of caches attached or separate from rock rings, but it was observed that close to 50% of rock rings had smaller, approximately 1 meter diameter caches.

Table 3**GROUND STONE OF BANNER RIDGE COMPARED TO ROCK RINGS**

Site	Date BP	Ground Stone	Rock Rings	House Depression	Rock Shelter	C-Shape
1971	0	45	5	0	1	1
79	0	28	0	0	1	0
347	3500-700	25	12	0	0	2
23	8000-100	25	0	0	0	0
350	8000-1400	7	2	0	0	0
346	3500-1300	6	4	0	1	0
71	0	6	0	0	2	0
1932	8000-1400	4	4	0	0	0
1973	3500-1300	4	2	0	0	0
1930	8000-700	4	2	0	0	0
1934	0	4	1	0	0	0
21	8000-100	3	0	0	0	0
576	3500-1300	2	12	0	0	0
1929	0	2	1	0	0	0
328	3500-1300	2	0	0	1	0
1974	1500-700	1	16	3	0	1
427	0	1	5	0	0	0
1994	0	1	2	0	0	0
25	100	1	1	0	0	0
98	8000-1300	1	1	0	0	0
1931	0	1	1	0	0	0
1944	0	1	1	0	0	0
18	3500-100	1	0	0	0	0
1980	900-100	1	0	0	0	0
Iso 1		3				
Iso 2		1				
Iso 3		1				

Table 3 shows only Banner Ridge sites with ground stone, 24 sites, and compares the number of ground stone items with the number of rock rings, house depressions, rock shelters and C-shaped structures found at the sites. All groundstone is included; bedrock mortars, portable mortars, pestles, manos and ground stone bowls. The three Isolates of ground stone artifacts found on Banner Ridge were included: Isolate 1, a bedrock mortar with three slicks, Isolate 2 a portable slick and Isolate 3 a portable slick.

Food Processing in the Ethnographic Record

Sources used are Steward's "*Ethnography of the Owens Valley Paiute*" (1933) and his "*Basin-Plateau Aboriginal Sociopolitical Groups*" (1938). The Mark Kerr Manuscript, "*The Shoshoni Indians of Inyo County, California*" has provided comparative information. Mark Kerr was born in Kinlouch, Ireland in 1883, enlisted in the American Expeditionary Forces during WWI. He settled in Independence California where he served as the Eastern California Museum's first curator. He had a strong interest in botany and in 1936 he compiled Shoshoni folk history and customs into a manuscript, that was edited by Charles N. Irwin in 1980 who worked with Paiute informants on the editing of the manuscript. Another source is "*Survival Arts of the Primitive Paiutes*" by Margaret M. Wheat. She was a geologist exploring the area with her husband during the 1940's who recorded an extensive ethnographic record on Paiute life.

It is very clear from the OHV survey that pinyon gathering continues undiminished in Banner Ridge. We came across evidence of very large, modern plastic storage containers, earth scooped out to hold pinyon nuts under favored trees, pinyon sticks left in trees, some brittle and old, some still usable. Four-wheel roads leading to pinyon areas were reinforced in places by stone road

improvements, water channeling and rocks lining the dirt tracks. Modern fire pits and trash are situated within archaeological rock ring sites. No ethnographic information has been gathered about the Banner Ridge pinyon gathering sites, but Julian Steward described Shoshoni-Paiute life (Steward 1938). His map indicates that northern Paiute from Fish Springs in Owens Valley and Fish Lake Valley are two groups that had villages close to Banner Ridge, within 20 miles as described by Steward (1938). The Shoshoni of Lida, in Fish Lake Valley of Nevada are also close by according to Julian Steward. Banner Ridge may possibly have been a shared resource area for the Lida area people. (See Map 3, from Steward 1933).

It's not known if Banner Ridge was divided by band ownership and if grass seed and pinyon nut gathering, antelope and mountain sheep hunts followed this general pattern of resource division and sharing. Steward does say that beyond the village of lowlands arid foothill areas afforded seeds of *Oryzopsis and Stipa* (Steward 1938:50). Every two years or so pine nuts would be plentiful and ripe in the fall for harvest. When the Chief had decided, family bands traveled to the uplands to their own area where they harvested nuts, gathering and caching in large quantities. Some were taken down to the valley village homes when the family returned and more could be brought down when needed. In March or April seed foods were finished and families left the winter villages, gathering early green foods in the valleys and hunting.

Grass seed and pine-nuts were gathered in the White and Inyo Mountains, each area bounded by natural landmarks known in detail to members of the band. Throughout Owens valley seed areas were band-owned. Territories were rectangular extending from the crest of the Sierra Nevada Mountains across the valley floor to the heights of the White and Inyo Mountains in the east. At

George's Creek village to the south, inheritance was matrilineal, at Fish Springs and Big Pine inheritance was patrilineal.

Deep Springs Valley food gathering range extended 250 miles according to Julian Steward (1938). They did not have ownership of food areas, including seed harvesting lands and Steward's informants thought such a concept strange. When nearby pine nut harvests were less, the people went into Fish Lake Valley or anywhere in the White Mountains, avoiding the Owens Valley village areas. Areas for a family to gather pinyon and grass were agreed upon before they began harvest, and disputes over seed resources were settled without fighting. People who had had a bad harvest were not denied gathering rights, they were assigned areas.

Fish Lake Valley Paiute lived very similar lives to those people in Owens Valley. The proximity to the arid White Mountains instead of the Sierra Mountains made differences, though. The steep, arid White Mountains on the east and the low arid ranges on the west (here, Steward is probably referring to Banner Ridge and other arid mid-valley ranges) defined the resource area (Steward 1938:61). Families gathered pine nuts and seed and there was no ownership of pine nut groves here.

Pine nuts were the most important food, as it lasted the longest. Meat was secondary as it was usually eaten right away. Pine nuts lasted all winter in good years, other seed lasted a few weeks or at most two months. One informant rated *Mentzelia*, 'tonopuda', *Salvia*, and *Oryzopsis* 'wai', as the most important grasses. 'Wai' was also called sand bunch grass, because it grows on sandy soil and because of one technique for harvesting it. The collector beats the grain into a seed-

collecting basket with a seed beater, both are called ‘*tanayhi*’. She lays the cut ‘*wai*’ on a bed of fine sand and burns the chaff off. She then sifts or winnows the ‘*wai*’ through an open twined basket (Kerr 1980:11-16). The grain is ground on a stone slick with a mano and could be eaten dry or prepared as mush. In Owens Valley it was boiled in pots and stirred with a looped stick. At Mono Lake mush was made using hot rocks stirred in a basket with a looped stick (Steward 1933:239-240. Steward says that rice grass was gathered all over but never irrigated (Steward 1933:244).

Steward says *Elymus condensatus* is called ‘*wai’ya*’ in Owen’s Valley, and called ‘*wad’odova*’ at Fish Springs. Large sources he names are at the mouth of Bishop Creek and Oasis in Fish Lake Valley (Steward 1933:244). He includes Muir’s 1870 report of it growing in wetlands below Moraine Lake, six to eight feet tall, with seed heads from six to twelve inches long and seeds about 5/8 inch long. “The women were gathering it in baskets, bending down large handfuls, beating it out, and fanning it in the wind.”

The Kerr Manuscript describes harvesting wild wheat, identified as either *Agropyron trachycaulum*, *Elymus cinereus* or possibly *Oryzopsis hymenoides* ‘*wai*’.

“All the Indian women get up early in the morning and go out to the sand dunes in Saline Valley. They pack their pinenut baskets, ‘*oh sa*’ on their backs and start out. When they get there they cut the wheat and put it into the ‘*oh sa*’. About noon when it gets too hot they quit and go home. When they get home they put the ‘*oh sa*’ out to dry. When the seeds drop out they would grind them. ...Not only do they gather the wheat during the day but they also gather it at night by the light of the moon. They dried it out good, then they would gather it all up, thresh it and pack the wheat good in the ground. Then they gather bunchgrass ‘*who ky*’. When this is harvested they gather ‘*ark ker*’ *Helianthus annus*. When they have

enough gathered they put it into a cave and use it just as they need it.” Mamie Gregory. (Kerr 1980:15).

It is doubtful this describes ‘*wai*’ harvest, because it is not necessary to “cut the wheat” as the quote says. With ‘rice grass’ the grain drops off or it can be stripped easily into a basket. More likely its *Elymus* spp. the thick, tough, stringy stems are preferably cut.

Populations were low and scattered, although very mobile. In the late 1800’s around 1880 to 1900 the population of Fish Lake Valley was about 100 in eight villages of one to four families with a total of sixteen families in the valley (Steward 1938:62). People moved very freely throughout the whole region, and a person might have relatives from southern Owens Valley, to Hot Creek east to the White Mountains and beyond.

Fall pine nut harvests were made by all members of the family, who would take as much as possible to the summer house in the valley, or, families could build a winter house and stay in the mountains near their pine nut area. The fall festival took place after the pine nut harvest sometimes in conjunction with a rabbit drive. Antelope and mountain sheep were hunted by groups of men (Steward 1938).

Discussion

The three year OHV survey has been the most extensive, inclusive cultural heritage survey attempted to date on the Inyo National Forest. It has given Forest archaeologists an inventory of resources to improve the management of public lands that are heavily used by a great number of people and businesses. However, the survey covered only part of the Forest, and only roads and

trails accessible by motor transport. This has the advantage of quickly surveying a larger area. It also means that areas readily accessible now, would probably have been areas readily accessible in prehistoric times. There may be areas that are not as easily accessible by motorized transportation that have sites, including large multi-component sites. The OHV survey has not been designed to recover this information.

Banner Ridge appears to have been used seasonally since the earliest occupation time of 8,000 years BP, as dated by the Pinto projectile points. There does appear to have been an increase in occupation, if the increase in the number of Elko and Rose Spring projectile points is used as an indicator. Humboldt projectile points do not provide any dating information as they were specialized tools used for big game hunting. Their high numbers do suggest frequent and continued deer and antelope hunting on the ridge.

The rock ring distributions show that most rock rings range in size from 3 to 5.5 meters diameter. There are large numbers of rock rings and mortars at five sites -- 1974, 347, 576, 1971 and 23 are dated by surface artifacts to Elko and later occupations 3500-100 years before present. This demonstrates that later site use intensified and focused on pinyon gathering, storage and processing. Preliminary settlement pattern analysis from the survey suggests that large sites are situated approximately every 1 to 2 kilometers, on mid-slopes with an elevation of between 2240 and 2700 meters.

There are today extensive stands of *Elymus* and *Achnatherum* spp. grasses in the swales and boggy valleys of Banner Ridge. This food resource would have been available to the early inhabitants. Groundstone artifacts suggest that it formed a constant seasonal source of food.

There is some relation between bedrock mortars and rock rings, but not a direct linear relationship between the number of bedrock mortars and the number of rock rings. This study suggests that there is some other influence or factor that remains to be studied. The results of the chi square shows that there is no simple one to one correspondence between sites for collection and storage of pine nuts and sites for processing pine nuts. Some other factors are going on that remain to be studied. Mortars indicate food processing, and rock rings indicate pinyon storage. There are sites that have large numbers of mortars, such as site 79 with 28 mortars, but with no rock rings. One question is, how was the pinyon processed in large quantities, as indicated by large numbers of mortars, without large amounts of pinyon stored nearby?

The rock art on Banner Ridge could provide some answers in several areas. If rock art can be integrated into the regional picture as a means of communication, the location of rock art within Banner Ridge may provide information on the communication network of Banner Ridge. The location of rock art on Banner Ridge could be related to the placement of large sites. The presence of two petroglyph panels at site 1971 may indicate a relationship between rock art and large rock ring sites. There is not enough data available to address this part of the settlement pattern of Banner Ridge.

Evidence of trade can be seen on the ridge in the variable distribution of obsidian from different sources. The north end shows more from Glass Mountain, the south end shows more from Casa Diablo sources. All sites show a variable distribution of imported stone materials in almost all of the Banner Ridge sites, demonstrating that the distribution of lithics involved more than personally obtaining and using stone for tools. A study of the lithic sources and tools of Banner Ridge would reveal more information.

Factors Affecting Banner Ridge Sites Today

Banner Ridge shows signs of hunting and camping, especially on accessible sites. Rock rings draw people's attention, with the result that rock rings are driven over by vehicles, rocks are moved around, rearranged to line paths and surround trees, as in a park-like setting, and rocks from rock rings are moved to form fire pits. This type of re-use has been continuing since early historical times, as the age of the earliest match-stick food cans and glass bottles can attest. Mining prospectors, shepherders and now hunters, campers and 4-wheel drive enthusiasts have disturbed the prehistoric sites. Parts of Banner Ridge are very heavily impacted by shepherders camps, who now shelter their sheep overnight in the same protected spots that also appealed to the early Indian inhabitants.

There is the inevitable erosion and deflation caused by the annual freeze thaw cycle and spring snow melt. This cycle of ground heaving brings artifacts to the surface and alternately buries them. At the surface the snow melt and rain run-off shift rock and artifact down slope. The harsh winter climate is degrading the bedrock of the bedrock mortars, the ground stone artifacts and the rock rings, as volcanic tuff is soft rock and surface granites are subject to spalling.

Present Day Paiute and Shoshoni Gathering

The current Paiute and Shoshoni Indian population continue to use the pinyon gathering lands in traditional ways. The OHV survey discovered some signs of the continuing use of the land in traditional ways, with some modern influences. We observed road reinforcement with rock retaining walls, unpaved roads were lined with rock leading to rock ring sites. Pinyon cone gathering sticks were left at sites, some old and too brittle to use now, but clearly wedged in trees for later use, some showing signs of current use. Shallow earth pits were formed under some pinyon trees to make gathering the cones and nuts easier. Some sites had modern storage containers kept on site, possibly for the collection of pine nuts.

This subject of modern use of traditional lands would be a very useful study into the continuing importance of traditional gathering grounds to the Paiute and Shoshoni people from the surrounding towns. Ethnographic survey and interviews are needed to link continued land use with Paiute families and lineages and the length of time land has been used by a particular family in living memory. Questions of continuity, the role of traditional land use in families could be addressed. It would, in fact, provide a study in continuity and tradition into the 21st century.

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