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# THE IDAHO ARCHAEOLOGIST



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# Idaho

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# ARTICLE

# A Report on Recent Archaeological Excavations at Three Island Crossing (10-EL-294), Southwest Idaho

JOSEPH D. WARDLE, MARK G. PLEW and ROYCE JOHNSON

## Abstract

This paper reports on test excavations at 10-EL-294 that were conducted in 2013, 2018 and 2019. Findings support the general conclusions of the original investigations (1986-87) and Eastman's 2010 explorations at Three Island Crossing.

KEYWORDS**:** Three Island Crossing, Glenns Ferry, Middle Snake River, Mobility, Fishing

## Introduction

Three Island Crossing (10-EL-294) is a Late Archaic site located near Glenns Ferry, Idaho – a site that has remained of interest in the archaeology of southern Idaho following the excavations conducted in 1986 and 1987. The range of archaeological data collected during those field projects has been useful in addressing the major research questions that are central to archaeology of the Middle Snake River, namely the scale of anadromous fish use and whether the archaeological record matches the ethnographic model of local subsistence described by Steward (1938, see Gould and Plew 2001). Recent excavations in 2013, 2018, and 2019 have continued these investigations and are formally reported here.

Three Island (10-EL-294) is situated on the north river terrace of the Snake River approximately two miles southwest of Glenns Ferry, Idaho within the westernmost edge of the Hagerman Valley (Figure 1). An area of approximately 100 square meters is located near the center of the terrace some 170 meters west of the Three Island State Park access trail and 10 meters south a fence line separating private from state park lands. The importance of salmon to the diet of prehistoric foragers on the western Snake River Plain is based upon the accounts of Steward (1938) and Murphy and Murphy (1960). One explicit goal of the initial inquiry of the archaeological site at Three Island Crossing was to assess whether the data supported this economic model as some archaeologists have relied heavily upon historical and ethnographic records (Meatte 1990; Pavesic 1978; Pavesic and Meatte 1980), with little consideration of the limitations of such sources (see Gould and Plew 2001; Kelly 1996). Use of this location occurred over a 400 or 500-year period. Three radiocarbon dates were obtained ranging from 580 ± 180 B.P. (TX 5724) to 970 ± 60 B.P. (TX 5722) (Gould and Plew 2001). The radiocarbon dates and presence of pottery and projectile point types such as the Desert Side-Notched suggest a series of occupations throughout the Late Archaic.

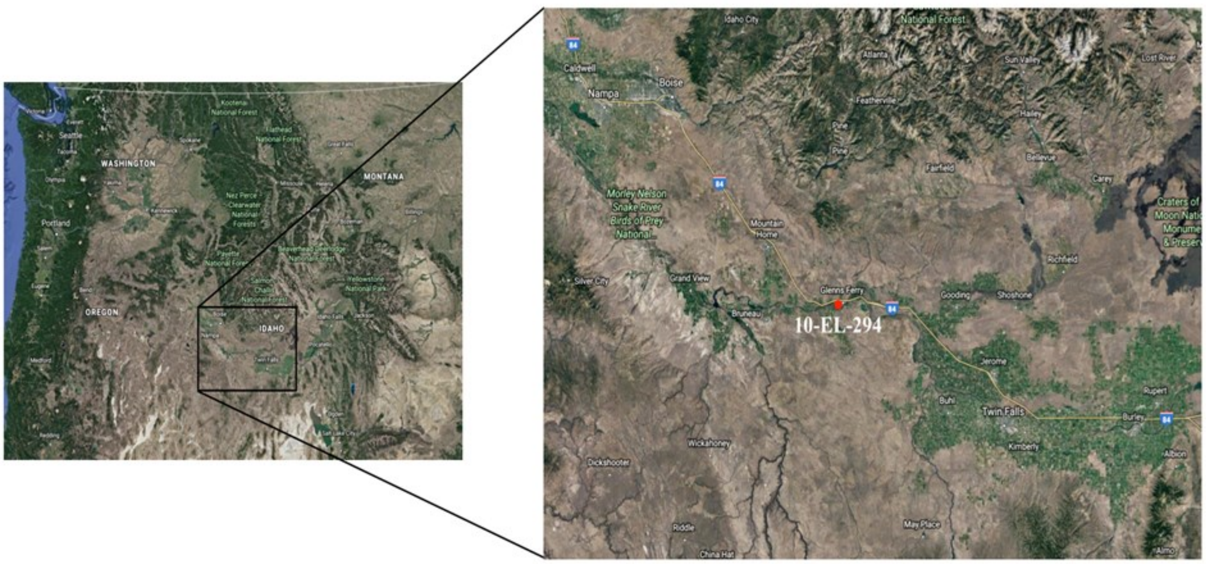


**Figure 1. Map of site location within southwest Idaho.**

## Previous Excavations

### <u>1986-1987</u>

Following the discovery of Three Island Crossing (10-EL-294) by Mrs. Esther Pusey, Boise State University excavated two 1 x 2-meter test units in March, 1986. These revealed a dark-stained cultural lens at a depth of 20-30 centimeters (Gould and Plew 2001). Late Archaic projectile points, pottery sherds, and fish remains were recovered. What followed were extensive excavations during the summers of 1986 and 1987. The investigations sought the age and nature of the occupations; the depositional and post-depositional history of the site; the function of the site and whether that changed over time, and whether it was a fishing site (Gould and Plew 2001).

The post-depositional history of the site is characterized by significant disturbance. First, the crossing of the Oregon Trail during the 19th century may have had an impact on the site. Travelers historically crossed at Three Island west of the site and there are records of interactions with native communities. During the early 20th century, some mining occurred west of the site area. While the mining had no direct effect on the site, a road was extended running through the site from east to west. The excess sediment from the road may have been turned over onto the top of the original surface of 10-EL-294. This might explain the density of cultural material recovered in the area of the 1986-1987 excavation (Gould and Plew 2001). Potato farming occurred at the site until 1983.

Faunal remains recorded during 1986 and 1987 included 19,000+ individual fish remains that consisted of highly fragmented remains of head parts and ribs. Based on a calculation of the minimum number of individuals (MNI), only 300-400 fish are represented. These were associated with three radiocarbon dated occupations. Although a sampling bias is possible, the prospect of preservation of remains is better than often proposed (Gould and Plew 2001).

Analyses of the 1986-1987 excavations also concluded that the total nutritional value of the quantity of fish at Three Island Crossing (10-EL-294) is half of what a typical domestic unit would need to subsist through the winter period from December to March (a minimum of 1,270 kg) (Gould and Plew 2001; Plew 1990). Gould and Plew (1996, 2001) have argued that the costs of harvesting, processing, and storing salmon for winter (Plew 1990) made bulk procurement less optimal. The MNI of deer (n=30) would have undoubtedly provided greater nutritional value than a few hundred fish (Gould and Plew 2001:95).

An additional inquiry relates to the degree to which site function can be inferred and how this site compares to nearby sites. Long-term caches or residential bases are notably under-represented along the river (Plew 2003). Feature No. 7, an apparent occupational surface with extensive fire-cracked rock and mussel shell fragments, was recorded ca. 10 meters south of the fence and contained two attached storage pits measuring ca. one meter in diameter. Fish remains, including partially complete remains of a salmon, were associated with the feature (Gould and Plew 2001). At no other site adjacent to the Middle Snake River is there a storage feature with associated fish remains. The second storage pit was of similar dimensions and contained fewer cultural items than the first. This suggests that any storage was short-term and not consistent with decreased residential mobility typical of the mobility pattern proposed by the ethnographic record. A housing structure, Feature 5, was 2.5 m in diameter and 25-30 cm in depth, similar to other housing structures excavated at Hagerman (Pavesic and Meatte 1980) and Givens Hot Springs (Green 1982).

A total of 1,413 artifacts were recovered during the first two excavation seasons. Using Winters' (1969) functional classification, the site produced 947 domestic items, composed mostly of pottery sherds (N=935), 245 weapons, 129 general utility items, 49 fabricating tools, and 21 decorative items (Gould and Plew 2001). While the assemblages of sites in southwest Idaho are relatively homogenous, the number of general utility items at Three Island Crossing was relatively higher than expected. Lithic debitage analysis also suggests retooling rather than production, with a majority of flakes less than 1 cm in diameter. Of the 13,885 lithic flakes recovered, 53.2% were consisted of basalt (Eastman 2011). This raw material frequency is similar to that of nearby sites and reflects the possibility of initial production at the nearby Bell Mare basalt quarry.  Diversity among toolkits and use-wear analyses suggest generalized and expedient use (Gould and Plew 1996; 2001).

The data collected during the first two summers of excavation at Three Island Crossing (10-EL-294) were utilized in the analyses of publications and presentations throughout the 1990's (e.g., Gould and Plew 1994; Plew 1997). A monograph that comprehensively described and analyzed the data was published in 2001 (Gould and Plew 2001).

Subsequent excavations in 2008 and 2010 continued to address the research questions that guided the first excavations. In addition, these later excavations investigated the horizontal extent of the site, the spatial distribution of cultural material, additional evidence of the post-depositional history of the site, and the relative importance of fishing, hunting and gathering (Eastman 2011).

2008 Excavations

The Boise State University Archaeological Field School conducted an excavation in the summer of 2008 that was located east of the 1986-1987 excavation. A datum was established relative to the most eastward unit from the 1986-1987 excavation, accurate to within approximately 20 cm (Eastman 2011). A total of 17 1 x 1 m units were excavated to a depth of 40-60 cm and the entire site area was augured at one-meter intervals to a depth of 100 cm (Eastman 2011).

Additional observations about the post-depositional history of the site were made in 2008. Considerable undulation was noted across the terrace where the site is situated. The site area may have been levelled at some point. A berm extending east to west is believed to have been part of the original surface. A shallow, 50-cm wide water diversion ditch runs east to west through the center of the site.

The 2008 excavation concluded that cultural deposits extended approximately 40 m east of the original excavation. The conclusion that the site was occupied multiple times over the Late Archaic was supported by data recorded during the excavation. The site function reflected activities such as retooling (70% of flakes were <1 cm in length) (Wilson and Plew 2008). No features were recorded, but the site produced 17 artifacts (3 weapons, 9 general utility tools, and 5 domestic items).

Of particular interest was the faunal evidence produced. A total of 86 vertebrate faunal remains was recovered. Most were unidentifiable, though likely from mammals such as rodents or rabbits. One deer bone fragment was recorded. No fish remains were documented in any of the excavation units or auger probes.

2010 Excavations

The 2010 excavation, conducted by the Boise State University Archaeological Field School, had a number of objectives: 1) delineate site boundaries and the geomorphic and stratigraphic nature of the site; 2) identify the age of cultural deposits and the number of occupations; 3) describe the technological organization of the artifact assemblage; 4) describe the diet breadth based on faunal evidence; and 5) investigate levels of residential mobility (Eastman 2011). The excavation included thirty-three 1 x 1 m units across the western portion of the terrace, constituting a 3,750 $m^2$ portion of the site. An additional 14 auger tests were conducted to a depth of 50 cm around the peripheral margins of the excavation (Eastman 2010).

The excavation produced ten features and 155 prehistoric artifacts. The functional classification scheme indicated that 52% of artifacts were domestic, 21% weapons, 17% fabricating, 7% general utility, and 3% decorative. Similar to the 1986-1987 excavation, there was a relatively even distribution of artifact types. This is the pattern expected among relatively more mobile groups with a generalized toolkit (Gould and Plew 1996). A total of 1,454 lithic flakes were recovered during the 2010 excavation. Basalt was the predominant raw material type among lithic flakes and the majority of flakes were less than 3 cm in length. This is similar to the characteristics of the lithic debitage produced during the 1986-1987 excavation. Of the five objectives of the 2010 excavation, two are of significant importance in understanding the history of research at Three Island Crossing— diet breadth and level of residential mobility.

Zooarchaeological evidence from the 2010 excavation included 985 specimens of fish (MNI=45), 102 small-sized mammal bones, and 347 medium-sized mammal bones (Eastman 2011). A comparison of the caloric return of deer and salmon was conducted for the one deer and 45 salmon produced. Each salmon was estimated to consist of approximately 5 lbs (2,265 g) of edible meat and 176 kilocalories/100 g; the one deer was estimated to consist of approximately 100 lbs (45,300 g) of edible meat and 126 kilocalories/100 g (Eastman 2010: 104-105). The results suggest that a far greater proportion of the diet would have been composed of fish at this location: 179,388 kcal of fish versus 57,078 kcal of deer (Eastman 2010). The same calculation revealed that the faunal assemblage of the 1986-1987 excavation represented 1.59 million kcal of fish and 1.43 million kcal of deer, a more even distribution (Eastman 2010).

It is reasonable, when considered with other lines of evidence, to expect that fishing comprised a significant proportion of the subsistence activity at Three Island Crossing. However, the amount of fish recovered could not support significant village-level populations through the winter period. Of note are the results of Eastman's (2010) study that fail to account for faunal uses beyond deer and salmon. If "the mechanism forcing population shifts and determining village size were the anadromous fish runs" (Pavesic and Meatte 1980: 21), then one would expect more specialized toolkits, more evidence of long-term storage, and lower levels of residential mobility than are present at Three Island.

The question of what level of mobility the site represents has been a central question in previous analyses of 10-EL-294. It was also central to the question of whether the assemblages of the area excavated in 2010 reflect high or lower levels of residential mobility. This question was hastily answered by those proponents of the fishing village hypothesis (Pavesic and Meatte 1980) with minimal skepticism toward the ethnographic model and no consideration of the archaeological variables that could be used to infer levels of mobility.

Although it is a simplification, the utility of Binford's (1980) forager-collector continuum has proven useful in differentiating organizational strategies for resource procurement and the varying products of the behaviors that result from these strategies, which often leave traces in the archaeological record. A foraging pattern of economic organization moves people to resources where residential mobility is high and storage is low, while a collector pattern of economic organization moves resources to people through logistically organized task groups (Binford 1980). The former is characterized by a variety of activities and low-visibility locations left in the archaeological record, and the latter is characterized by reused locations with high-visibility, field camps created by logistical task groups, and caches of bulk resources (Binford 1980). The archaeological data from 2010 suggests a mobile foraging pattern. Eastman (2010) utilized Kelly's (2001) index that infers levels of residential mobility from variability in 14 lithic criteria. Eastman (2011) found that 10 of 14 criteria from the 2010 excavation suggested high residential mobility (Table 1). This number of criteria suggesting high residential mobility is similar to that of nearby sites: 10/14 for Swenson (10-EL-1417), 10/14 for 10-EL-215, 12/14 for King Hill Creek (10-EL-110), and 13/14 for 10-EL-216 (VanWassenhove et al. 2018).

In summary, previous excavations (1986-1987, 2008, and 2010) indicate high levels of residential mobility, some evidence of short-term storage, a relatively higher frequency of fish remains than nearby sites, generalized toolkits, and retooling reduction strategies. The site represents the activity of highly mobile hunter-gatherers engaged in a foraging mobility pattern that moved people to an array of seasonally available resources.

**Table 1. Kelly's (2001) Index of Residential Mobility applied by Eastman (2011).**

| | High Residential Mobility | Low Residential Mobility | 10-EL-294-2010 |
|---|---|---|---|
| Lithic Raw Material | CCS/Volcanic Glass | Siltstone, Tuff, Rhyolite | Even |
| Bifaces as Cores | Common | Rare | Rare |
| Bifaces as Bi-products | Rare | Common | Rare |
| Bipolar Knapping/Scavenging | Rare | Medium to Common | Rare |
| Flake Tools | Rare to Medium | Common | Rare/Medium |
| Fire-Cracked Rock | Rare | Common | Rare |
| Site Size/Density | Small/Low | Large/High | Small/Low |
| Tool/Debitage Ratio | High | Low | Low |
| Biface/Flake Tool Ratio | High | Low | Low |
| Complete Flakes | Rare | Common | Rare |
| Proximal Flake Fragments | Common | Rare | Common |
| Distal Flake Fragments | Common | Rare | Common |
| Angular Debris | Rare | Common | Rare |
| Assemblage Size/Diversity | Low Slope | High Slope | Low Slope |

## Recent Excavations in 2013, 2018, and 2019

Recent excavation conducted by the Boise State University Archaeological Field School during May and June of 2013, 2018 and 2019 sought to further document the spatial distribution of cultural material throughout the site, reassess the original research questions with new data when possible, and create a comprehensive map displaying the locations of excavation units from the more recent excavations. The data collected from these excavations suggest that the cultural materials at Three Island Crossing are spatially concentrated in only a few areas, primarily the location of the original excavations in the late 1980's. Data from these three excavations support the most important conclusions of previous excavations (e.g., Eastman 2011; Gould and Plew 1996) that the site represents fishing activity and storage but only within the overall economic strategy of high residential mobility and generalized foraging (Gould and Plew 2001).

As stated in the report of the 1986 and 1987 excavations, a continual reevaluation of conjectures about the past is a fundamental part of archaeological investigations (Gould and Plew 2001:2). With that in mind, we report data recorded from the three most recent excavations in an attempt to re-address the extent of fishing, site function, and mobility. In addition, we produce a map showing the location of the different excavations.

## Methods

A datum was established in 2013 ca. 14 meters south of a fence and ca. 45 meters north of the river (Figure 2). The 2018 datum was placed as near as possible to the bulk of 2013 units 50 meters east of the 2013 datum based on surface evidence of 2013 excavation test units. A baseline from a previously excavated unit was visible in the floor and north wall of 2018 unit 12N-11E, likely a unit from 1986 or 2010. The 2019 units were placed centrally between the original excavation and the area explored during 2008 (see Figures 2 and 3).

A standard 1 x 1 m grid was superimposed onto the surface with a central Y-axis running north to south and an X-axis running east to west, eight meters north of the datum. Test units were placed along this X-axis, other than one unit placed within a clearing to the southwest of the datum. A standard transit was used to take elevation and distance measurements from the datum.

**Figure 2. Overview of 2018 excavation looking west.**

The locations of 2013 units visible on the surface were flagged. A map was made featuring the 2013, 2018 and 2019 units (Figure 3). The topography of the 2018 excavation area is highly uniform. A standard transit/theodolite and handheld GPS were used to measure the east to west length of the river terrace upon which the site is situated—encompassing the original excavations at its eastern edge and the 2010 excavation units at its western edge. An overview map was created of the extent of the entire site.

Units were excavated in arbitrary 10-cm levels by shovel shaving, hand troweling, and brushing. Each unit was designated by the distance of its NW corner from the datum. The first level began at the top of metal stakes 5 cm above the surface at the NW corner of the unit. The sediment removed from each unit was screened through 1/8$^{th}$ inch hardware mesh. Each level floor was photographed and drawn. Once excavation of a unit ceased, a final profile of each wall was drawn. Artifacts were sorted in the field by morphological or descriptive type and assigned a catalog number. Lithic debitage was analyzed by size range and raw material type. Thermally altered rock and freshwater mussel shell fragments were noted on level records, but not collected.

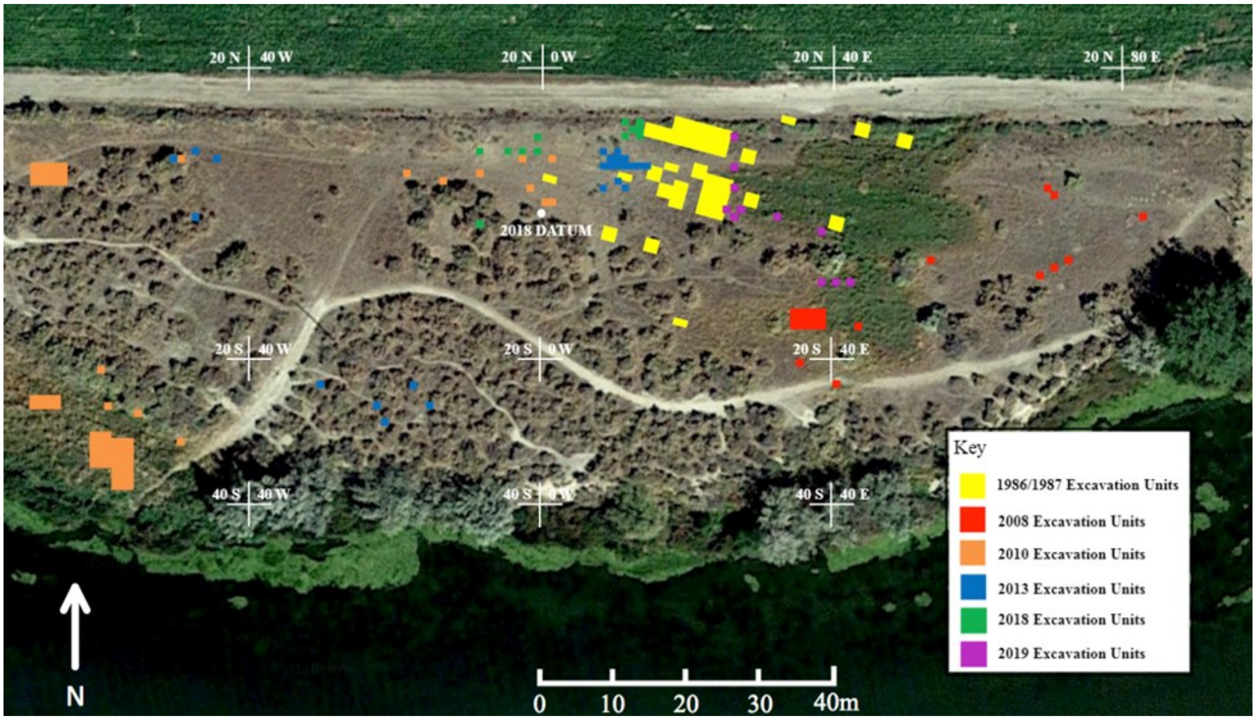


**Figure 3. Plan map Showing Locations of all Excavations including of the 2013, 2018, and 2019 excavations.**

## Sediments and Stratigraphy

No sediment samples were taken due to extensive sediment analyses conducted during previous projects. Sediments in the area are mostly aeolian deposits that consist of 75-85% sand and 12-18% clay/silt mixed with small gravels (Bentley 1981). Previous excavations have found higher than normal levels of phosphorus in sediments near areas of significant cultural activity (Gould and Plew 2001).

Sediments observed in 2018 excavation units (Figure 4) ranged from dark grayish brown (10YR 4/3) to a light sandy color (10YR 5/3), similar to Munsell (2009) readings from 1986/87 excavation units 10-20 meters to the east (Gould and Plew 2001). Within the upper 20 cm of the sediment deposit there is significant disturbance which is likely due to agricultural or mining activity. Post-depositional impacts include farming that occurred into the 1970’s. It appears that a portion of the site may have been leveled at some point, as evident from a large swale in the eastern end of the site (Eastman 2010). It is also likely that an access roadway ran east to west just south of the fence, within 10 meters of ca. 70% of the surface area of total excavations conducted over the years.

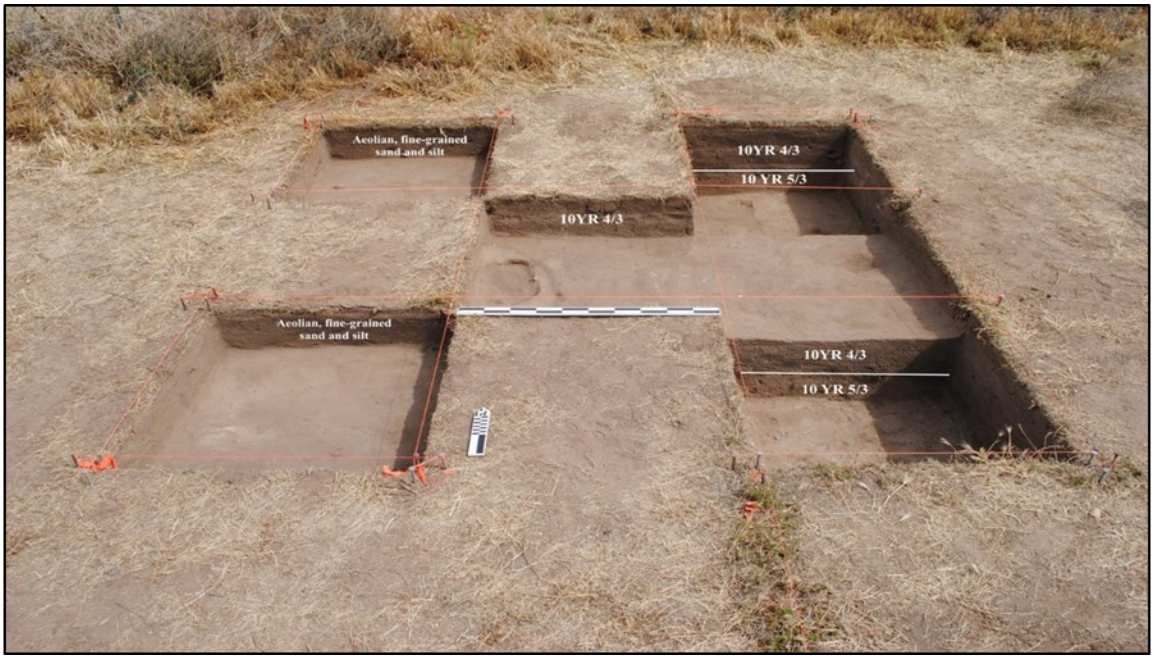


**Figure 4. Stratigraphic profile of excavation units 13N-10E, 11N-10E, 12N-11E, 13N-12E, and 11N-12E, which had 11N-12E, which had relatively uniform stratigraphy and evidence of disturbance.**

## Material Culture

Cultural materials from both the 2013 and 2018 excavations were typed and functionally classified based on Winters' (1969) classification scheme. The categories include weapons (e.g., projectile points), domestic tools (groundstone, ceramics), fabricating tools (cores, drills), general utility tools (knives, bifaces, worked flakes, hammerstones), and decorative items. The site also produced historic 19th century items. A typology for each excavation is presented. Description of general morphology, size ranges, and material types are included. Measurement in centimeters are given as length, width and thickness.

## Typology of Material Items Recovered From 2013 Excavations

### A. Projectile Points and Point Fragments

1. Desert Side-Notched Points

Number of Specimens: 3

Form: Small triangular points with straight to concave margins and convex base. The points are biconvex in cross-section.

Size Range: 1.9-2.1L x 1.1-1.2W x 0.2-0.3T cm

2. Eastgate Points

Number of Specimens: 4

Form: Triangular points with blades ranging from a mixture of straight to concave to convex. Corner notches are generally deep, creating prominent tangs. All stems are expanding with basal elements.

Size Range: 2.7L x 1.8-2.0W x 0.3-0.4T cm

Material: Basalt (n=2), Obsidian (n=2)

3. Rose Spring Point

Number of Specimens: 4

Form: Narrow triangular points with slight corner notches and a convex cross-section. Two specimens are broken at the base at a 30-degree angle. One specimen is broken just above the base and at the tip.

Size Range: 2.3L x 1.1-1.4 W x 0.3-0.4T cm

Material: Obsidian

4. Small Stemmed Point

Number of Specimens: 1

Form: Triangular mid-section fragment with straight lateral margins and a biconvex cross-section. The specimen is thinner in cross-section on one side.

Size Range: 2.1L x 1.1W x 0.2T cm

Material: Cryptocrystalline

5. Large Stemmed Point

Number of Specimens: 1

Form: Large point with a slightly convex base and concave margins. The point is broken laterally across the body of the point.

Size Range: 3.5L x 2.3W x 0.8T cm

Material: Basalt

6. Point Tips

Number of Specimens: 7

Form: Triangular point tips which are broken between approximately one and two centimeters below the distal end of the specimens.

Size Range: 1.1-2.0L x 0.6-1.1W x 0.1-0.5T cm

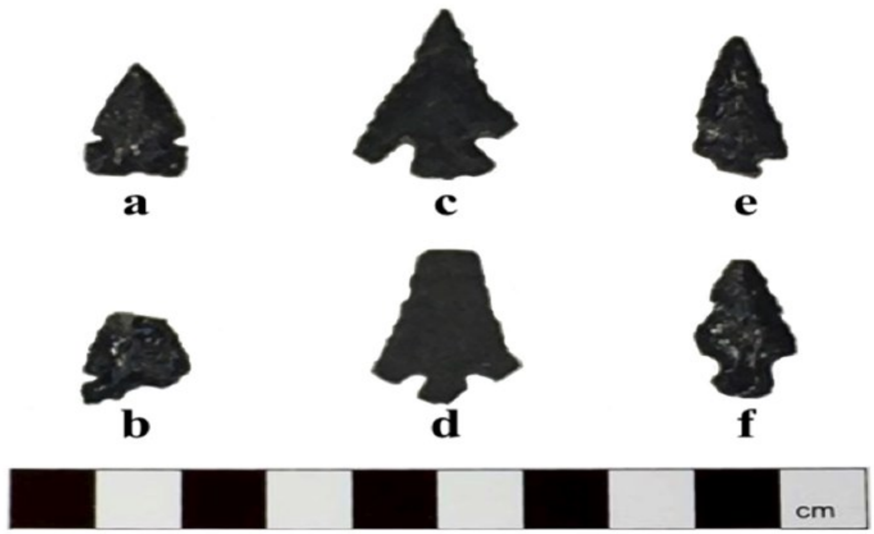


**Figure 5. Desert Side-Notched; a-b, Eastgate; c-d, Rose Spring; e-f.**

## B. Domestic Tools

1. Pottery Sherds

Number of Specimens: 81

Form: Ceramic sherds are sand-tempered brownish-gray surface and core color. Some sherds have a distinctive reddish surface color, while some small sherds have a light yellow color. All are body sherds except for a single rim fragment which is flaring and well-made. One sherd exhibits two parallel lines as decoration. Most appear to belong to what is commonly described as Intermountain or Shoshoni Ware.

Size Range: 0.9-6.1L x 0.9-6.1W x 0.2-1.2T cm

Material: Sand tempered clay.

2. Pestles

Number of Specimens: 2

Form: Two specimens of pestle fragments one cylindrical and one triangular shaped.

Size Range: 3.3-9.9L x 3.4-6.1W x 3.4-5.2T cm

Material: Quartzite

## C. Fabricating Tools

1. Cores

Number of Specimens: 9

Form: Cores are irregularly shaped, angular, and vary in size. One cryptocrystalline specimen is a dark yellow color.

Size Range: 2.9-12.6L x 2.1-8.6W x 1.1-5.9T cm

Material: Basalt (n=7), Obsidian (n=1), and Cryptocrystalline (n=1)

2. Awls

Number of Specimens: 1

Form: Distal end fragment of an awl.

Size Range: 2.0L x 0.3W x 0.3T cm

Material: Bone

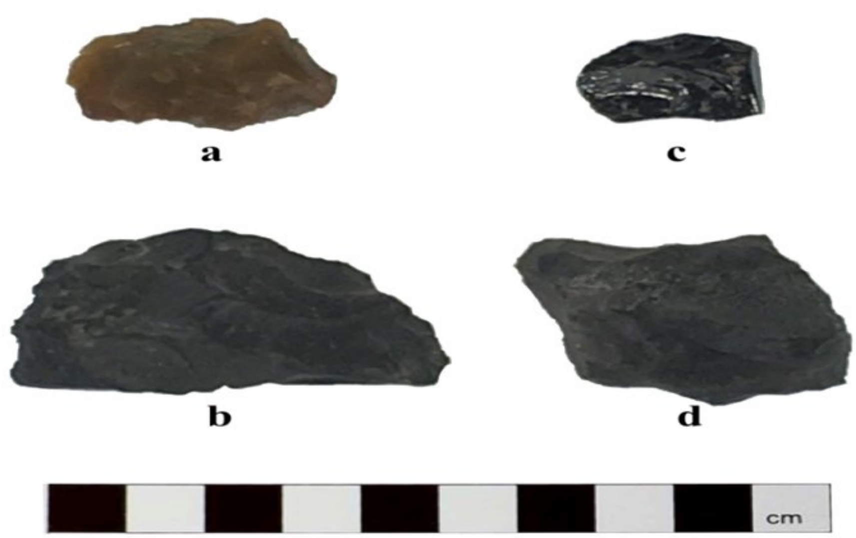


**Figure 6. Cores; a-d.**

## D. General Utility Tools

1. Hammerstones

Number of Specimens: 1

Form: Cobble with proximal and distal end damage.

Size Range: 8.5L x 7.0W x 5.3T cm

Material: Quartzite

2. Biface Fragments

Number of Specimens: 1

Form: The specimen is white, biconvex in cross-section, and exhibits evidence of bifacial reduction along one lateral margin.

Size Range: 2.8L x 1.9W x 0.4T cm

Material: Cryptocrystalline

3. Abrader

Number of Specimens: 1

Form: A double-sided abrader with 0.2-0.4 mm diameter grooves.

Size Range: 7.3L x 4.5W x 2.5T cm

Material: Pumice


**Figure 7. Hammerstones; a-b, Abrader; c.**

### E. Decorative Items

1. Polished Bone

Number of Specimens: 5

Form: Specimens are cylindrical-to-flat bone fragments which show evidence of modification and polishing.

Size Range: 2.5L x 1.5W x 0.1T cm

Material: Bone

### F. Historic Items

1. 19th Century Historic Items

Number of Specimens: 23

Description: Glass "seed" beads measuring 1-2 mm in diameter. There are nine red beads, six yellow beads, six aqua beads, and one blue bead.

2. Recent Historic Items

Number of Specimens: 13

Description: Eight .22 caliber shell casings, 2twosmall metal balls measuring 0.3-1.2 cm in diameter; one bottle cap, one piece of inexpensive jewelry, and one recent reddish colored button with cloth overlay.

## Typology of Material Items Recovered From 2018 Excavations

### A. Projectile Points and Point Fragments

1. Eastgate Points

Number of Specimens: 2

Form: Both specimens are flat on one side and convex on the other in cross-section. Both are corner-notched with wide barbs that extend to the base of the point. One specimen is complete while the other is broken horizontally at the mid-section and vertically on one side just at the edge of the stem.
Size Range: 1.4-1.8L x 1.3-1.6W x 0.3T cm

Material: Obsidian

2. Irregular-Shaped Point

Number of Specimens: 1

Form: A triangular, plano-convex point with corner and side notches is broken at distal end with a second side notch on one margin at the distal end. Base is also fractured and flares at 45-degree angles.

Size Range: 2.9L x 2.2W x 0.6T cm

Material: Obsidian

3. Mid-Sections

Number of Specimens: 2

Form: Both specimens are bifacially worked and triangular with biconvex cross-sections.

Size Range: 0.7-0.9L x 1.0-1.2W x 0.3T cm

Material: Basalt and Obsidian


**Figure 8. Eastgate; a-b, projectile fragment; c, projectile tip; d-f.**

4. Tips

Number of Specimens: 8

Form: One specimen is ovate at the distal end, while all others are triangular. All specimens have biconvex cross-sections and are broken laterally across the mid-section. Flaking patterns are variable and random.

Size Range: 0.8-2.5L x 0.6-1.1W x 0.2-0.4T cm

Material: Obsidian (n=4), Cryptocrystalline (n=3), and Basalt (n=1)

## B. Domestic Tools

1. Pottery Sherds

Number of Specimens: 14

Form: Ceramic sherds are sand-tempered brownish-gray surface and core color. Some sherds have a distinctive reddish surface color. One specimen is a rim. Most appear to belong to what is commonly described as Intermountain or Shoshoni Ware.

Size Range: 1.1-4.1L x 0.7-3.0W x 0.5-0.9T cm

Material: Sand-tempered clay.

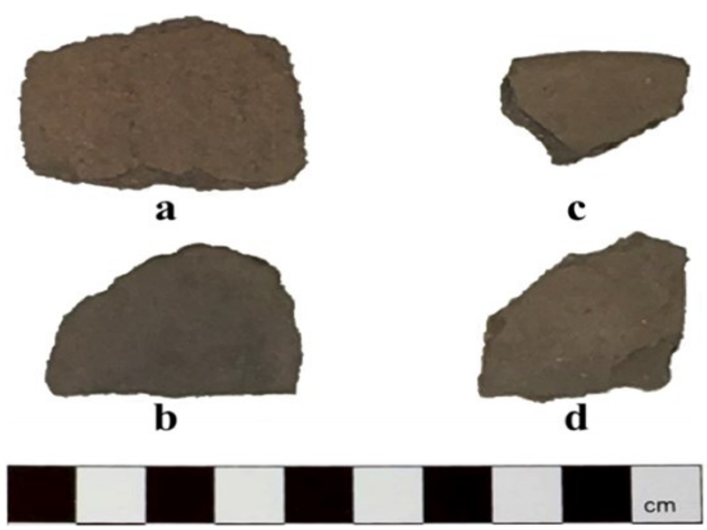


**Figure 9. Pottery sherds; a-d, rim; c.**

## C. Fabricating Tools

1. Cores

Number of Specimens: 4

Form: Specimens are relatively the same size with irregular shapes. They are angular, with flaking on all sides.

Size Range: 3.2-4.9L x 3.1-3.6W x 1.5-2.1T cm

Material: Basalt

## D. General Utility Tools

1. Worked Flakes

Number of Specimens: 1

Form: The specimen is plano-convex with flaking on lateral margins.

Size Range: 3.4L x 2.7W x 0.6T cm

Material: Obsidian

2. Biface Fragments

Number of Specimens: 2

Form: The specimens are mid-sections, bifacially worked, and biconvex in cross-section.

Size Range: 1.6-1.7L x 1.9-2.3W x 0.5-0.7T cm

Material: Basalt and Obsidian

3. Scrapers

Number of Specimens: 3

Form: The specimens are plano-convex with flaking on the distal end.

Size Range: 1.9-4.0L x 1.4-4.8W x 0.5-1.5T cm

Material: Basalt (n=1) and Cryptocrystalline (n=2)

## E. Decorative Items (No decorative items were recorded in 2018.)

### F. Historic Items

Number of Specimens: 13

Description: Specimens include 19th century can fragments, nails, and white opaque glass bottle fragments.

## Typology of Material Items Recovered From 2019 Excavations

### A. Projectile Points and Point Fragments

1. Desert Sierra Side-Notch Point

Number of Specimens: 1

Form: A small triangular point with straight to concave margins and convex base that is biconvex in cross-section.

Size: 2.8L x 1.4W x 0.3T cm

Material: Cryptocrystalline

2. Rose Spring Point

Number of Specimens: 1

Form: Narrow triangular points with slight corner notches and a convex cross-section.

Size: 2.2L x 1.2W x 0.2T cm

Material: Obsidian

3. Lanceolate Point

Number of Specimens: 1

Form: Biconvex point having concave base.

Size: 4.6L x 1.8W x 0.4T cm

Material: Basalt

## B. Domestic Tools

1. Pottery Sherds

Number of Specimens: 34

Form: Ceramic sherds are sand-tempered brownish-gray surface and core color. Some sherds have a distinctive reddish surface color, while some small sherds have a light yellow color. All are body sherds except for a single rim fragment which is flaring and well-made. One sherd exhibits two parallel lines as decoration. Most appear to belong to what is commonly described as Intermountain or Shoshoni Ware.

Size Range: 1.4-4.6L x 1-3.6W x 0.6-1.2T cm

Material: Sand-tempered clay.

## C. Fabricating Tools

1. Cores

Number of Specimens: 1

Form: Cores are irregularly shaped, angular, and vary in size.

Size Range: 7.1-3.7L x 3.7W x 3.0-1.9 cm

Material: Basalt, Cryptocrystalline

## D. General Utility Tools

1. Worked Flake-Uniface

Number of Specimens: 1

Form: Flake exhibits minor retouch on one lateral margin.

Size Range: 3.4-5L x 2.4-3.4W x 0.5-1T cm

Material: Cryptocrystalline and Basalt

2. Biface Fragments

Number of Specimens: 2

Form: Bifacial reduction on angular stone fragments

Size Range: 3.4-1.5L x 2W x 0.7-0.8T cm

Material: Cryptocrystalline

3. Scraper

Number of Specimens: 2

Form: Specimens exhibits retouch on distal end of thick flakes that are plano-convex in cross-section.

Size Range: 6.6-2.8L x 7.0-3.7W x 2.6- 1.5T cm

Material: Basalt, Cryptocrystalline

## E. Decorative Items

1. Polished Bone

Number of Specimens: 2

Form: Specimens are cylindrical-to-flat bone fragments which show evidence of modification and polishing.

Size Range: 1.3-1.8L x 1.3-1.8W x 0.2T cm

Material: Bone

## F. Historic Items

1. 19th Century Historical Items-Euro-American Trade Beads

Number of Specimens: 2

Description: White glass beads

Size Range: 1 mm in diameter

2. Recent Historical Items

Number of Specimens: 37

Description: Glass and metal fragments, bolt and nut, nail, metal can fragment, glazed pottery fragment.

# Functional Analysis

An analysis of functional categories of artifacts from recent 10-EL-294 excavations reveals that weapons and domestic items make up a larger portion of the total assemblage. Weapons constitute 17% of the 2013 total assemblage, 35% of the 2018 total assemblage, and 7% of the 2019 total assemblage, or 18% of all the assemblages. General Utility items constitute 2% of the 2013 total assemblage, 16% of the 2018 total assemblage, and 11% of the 2019 total assemblage, or 7% of all the assemblages. Domestic items constitute 69% of the 2013 total assemblage, 38% of the 2018 total assemblage, and 76% of the 2019 total assemblage, or 65% of all the assemblages. The domestic category is comprised mostly of pottery sherds in both cases (n=81, n=14, n=34).

Fabricating items, mostly cores, make up 8% of the 2013 total assemblage, 11% of the 2018 total assemblage, and 2% of the 2019 total assemblage, or 7% of all the assemblages. Finally, decorative items, while absent from the 2018 total assemblage, represent 3% of all items recovered in 2013 and 2019. There is little evenness between artifact types. (Figure 10). In general and reflecting the frequency distribution of artifacts from major excavations in 1986/87 and 2010, most items consist of weapons and domestic tool (largely pottery and groundstone).

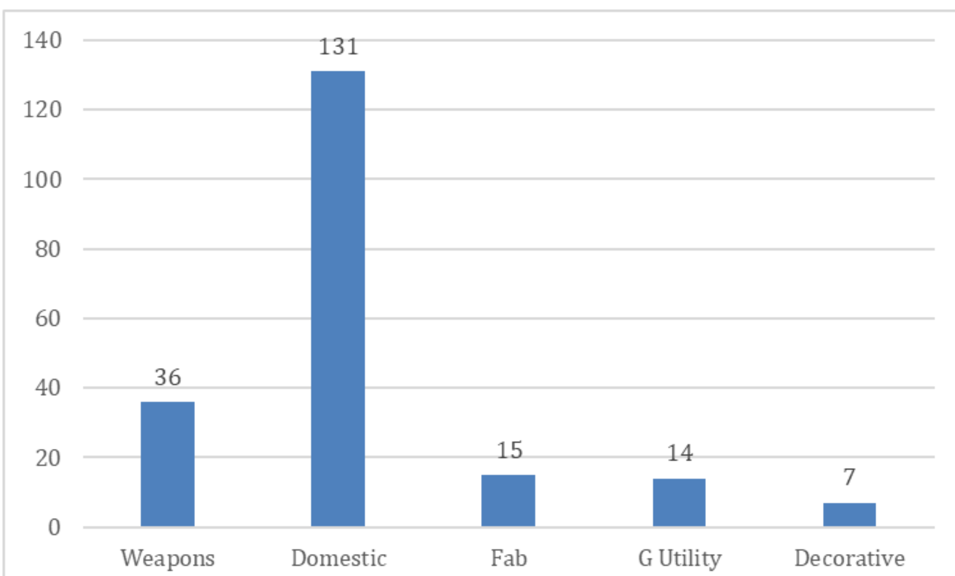


**Figure 10. Functional distribution of Weapons, General Utility Items, Domestic, Fabricating and Decorative Items based on Winter's (1969) categories of artifacts from 2008, 2013 and 2019.**

# Lithic Debitage Analysis

## Raw Material Type

A total of 3,662 lithic flakes were recovered and recorded during the 2013, 2018 and 2019 excavations. This included 2,270 recorded during 2013, 1,392 recorded during 2018, and 571 recorded during 2019. Basalt accounts for 47% of the total lithic flakes recorded during 2013, 46% of the total lithic flakes recorded during 2018. Obsidian constituted 35% of the 2013 total of lithic flakes, and 36% of the total in 2018. Cryptocrystalline materials account for the remaining 18% of 2013 lithic flakes and remaining 18% of 2018 lithic flakes (Figure 11). The prevalence of basalt as raw material is likely due to the nearby Bell Mare quarry, although lithic flakes recovered during the 2019 excavation were relatively even among the three raw material types.

The relatively high frequency of basalt is similar to that in 1986-1987 excavations and 2010 excavations, but not as high relative to excavations at other nearby sites (70% at 10-EL-1417, 80.4% at 10-EL-110) (VanWassenhove et al. 2018; Willson and Plew 2007).

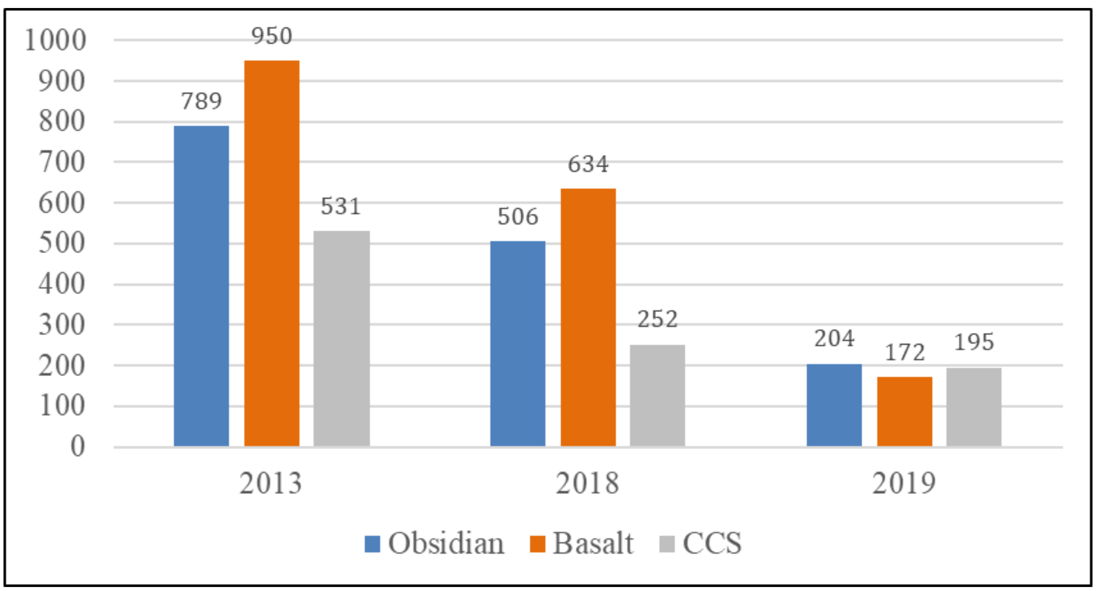


**Figure 11. Frequency distribution of lithic debris by raw material type.**

## Size Range

An analysis of the size range of lithic flakes suggests late stage reduction or retooling, as well as high residential mobility. The lithic flakes from 2013 were mostly less than 1 cm long (67%). Similarly, 57% of lithic flakes from 2018 were less than 1 cm long. Less than 1% of flakes from 2013 and ca. 1% of flakes from 2018 were greater than 5 cm (Figure 12). The size range of lithic flakes from the 2019 excavation was dominated by smaller flakes, including 67% measuring less than 1 cm long with 23%

between 1 and 2 cm long. This high frequency of smaller flakes is also similar to frequencies recorded in nearby sites (80% of flakes at 10-EL-216 are less than 1 cm long and 46% of flakes at 10-EL-1417 are less than 1 cm long. (VanWassenhove et al. 2018). This could reflect materials being retooled or small locally derived nodules reflecting small flake sizes that would normally represent late stage reduction (Willson and Plew 2007).

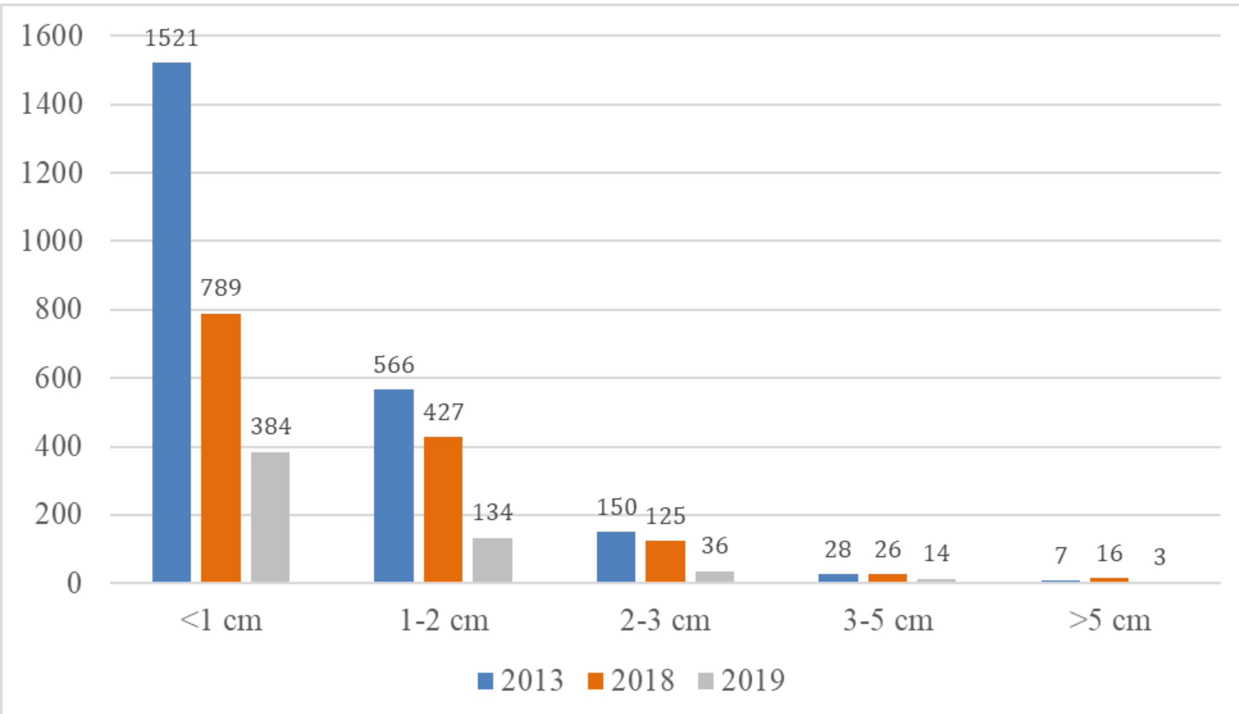


**Figure 12. Frequency distribution of lithic debris by size.**

## Faunal Analysis

A total of 2,970 faunal remains was recovered from the previously unreported excavations. Of those, a total of 2,457 were recorded in 2013, a total of 412 were recorded in 2018, and a total of 101 were recorded in 2019. Of those recovered, only 3.1% were identifiable (n=92). Identifiable faunal specimens were classified as either fish, small mammal, or medium mammal and placed in a vertical provenience. Fish remains constitute 52% of the identifiable faunal specimens and are found within the up 30 cm. of the deposit. Unidentifiable skeletal remains consisted of 37.5% green fragments and 62.5% charred fragments (Figure 13). There was no evidence of cut marks or modification to any of the bone fragments. The frequency of faunal remains recovered during the 2013 excavation was second only to those of 1986-1987 excavation (Figure 14). Invertebrate faunal remains included fragments of freshwater mussel shells found across the site.

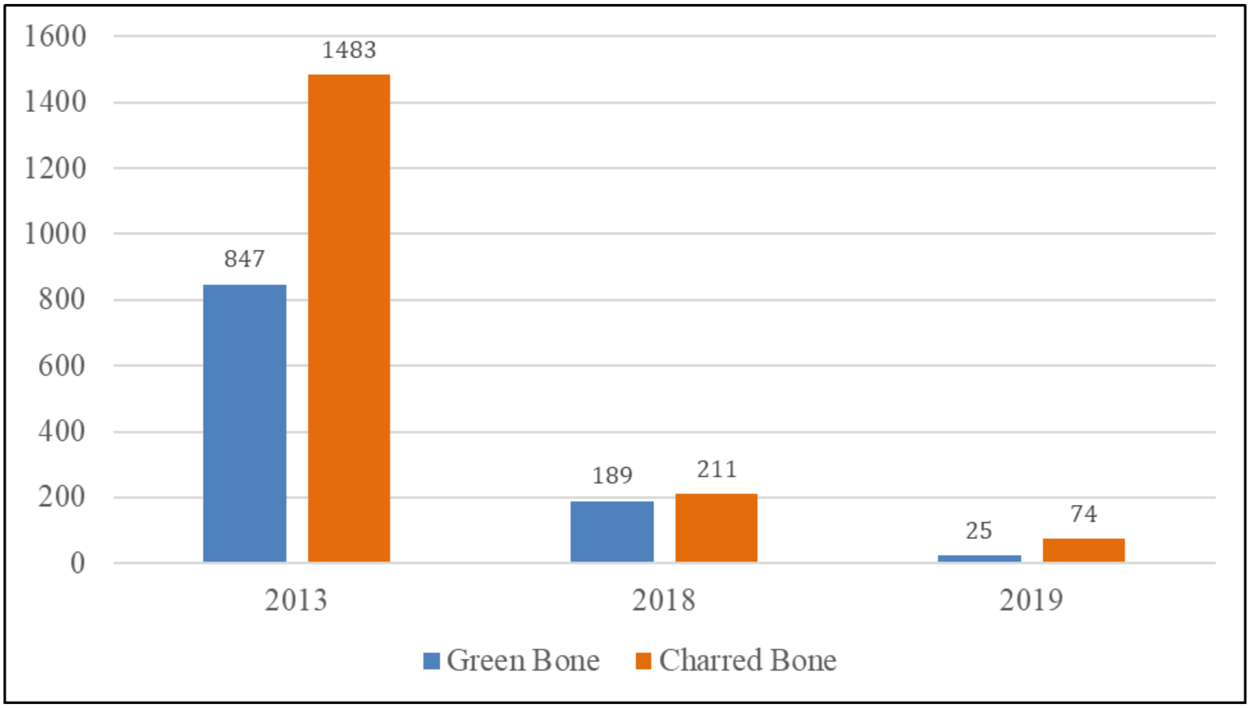


**Figure 13. The frequency of green and charred bone (2013, 2018, 2019).**

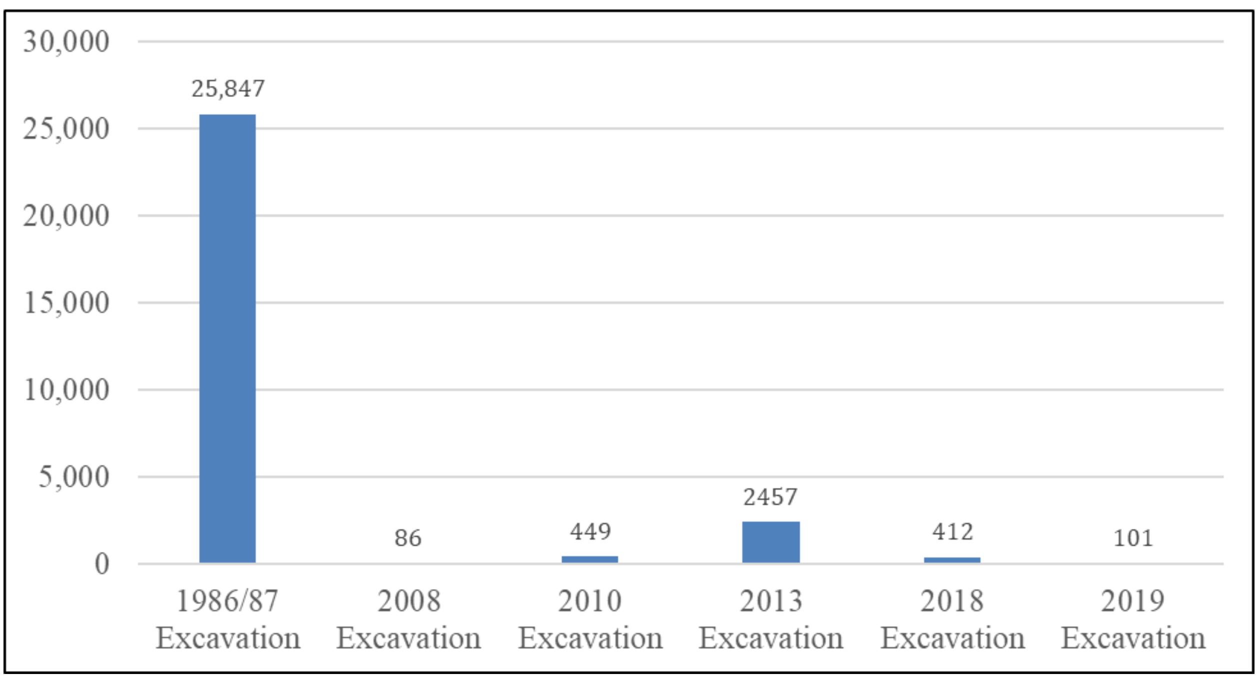


**Figure 14. Frequency of individual faunal specimens across excavations.**

## Summary

Test Excavations reported here address a number of questions relating to 10-EL-294. It is clear that the extent of the primary site area is as determined by the original excavations, limited to an area of approximately 100 square meters. Although materials are reported, as in 2010, from areas several meters distant from the 1986/87 excavation, these areas including the testing in 2013, 2018 and 2019 have produced only limited material assemblages. The testing reported here demonstrates varying degrees of post-depositional alteration of the terrace by agricultural activity that extend to the east and south beyond the original excavation. Sediments taken from the recent investigations are highly uniform and characteristic of those previously reported (Bentley 1989).

Functionally, a range of activities are associated with use of the area. These include manufacturing and retooling, short-term use for fishing and hunting and associated processing—though considerably less extensive. Tool types consist predominately of weapons and domestic items consisting of pottery and a few groundstone items—assemblages exhibiting little evenness and generally like those recovered in the original excavations. Weapons include Desert-Side Notched, Eastgate, Rose Spring and Bliss series points. The dominant presence of these series with pottery re-inforce the Late Archaic age of the site. Of some note is the recovery of a significant number of historic Euro-American trade-beads though fewer than recovered originally and in the 2010 excavation. Analysis of the assemblage using Kelly's Mobility Index supports Eastman's (2010) assertion that it reflects a high degree of residential mobility.

The recent excavations reported no formal features and faunal evidence supporting the earlier demonstration that fish, rabbits and deer are the primary species in the diet breadth. Fish remains are limited and appear to represent salmonids—by size most likely trout or whitefish. The recent investigations at Three Island are confirming that activities occurred at locations across the greater terrace area though in varying degrees of intensity. There is no basis for determining whether these areas are associated with the earlier radiocarbon-dated components or that they date to other uses of the site area.

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Report

# A Frequency Distribution Analysis of Rock Alignments in the Owyhee Uplands, Idaho

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## Abstract

Rock alignments were previously reported on in the southcentral Owyhee Uplands. There has been no systematic analysis of rock alignments. This paper tests whether there are differences in rock alignment form relative to their geographic placement. 345 rock alignments were analyzed with a chi-square test. The result was significant, however it provides no conclusive evidence of how individual rock alignment forms reflect functional differences.

KEYWORDS: Rock Alignments, Frequency Distribution, Geographic Placement, Chi-Square

## Introduction

Rock alignments were first recorded in the Owyhee Uplands in the early 1960's (Tuohy 1963) with several hundred more documented in the late 1970's (Meyer 1973; Agenbroad 1976; Plew 1976, 1978, and 1980). Four types of rock alignments have been described based on their form and include cairns, circular, semi-circular, and linear rock alignments. These can be found as isolates, in clusters, and in complexes. In the Owyhee Uplands, it has been argued that they were used to drive, trap, corral, and ambush (Agenbroad 1976: 213; Plew 1976: 41 and 1978: 18), forcibly jump (Agenbroad 1976: 217), and observe big game (Plew 1976: 40; 1978: 17). Hunting complexes consisting of combinations of alignment types would often make use of natural barriers to detain (Plew 1977: 5) or influence the movement of prey (Benedict 2005: 425) or force them to jump (Agenbroad 1976). These activities are representative of the prehistoric period. Many rock-alignment sites lack artifact associations at all (Plew 1976: 40) though 56 of the 197 were associated with lithic debris, stone tools, projectile points, ground stone, and petroglyphs. This makes it difficult to establish any kind of temporal framework. When diagnostic artifacts (i.e., projectile point types) or obsidian (for hydration analysis) are within a rock alignment site, they are often used to provide an approximate date range. However, there is no way of knowing whether they have a direct association or not.

Even though data specific to the rock alignments in the southcentral Owyhee Uplands is limited, some inferences can be made based on their placement and form (Plew 1977: 5). Their placement would have been in relation to the habits of the animals that were being hunted (Brook 1980: 60). Cairns, in this regard, have been described as markers indicating the location of game trails and watering areas or marking where hunting alignments are (Plew 1978: 18). Circular rock alignments often described as hunting blinds (Tuohy 1963; Plew 1976; Butler 1978) are commonly placed near game trails (Plew 1976 and 1978) while semi-circular rock alignments as described by Plew (1976 and 1980) may have served as game observation posts. Linear alignments include straight and curvilinear rock walls. These were probably used to impede the movement of game or corral them (Rudy 1953; Arkush 1986 and 1995; Plew 1979).

Big game species that inhabit the Owyhee Uplands include mule deer (*Odocoileus hemionus*), antelope (*Antilocapra americana*), and elk (*Cervus canadensis*). Mountain sheep (*Ovis canadensis*) remains were found during excavation (Plew 1979 and 1981). The behavior of these animals is varied and the hunting of them required knowledge of their habits. During the fall and winter, they form large herds. From spring to summer, they could be taken by quick-footed and strategically placed hunters concealed behind rock alignments or brush. Hunters were known to wear antelope disguises as a way to move close to them (Steward 1938: 34). Rock alignment complexes could have facilitated the capture of several at a time, communal hunts would have been more advantageous.

Mule deer migrate from high to low elevation areas in the fall and by spring make their way into higher elevations. Aboriginal hunters would have been aware of this pattern and exploited them whenever possible. Mule deer are prone to jump. Pits on the other side of alignments with hunters waiting there to dispatch them was a common strategy (Steward 1938: 36). In some instances, a small group of hunters might have surrounded an animal and pushed them toward hunters hidden behind other alignments. Mountain sheep move throughout an area. However, when spooked often head to higher ground. Hunters concealed behind rock alignments on the rim edge could have taken them down as they ran uphill away from a group of hunters.

Knowing the habits of these animals would have provided hunters knowledge with which to make decisions about where to place rock alignments. This coupled with observations made in the field about the general location of certain types of rock alignments and their presumed function in the hunt contribute to our understanding of rock alignment placement. As no study has systematically evaluated whether different types do have specific geographic associations this paper posits four hypotheses or predictions regarding where they would most likely and commonly be found.

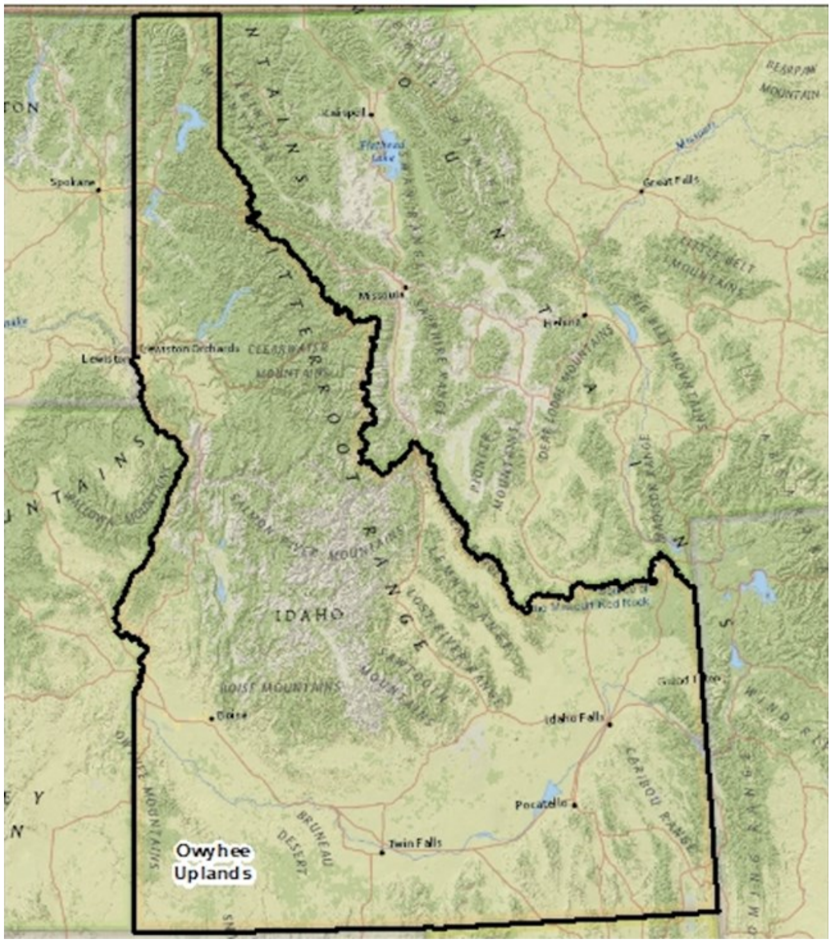


**Figure 1: Owyhee Uplands, Idaho.**

## Hypotheses

### Cairns:

Hypothesis 1: In the Owyhee Uplands, cairns have been most commonly reported near rim edges (Tuohy 1963; Meyer 1973; Agenbroad 1976) marking the location of rock alignment complexes. They have also been found marking the location of game trails and water sources (Plew 1976). If cairns are marking alignment complexes, game trails and water sources they will probably have a broad distribution with most appearing on rim edges more than any other location.

### Circular:

Hypothesis 2: If circular rock alignments are hunting blinds and are most commonly located near game trails and water sources then they will be found more frequently on bench and alluvial terraces.

### Semi-Circular:

Hypothesis 3: If semi-circular rock alignments are used as observation posts then they will be located at the highest elevations in areas overlooking game trails and water sources. These will be found more frequently on rim edges and upper bench terraces.

Linear:

Hypothesis 4: If linear rock alignments are drive fences and corrals used in communal hunting, they are more likely to be located on rim edges and projections.

## Methods

The data set was produced during surveys conducted by the Idaho State Historical Society (ISHS) in coordination with Indiana University Museum and Boise State University. Surveys and excavations were done in 1975, 1977, 1978, and 1979 (Plew 1976, 1978 and 1980). Around 400 rock alignments were recorded including cairns, circular, semi-circular, linear, rock piles, and unknown alignments (ones that were not defined as any of the aforementioned ones). These rock alignments vary in size. Cairns are between 0.5 and 3 meters tall; circular and semi-circular alignments are approximately 1 to 3 meters in diameter and between 0.5 to 2 meters high; linear alignments are between 1 to 50 meters in length and 0.5 to 2 meters high. These rock alignments were recorded as being on the rim edge, bench terraces/talus slopes, and near alluvial terraces. The data set also includes variables about which site they were found in, their age (prehistoric, historic or unknown), whether they are associated with artifacts, the rock material (most are made of basalt with one exception – river cobbles), and which creek it was found near. Six creeks contained rock alignments: Battle Creek, Big Springs Creek, Camas Creek, Deep Creek, Nickel Creek, and Pole Creek (see Figure 1). The water in these drainages eventually drain into the Owyhee River. The variables that used for this study are the geographic location (independent variable) and rock alignment type (dependent variable). Since the data is categorical a Pearson's chi-square test was performed.

To run the analysis, a contingency table was created (Table 1) which included the geographic location (independent variable) and rock alignment type (dependent variable). For geographic location, there are three categories: rim edge, bench terrace/talus slope, and alluvial terrace. As for the alignment types, there are three categories: cairn, circular, semi- circular, and linear. The chi-square test statistically examines whether the proportion of rock alignment types are the same across geographic locations. A significant result signifies that at least one of the rock alignment types has a different distribution of geographic locations.

Using SPSS, a chi-square test includes expected counts to check that the assumptions were met. To more easily interpret a significant result, percentages for row, column, and total were selected as were standardized residuals to determine whether individual columns were significantly different from each other.

## Results

A chi-square contingency table (Table 1), shows a total 108 cairns. 83 of them were on a rim edge (76.9% of the total cairns), nine on a bench terrace/talus slope (8.3%), and 16 were located on an alluvial terrace (14.8%). There were 142 circular alignments of which 94 were on a rim edge (66.2% of the total circular alignments), 33 were on a bench terrace/talus slope (23.2% of the total), and 15 were on alluvial terraces (10.6% of the total). Semi-circular alignments totaled 52; 41 were on a rim edge (78.8% of the total semi-circular alignments), three were on a bench terrace/talus slope (5.8% of the total), and eight were on an alluvial terrace (15.4%). There was a total of 43 linear alignments; 29 were on a rim edge (67.4% of the total linear alignments), six were on a bench terrace/talus slope (14%), and eight on an alluvial terrace (18.6%).

There is a significant association between the type of rock alignment and its geographic placement $X^2(6) = 16.257$, $p = .012$ although the overall effect was small, Cramer's V is .153 out of 1. Standardized residuals indicated which rock alignments contributed to the significant chi-square result. More specifically, it tells us which rock alignment is or is not significantly associated with a particular geographic location when compared with the other alignments. When a standardized residual is outside of +/- 1.96 then it is significant at $p < .05$ and +/- 2.58 at $p < .01$. Circular alignments on bench terraces/talus slopes had the only meaningful standardized residual with 2.6, $p < .01$.

To meet the assumptions of a chi-square test, two requirements are necessary. The first requires that the residuals are independent. In other words, each entity must contribute to only one cell of the contingency table (Field 2016; 735). In this study, all of the rock alignments are different, and none have been repeated so this meets the first requirement. For the second assumption, the expected frequencies should not be less than 5. The rock alignments in this instance are all above 5. The lowest one was 5.9 (linear alignments on alluvial terraces). The assumption of expected frequencies was met.

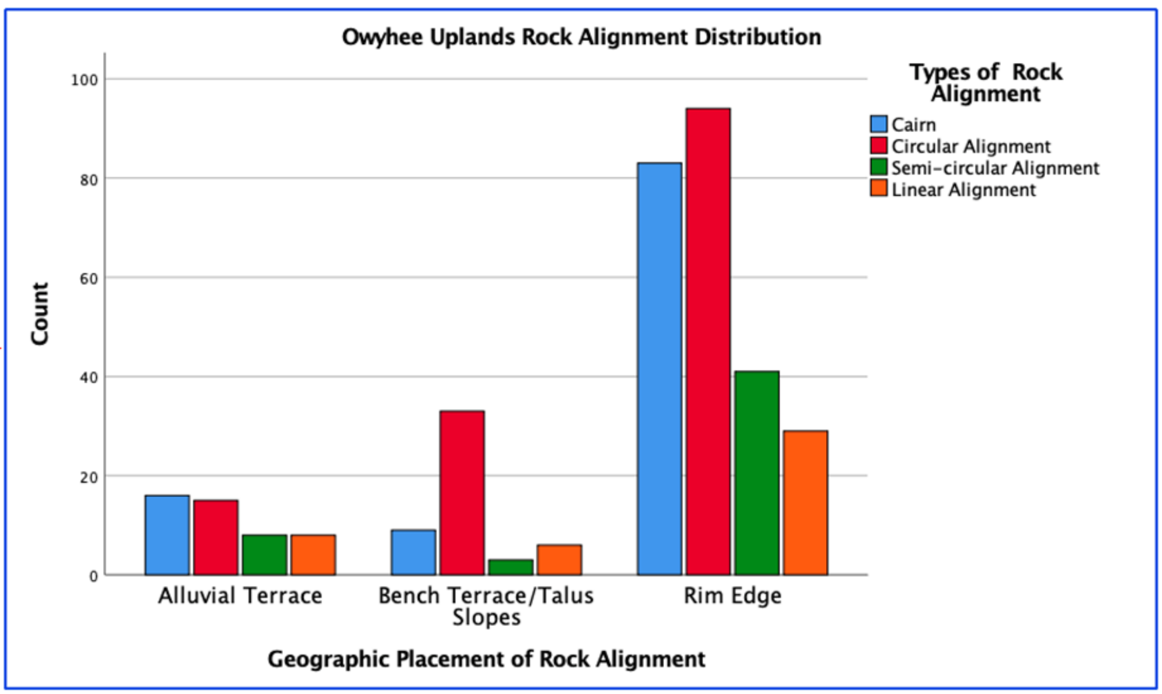


**Figure 2: A bar graph showing the relationship between rock alignment type and its geographic placement.**

**Table 1: Contingency table of rock alignment type and geographic location. Numbers in bold indicate which alignments had higher observed than expected counts as well as a significant standardized residual.**

| Geographic Placement | Rock Alignment Type | Observed Frequency | Expected Frequency | % within Geographic Placement of Rock Alignment | % within Types of Rock Alignment | Standardized Residuals |
|---|---|---|---|---|---|---|
| **Alluvial Terrace** | *Cairn* | **16** | **14.7** | 34% | 14.8% | 0.3 |
| | *Circular* | 15 | 19.3 | 31.9% | 10.6% | -1 |
| | *Semi-circular* | **8** | **7.1** | 17% | 15.4% | 0.3 |
| | *Linear* | **8** | **5.9** | 17% | 18.6% | 0.9 |
| | | | | | | |
| **Bench Terrace / Talus Slope** | *Cairn* | 9 | 16 | 17.6% | 8.3% | -1.7 |
| | *Circular* | **33** | **21** | 64.7% | 23.2% | **2.6** |
| | *Semi-circular* | 3 | 7.7 | 5.9% | 5.8% | -1.7 |
| | *Linear* | 6 | 6.4 | 11.8% | 14% | -0.1 |
| | | | | | | |
| **Rim edge** | *Cairn* | **83** | **77.3** | 33.6% | 76.9% | 0.6 |
| | *Circular* | 94 | 101.7 | 38.1% | 66.2% | -0.8 |
| | *Semi-circular* | **41** | **37.2** | 16.6% | 78.8% | 0.6 |
| | *Linear* | 29 | 30.8 | 11.7% | 67.4% | -0.3 |

## Discussion

The results of the Pearson's chi-square test show that there is a significant relationship between the rock alignment type and its geographic placement. To check the predictions, the observed and expected counts will be compared. Expected counts are based on the proportion of rock alignments overall at each geographic location. If the observed count is higher than the expected count, then there were more rock alignments of this type in this geographical location than rock alignments overall. Another way to check whether a certain rock alignment form is associated with a particular geographic location is from the standardized residual (described above).

Hypothesis 1 predicted that cairns would be located most frequently on rim edges. The observed count of 83 exceeded the expected count of 77.3 by 5.7, which supports the first part of the hypothesis. The second part of the hypothesis predicts that cairns marking water sources and game trails would be fewer and located on bench and alluvial terraces. For bench terraces, cairns had an observed count of 9 and an expected count of 16; on alluvial terraces observed counts were 16 and expected counts were 14.7. This means cairns are proportionately more often placed on alluvial terraces (14.8%) than bench terraces (8.3%).

Hypothesis 2 predicted that circular rock alignments would be found more frequently on bench and alluvial terraces. The observed count was 33 for bench terraces while the expected count was 21;

this provides strong support for circular alignments being overrepresented on bench terraces than expected. Standardized residuals confirmed this with a z-score of 2.6. For alluvial terraces, the observed count was 15 and the expected count was 19.3; this does not support the hypothesis. For rim edges, the expected count was 101.7 and the observed count was 94, which means they didn't meet the expected count and are less likely to occur there.

Hypothesis 3 predicted that semi-circular rock alignments would be found more frequently on rim edges and upper bench terraces than alluvial terraces. Observed counts for rim edges were 41, which exceeded the expected count of 37.2 by 3.8. Observed counts was 3 for bench terraces and 7.7 for expected counts. On alluvial terraces, the observed count of 8 exceeded the expected count of 7.1 by 0.8. Although there is support for semi-circular alignments associated with rim edges, there is not for upper bench terraces.

Hypothesis 4 predicted that linear rock alignments would be found more commonly on or near rim edges was not supported by the counts. The observed count of 29 was 0.2 less than the expected count of 30.8. However, they were more supported on the alluvial terrace where observed counts exceeded the expected by 2.1. On bench terraces, the relationship with linear alignments is independent with observed and expected counts almost equal. Rim edges resulted in not being associated with linear alignments, however some support is provided for alluvial terraces.

Although this study provides a more formal analysis of the geographic location of rock alignment types it provides no conclusive evidence of how individual types reflect functional differences. It is however noteworthy that semi-circular and linear alignments occurred far less frequently than cairns and circular alignments though this may reflect that fact that these types are most commonly seen to occur in what have been referred to as complexes (Plew 1979). Future work will compare the results of this test with the Mount Bennett Hills area north of Bliss, Idaho with intent to assess whether these findings are similar to other areas where rock alignments are common.

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