Reexamination of Village Sites Identified by Merriam and Powers in Yosemite Valley

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Between 1871-1917 Stephen Powers and C. Hart Merriam identified approximately 40 villages in Yosemite Valley. Since the 1950s, three archaeological surveys have identified different archaeological sites as those representing villages identified by Merriam and Powers. Because of different interpretations of Powers and Merriam's written descriptions and little interpretation of archaeological materials, these studies have differed greatly in which archaeological sites they identified as the villages. This paper represents a reexamination of Merriam's field map and other historic maps using GIS.

Since the late 19th century anthropologists have extensively studied the inhabitants of Yosemite Valley. During this time, three ethnographic studies, Powers (1871-76), Merriam (1900-1920s), and Latta (1930s), noted village site locations. These ethnographic descriptions give archaeologists a unique opportunity to interpret the early historic period and culture change in Yosemite Valley. In order to take advantage of this ethnographic data, the locations of these villages need to be represented in a spatially accurate manner. Between 1950 and 1995, three archaeological studies attempted to relocate these village sites, however, these archaeological studies varied widely in their interpretation of the locations and extent of villages. Due to the differences in interpretations, it was thought a re-examination of ethnographic field maps and ethnographic publication, through the use of a Geographic Information System (GIS), could potentially give greater accuracy to the interpretation of village locations.

Ethnographers

Stephen Powers (1871-1876)

Stephen Powers (1976 [1877]) visited and studied in Yosemite Valley between 1871-1872, and again in 1875-1876. This observations were published as a chapter in *Tribes of California*, in this he described nine village (Powers 1976 [1877]: 365-366). The nine villages were Wah-ha'-ka, Sak'-ka-ya, Hok-ok'-wi-dok, Ku-mai'-ni, A-wa'-ni, Ma-che'-to, No-to-mid'-u-la, Le-sam'-ai-ti, and Wis-kul'-la. Powers provided no map and his descriptions range from very specific, "Hok-ok'-wi-dok, which stood very nearly where Hutchings's Hotel now stands, opposite Yosemite Fall" to vague, "No-to-mid'-u-la, a village about four hundred yards east of Macheto" (Powers 1976 [1877]: 366).

C. Hart Merriam (1900-1920s)

C. Hart Merriam made numerous visits to Yosemite Valley in the late 1800s and early 1900s. From these visits, he published a short article *Indian Village and Camp Sites in Yosemite Valley* (Merriam 1917). In this article, he identified 36 villages and camps. At least six villages were occupied as late as 1898, another 1907, another until 1910 and still another until 1917. In addition to this publication, Merriam left a field map that identified the locations of 26 of these villages and camps (Merriam c.1915).

Frank F. Latta (early 1930s)

In the early 1930s, Frank F. Latta left a map and a two-page handwritten note containing the names and locations of 36 villages (Latta c.1930). The village names are identical to those identified by C. Hart Merriam although some of locations differ. It is unknown whether this information is based on original ethnographic fieldwork or based on conversations with C. Hart Merriam (Snyder 2003).

Archaeological Studies

Since the 1950s, three archaeological studies, Bennyhoff (1956), Napton, Albee and Greathouse (1974), Hull and Kelly (1995), have attempted to identify which archaeological sites represent villages

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identified by Merriam (1917) and Powers (1976 [1877]). Bennyhoff (1956:Table 1) identified 38 archaeological sites for 28 of Merriam villages. Napton, Albee and Greathouse (1974: 22-23) identified 52 archaeological sites for 26 of Merriam's villages. Hull and Kelly (1995: 90-91) identified between 32 and 45 archaeological sites corresponding to 32 of Merriam's villages. Between these three studies, there is agreement on locations of only eighteen of the villages. Of these eighteen villages, five villages sites were all assigned the same archaeological site: Hep-hep'-oo'-ma (CA-MRP-64); Ti-e-te'-mah (CA-MRP-187); Poot-poo-toon (CA-MRP-189); Sap-pah'sam-mah (CA-MRP-71); and Kis'se (CA-MRP-76). In thirteen instances where multiple archaeological sites were identified as a village site, all four studies identified the same primary archaeological site but the secondary or tertiary sites differed between the studies.

GIS ANALYSIS

In order to examine the spatial differences between the three archaeological interpretations, GIS was used to determine the locations and spatial extent of each village. The tables from the original archaeological reports, Bennyhoff (1956: Table 1), Napton *et al.* (1974: 22-23), Hull and Kelly (1995: 90-91), which correlated site numbers to village sites were converted to an excel file. The excel file was then linked to the Yosemite archaeological sites shapefile (Figure 1). One shapefile per archaeological study was created and archaeological sites not identified as a ethnographic village were purged from the shapefile. The villages consisting of multiple archaeological sites, thus represented by multiple site polygons, were then merged to create one polygon per village (Figure 2). The three completed shapefiles could then be overlapped, easing the visual inspection of the different interpretations.

While the spatial inspection of the archaeological interpretations clarified the differences in the three interpretations, it did not clarify the location of the villages identified by Merriam. The original fieldnotes, maps, and historic maps were then examined. Using ArcView 3.2 and ArcGIS 8.0, copies of Merriam's field map, Bunnell (1892) fore piece map, and Wheeler's 1878-1879 expedition map (Wheeler 1883) were scanned using an 8.5 x 17 inch flat bed scanner. For originals larger than 8.5 x 17 inches, maps were scanned in sections and merged together in Photoshop 7.0. When available, maps were downloaded from the World Wide Web. The image was then georeferenced through 'heads up' digitization of point locations of benchmarks and geographic landmarks present on georeferenced Digital Raster Graphic (DRG) images of El Capitan, Yosemite Falls, and Half Dome 7.5 minute United States Geographical Survey Topographic Quadrangles. All images were georeferenced using North American Datum 1927 UTM zone 11.

Merriam's field map provided point locations for 26 villages. An additional 10 villages were described with enough detail in his 1917 publication "Indian Village and Camp Sites in Yosemite Valley" that a point could be attributed to these locations as well (Merriam 1917). Historic maps from Bunnell (1892) and Wheeler (1883) clarified locations and added villages.

SPATIAL EXTENT OF VILLAGES

During the process of producing the spatial extent of village sites from the archaeological interpretations, and collecting locational data from the historic maps, it was realized that the spatial extent of villages had not be defined by any of the previous studies. While the GIS analysis showed that the studies had differentiated villages into different sizes, none defined their methods for determining the size of a village. Bennyhoff (1956:Table 1) identified an average of 1.28 archaeological sites per village; Napton *et al.* (1974:22-23) identified 2.28 sites per village; while Hull and Kelly (1995:90-91) identified 1.47 sites per village. C. Hart Merriam's (1917; Merriam c.1915) written descriptions and map locations complicated

Figure 1: Process used to determine spatial extent of previous archaeological interpretations.
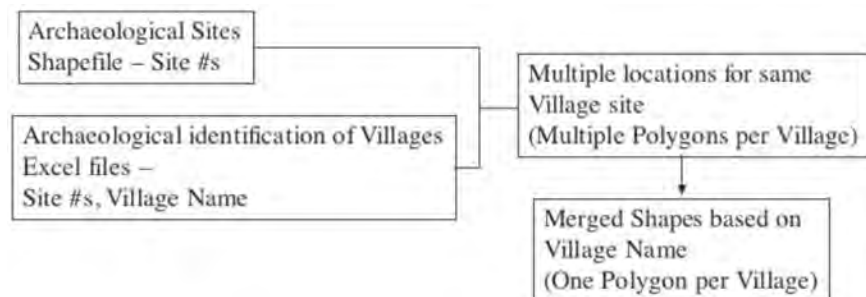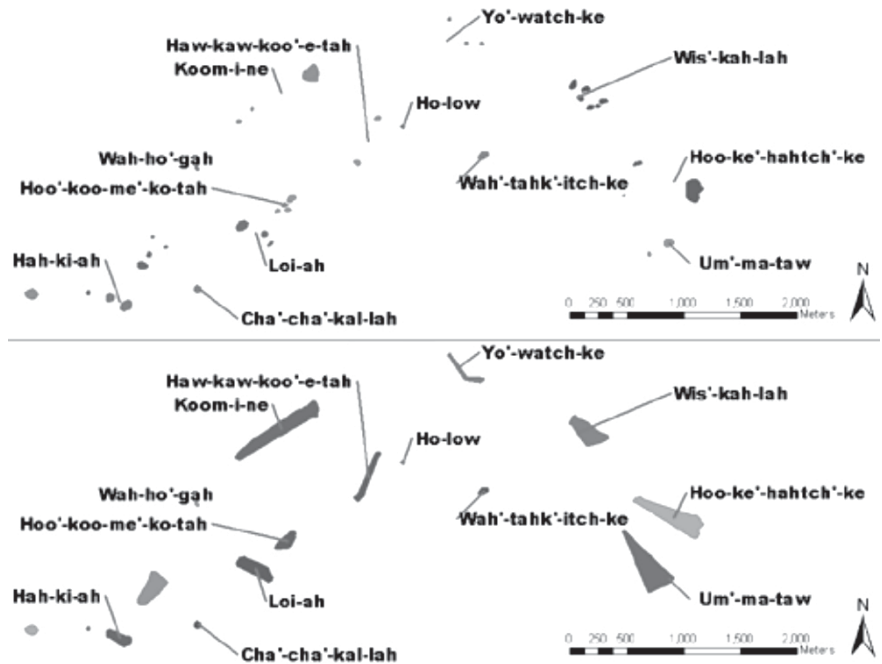
Figure 2: GIS analysis of Napton, Albee and Greathouse's (1974) interpretation of Merriam's village sites

Above: Initial sites analysis multiple polygons per village.

Below: Spatial extent of villages one polygon per village.

our ability to determine the extent of villages. Merriam's field map does not provide the spatial extent of village sites; he only provides an "x" and the village name. Because of this, it is difficult to interpret the archaeological manifestations of these villages without some interpretation of C. Hart Merriam's fieldnotes and the archaeological record.

Prior to exploring the potential extent of the individual villages, a short discussionis necessary of how multiple archaeological sites may be encompassed into one village site. Based on site catchment analysis (Vita-Finzi and Higgs 1970) and refuging theory (Merriam n.d.), land use in and surrounding villages falls into four zones: core, biodeterioration, trampling, and resource acquisition (or arena) zones. The differential use of these zones affects how they are represented in the archaeological record. The core zone is the central location of the population; it contains houses, stores, and tool processing areas. In his unpublished notes, C. Hart Merriam identifies 15 components comprising a typical Miwok village (Table 1). The various types of villages or camps may have contained varying numbers components and may be clustered or have contained biodeterioration and trampling zones between the components.

The preservation limitations of the archaeological record and management decisions on the definition of an archaeological site can limit our understanding of the spatial extent of villages. This is relevant not only in how archaeologists interpret village sites, but in how cultural practices not preserved in the

archaeological record, such as site catchment zones and settlement patterns, are understood. Currently, discrete archaeological sites within Yosemite Valley are defined as either five artifacts or a bedrock mortar separated by 30 meters or more.

Besides the list of parts and structures composing a village, Merriam did leave many clues to the size of the villages. Merriam (2002:204-206) defines three major categories of villages or camps: permanent villages occupied the year round; summer villages, occupied from May to October; and seasonal camps for hunting and fishing. In his description of individual villages, he uses ten different distinctions: largest village, large village, large summer village, village, summer village, small summer village, small village, village or camp, camp, and winter shelter.

In order to delineate Merriam's descriptions of villages, analogs were sought from the local archaeological record. An analysis of site sizes for archaeological sites within Yosemite Valley and the surrounding Yosemite National Park was used to determine appropriate sizes for each village category. The largest archaeological site in Yosemite Valley (CA-MRP-56/61/196/298/299/900/301/H) is 246,241 m^2. The next largest site is 47,000 m^2. In Yosemite Valley, 85 percent of archaeological sites are less than 10,000 m^2, the average site size in Yosemite National Park is 7,014 m^2, and the average site size for Yosemite Valley is 6,679 m^2. Hull (1976 [1877]) examined trends in archaeological site size for Yosemite Valley and noted three clusters: 9000 to 5,000 m^2, 4,500 to 1,500

Part or Structure	Miwok Name
Village place or ground (plaza)	
The village as a whole (rancheria)	Oo-choo-e-ah
Bark house	Oo-moo-chah
Roundhouse	Hang-e
Sweathouse	Chap-poo
Menstrual hut	
Scaffold for drying acorns	
Scaffold for drying meal	
Arbor or canopy for shade	
Fireplace	
Place for cooking acorns	
Acorn caches	Cak:a
Mortar rocks	
Obsidian workshops	
Place for burning the dead	Yu-lah

Table 1: Parts and structures of a Miwok village (1917: 202).

m², and less than 1,250 m². Table 2 presents how the archaeological size classes were matched to Merriam's descriptions.

Merriam does not define or rank the ten descriptions he uses. The ambiguity of Merriam's descriptions may relate to the wide variation in human habitation based on social, geographic, and environmental confines. The researcher arbitrarily determined the rankings of Merriam's descriptions.

These size classes were then used to create circular buffers around point locations. Where physical geographic barriers, such as the Merced River or cliff walls, would have impeded village occupation, buffers were cropped and additional area was added on all unimpeded sides. Buffers were expanded to maintain the originally projected size within ± 1.5 acres. Figure 3 shows the results.

Stephen Powers (1976 [1877]) did not leave a map, so in order to determine the locations of villages sites he identified a 1872 map of Yosemite Valley was georeferenced and used to interpret Powers written description. Figure 4 provides these interpretations.

Conclusions

GIS analysis is a powerful tool that may give insights into the spatial patterns of human occupation. With digital images of historic maps an archaeologist has the ability to explore the spatial notes left by early ethnographers in new and exciting ways but their use needs to include thoughtful and documented interpretation. The exploration of numerous supporting documents and data sets will increase the accuracy and suggest additional research topics. This analysis allows a new view of the potential locations of villages identified by Merriam (1917) and Powers (1976 [1877]). This analysis does not necessarily give a complete view of human occupation during the late nineteenth century. As of 1998, three sites not in areas identified by ethnographers have shown potential ethnographic affiliation through recovery of historical artifacts: CA-MRP-163, one trade bead (Mundy and Hull 1988); CA-MRP-190/191, one trade bead, sparse

Table 2: Spatial size of Merriam's villages based on archaeological data.

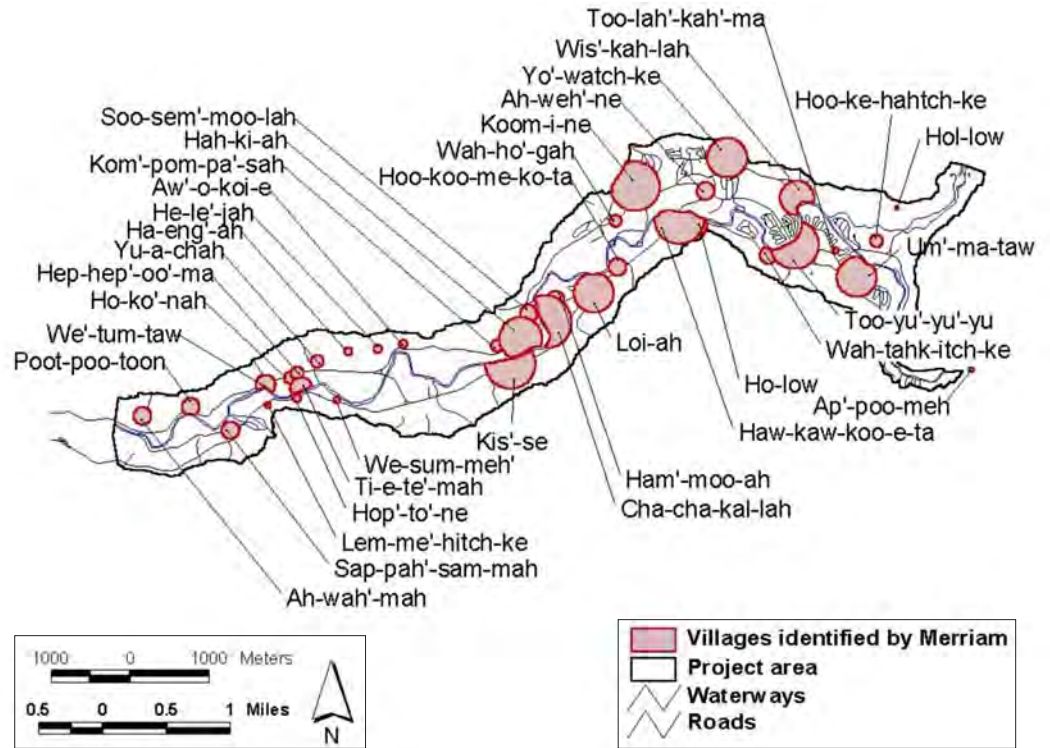| Merriam's Description	Archaeological site size (meters sq)	Buffer Radius	Buffer Used For This Analysis	Source /Justification for Site Size
Largest village	246,241	280m	300m	Largest archaeological site in Yosemite Valley
Large village	47,000	122m	250m	2nd largest archaeological site in Yosemite Valley
Large summer village	~30,000	97m	200m	Size in between large village and village
Village	10,000	56m	110m	85% of archaeological sites are <10,000 sq m.
Summer village	7,000	47m	80m	7,014 m sq average site size in Yosemite National Park
Small village	6,600	46m	75m	6,679 m sq average site in Yosemite Valley
Small summer village	5,000	40m	50m	5000-9000 m sq (0.5 -0.9 hectares)
Village or camp	4,500	38m	40m	1500-4500 m sq (0.15-0.45 hectares)
Camp	1,500	22m	30m	1500-4500 m sq (0.15-0.45 hectares)
Winter shelter	<1,250	20m	20m	<1250 m sq (<0.125 hectares)

Figure 3: Spatial extent of Merriam's village sites based on archaeological analogs.

Figure 4: Interpretation of Stephen Powers village descriptions overlaid on 1872 Yosemite Valley map.
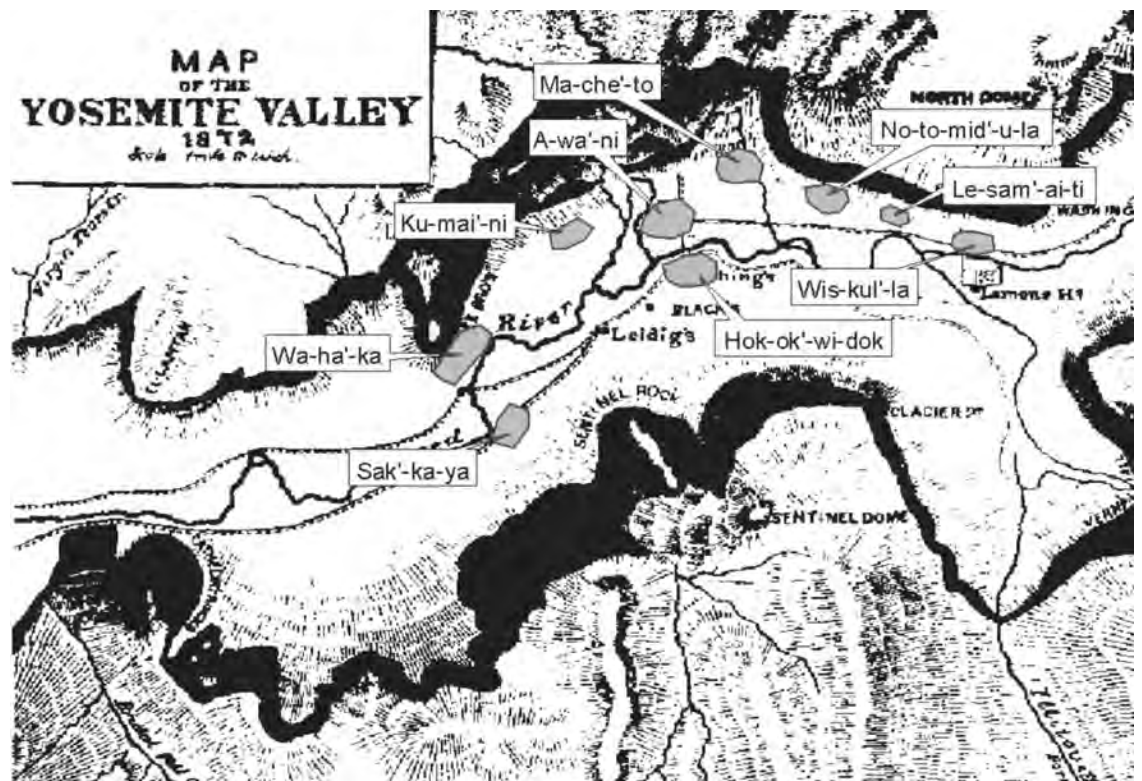
Table 3: Correspondence of ethnographically identified villages and archaeological sites.

Village Name (Italics Powers)	GIS Analysis	Merriam (1917)	Merriam field map	Village type	Powers (1976 [1877])	Latta (c. 1930)	Hall (1929)	Time of Occupation
Ah-wah'-mahAh-wah-ma	None identified	X	X	Village		X		
Ah-wah'-ne (A-wa'ni)	None identified56/61/196/… - 45 m north	X	X	Village	X	X		
Ap'-poo-meh	None identified	X		Camp		X		
Aw'-o-koi-e	310	X	X	Small summer village		X	X	
Cha'-cha'-kal-lahCha'-cha-ka-la	322	X	X	Large village	X	X		
Ha-eng'-ah	None identified	X	X	Small summer village		X	X	
Hah-ki-ah (Hakkiah)	6769817	X		Large village		X		Until approx 1897
Ham'-moo-ah	None identified	X	X	Village				
Haw-kaw-koo'-e-tah,Ho-kok'kwe-lah, Haw-kaw'-koi (Hok-ok'-wi-dok)Haw-kaw-koo'-e-toh	7879/H750H1529H	X		Large village	X	X		
He-le'-jah	None identified62 – 140m east	X	X	Small summer village		X	X	
Hep-hep'-oo'-ma	None identified64 – 50 m NNE	X	X	Summer village		X	X	
Ho-ko'-nah	None identified819H – 25m north	X	X	Small village		X		
Hol-low or Lah'-koo'hah	57	X		Winter shelter		X		Possibly used in 1880s and 1890s
Ho-low	78					X		Identified as Old Indian Village on Bunnell map
Hoo-ke'-hahtch'-ke	None identified46/47/74 – 300 m SE45/326 – 105 m SW	X		Summer village		X		Identified as Old Indian Village on Bunnell map, Until approx 1897
Hoo'-koo-me'-ko-tahHoo-koo'-me	325/H	X	X	Village		X		Until approx. 1910
Hop'-to'-ne	None identified	X	X	Village or Camp				
Kis'-se or Kis'-se-uh	76	X	X	Large village		X		
Kom'-pom-pa'-sah or Pom'-pom-pa'sah	67307	X	X	Small village		X		
Koom-i-ne or Kom-i-ne (Ku-mai'-ni)	59/H240/303749P-22-001950	X	X	Largest village	X	X	X	Occupied until 1907
Lem-me'-hitch'-ke	None identified319 – 40 m SSW	X		Village or Camp		X	X	
Loi-ah	83/H92/H323/H324/H	X	X	Large village		X	X	Abandoned in fall of 1910
Poot-poo-toon or Put-put-toon	189824314	X	X	Village		X		
Sap-pah'sam-mah	71P-22-0296	X		Village		X	X	
Soo-sem'-moo-lah	66/H306	X	X	Village		X		Identified on Wheeler 1878 map. Until approx 1897
Ti-e-te'-mah	187822H1446YOSE 1997V-21447H	X	X	Village		X		
Too-lah'-kah'-mah	None identified825 - 30 m North84 - 60 m SW	X		Village or Camp		X		
Too-yu'-yu'-yu	84827/H	X	X	Large village		X		
Um'-ma-taw	186	X	X	Large village		X		
Wah-ho'-gah (Wah-ha'-ka)	None identified325/H – 225 m WSW	X	X	Small village	X	X		Until approx 1897, re-inhabited 1932-1969
Wah'-tahk'-itch-ke	519	X		Village		X		
We'-sum-meh'	None identified	X	X	Village or Camp		X	X	
We'-tum-taw	None identified820 – 75 m WNW	X	X	Village		X		
Wis'-kah-lah (Wis-kul'-la)	52/H291/751 292/293/H	X	X	Large summer village	X	X		
Yo'-watch-ke Mah-cha'-to (Mah-che'-to)	56/61/196/298/299/300/301295296297	X		Large village	X	X	X	Occupied until 1936
Yu-a-chah	65	X	X	Summer village		X	X	Identified as Old Indian Village on Bunnell map
Hoo-moo-ah						X		
No-to-mid'-u-la					X			
Le-sam'-ai-ti					X			

glass and nails (Hull, Bevill and Kelly 1995); and CA-MRP-305, two worked glass fragments and 130 seed beads (as noted in Hull, *et al*. 1995:22; Mundy and Hull 1988).

The GIS analysis also discovered discrepencies in previous interpretations of village locations. In some cases the analysis determined the origin of discrepencies. The village of We'-sum-meh' was identified in the three archaeological studies as being located near the present day El Capitan bridge yet C. Hart Merriam's map located the village approximately 0.5 miles west of El Capitan bridge. Frank Latta's map located We'-sum-meh' in the same location as the three archaeological studies.

At this point only field work specifically focused on these villages may determine the true locations of villages identified by Powers and Merriam. As shown in Table 3, the findings of this analysis gives a good starting point inwhich to begin field investigations.

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