

Settlement Variability in the Late Natufian of West - Central Jordan

Introduction

Settlement patterns during the Natufian period (12,500 - 10,200 BP uncalibrated) exhibit a wide range of variation. Early Natufian sites are characterized by greater degrees of sedentism and largely occur within the Mediterranean core region (Bar-Yosef 1998: 162). Late Natufian settlement is more widely dispersed, with sites occurring in the steppe and desert regions of the southern Levant (Bar-Yosef and Meadow 1995). With generally smaller sites, fewer artifacts, a more limited array of material types and an absence of architecture, most Late Natufian sites represent a pattern of frequent residential mobility and a limited range of resource procurement activities. However, a cursory examination of Late Natufian sites indicates continuous variation with regard to these settlement traits. TBAS 102 and 212 are both Late Natufian sites from Wādī Quşayr in west - central Jordan (Neeley 2010; Peterson *et al.* 2010). An initial assessment of site size and chipped stone densities indicates a short-term, seasonal camp and a larger base camp. In this paper artifact densities at TBAS 102 and 212 are examined within the context of Late Natufian settlement and sedentism in the southern Levant, concluding that there is evidence for a range of settlement types in Wādī Quşayr.

Natufian Settlement Patterns

Archaeologists have generally recognized different patterns of settlement for the Early and Late Natufian in the Levant (Bar-Yosef 1998; Goring-Morris and Belfer-Cohen 1998; Henry 1989). Early Natufian sites are clustered in what has been termed the core region, an area that largely corresponds with the prehistoric extent of Mediterranean plant communities (Bar-Yosef 1998: 162). This includes much of northern Israel, the eastern Jordan valley and higher elevations in western Jordan. Within the core region, settlement consists of base camps characterized by lower residential mobility and / or larger populations. These sites tend to be larger and more archaeologically visible owing to the length of occupation. The second type of site associated with Early Natufian settlement consists of short-term extractive sites characterized by fewer occupants and short-duration, task-specific activities.

In contrast to the Early Natufian, the Late Natufian is characterized by an expansion of settlement out of the Mediterranean core area into the more marginal environments of the steppe and desert regions (Bar-Yosef and Meadow 1995: 59-60). Sites still occur within the core region, but they tend to be smaller and not as materially diverse. One characteristic of

Late Natufian settlement is a smaller number of large sites, suggesting that population aggregation was less common, possibly owing to environmental changes associated with the Younger Dryas climatic event (Bar-Yosef and Meadow 1995: 60). This reorganization of settlement still includes base camps, though apparently not on the same scale or material richness as the Early Natufian. At this time there is greater evidence for smaller, shorter duration occupations as Late Natufian populations exploit less productive resource ranges that have lower carrying capacities compared to the Early Natufian.

In a general sense, Natufian settlement trends can be characterized by a trajectory of stable, more sedentary Early Natufian settlement giving way to a pattern of increased residential mobility during the Late Natufian.

Evidence for Sedentism

Various factors have been used to identify reduced mobility or sedentism at Natufian period sites. Most commonly these include architecture (in the form of houses), site furniture (heavy, non-portable ground stone implements), storage (pits or structures for long-term occupation), human commensals, site size, burials (indicating some sort of tie to the landscape and the site) and artifact density (assumes length of occupation is related to the amount of material) (Boyd 2006: 166). The Natufian literature makes it clear that all of these traits do not occur at every Natufian sedentary base camp and that this sort of evidence for sedentism is more frequently associated with the Early Natufian (Olszewski 2004: 191-193). It has also been noted that these are more characteristic of sites within the Mediterranean core region and that the diversity of sedentism traits decreases as one moves out of this region. This raises the question of how to assess sedentism for sites outside of the core area that lack many of these traits? Should they be excluded from the discussion of Natufian

sedentism? Is there a qualitative difference in settlement behavior for Early vs Late Natufian occupations?

A closer examination of these indicators of sedentism reveals some ambiguity in terms of how accurately they monitor sedentism. For example, Edwards (1989) and Boyd (2006) have independently criticized these measures and questioned the notion of sedentism among Natufian populations, or at least our ability to adequately monitor this. Also, the lack of covariance among these traits at Natufian sites is also problematic as sites may be classified as sedentary base camps, whilst lacking one or more of these traits (Boyd 2006; Olszewski 2004; Valla 1995). In these instances, archaeologists may emphasize measures that are available to address the issue of mobility and settlement organization. For example, in southern Jordan Henry (1995: 328) uses the measure of artifact density to distinguish base camps, characterized by long-term occupation, from limited duration extractive camps.

It might be more useful to view the notion of sedentism as a behavioral strategy that operates on a sliding scale rather than as a binary condition that is either / or. This would suggest that sedentism, as a component of residential mobility, can be operationalized along a continuum from low to high with continuous states in between. As a result, some Natufian sites (base camps) might represent the high end (those with architecture; non-portable site furniture; burials), while other sites lacking these elements could still be considered base camps on the basis of artifact densities or other such characteristics.

One measure of occupation duration is site size. Bar-Yosef (1998: 162) has used site size to classify sites into small (15 - 100 m²), medium (400 - 500 m²), and large (1,000+ m²) categories. However, site size alone often results in an intuitive assessment of settlement without examining any of the underlying site structural factors. The approach taken in this

paper follows that of Henry (1995: 328) by emphasizing artifact densities along with site size to assess whether sites are representative of long or short-term occupations. In using these measures of residential mobility, I should note that they are not without potential limitations. Site reoccupation can alter site size and density in a way to make sites appear larger and more sedentary than the underlying behaviors responsible for site formation. In addition, geomorphological processes such as deflation can create greater artifact densities (per unit of excavated sediment) and affect settlement interpretations. Despite these limitations, I believe that the measures of artifact density and site size can provide some insight into the nature of Natufian settlement systems.

Wādī Quṣayr

In 2006, two Natufian sites in Wādī Quṣayr were subjected to limited test excavation (Peterson *et al.* 2010). Separated by about 200 m, the two sites (TBAS 102 and 212) represent two of the ten sites containing Natufian materials along this minor *wadi*. Preliminary environmental reconstructions of the area indicate that it was characterized by a shallow pond / marsh environment that was fed by springs in the area. Similar sorts of environments have been identified for Wādī al-Ḥasā and Jurf ad-Darawīsh to the north (Moumani *et al.* 2003; Schuldenrein and Clark 1994).

Typologically, these sites are assigned to the Late Natufian, an interpretation supported by two radiocarbon dates ($11,040 \pm 60$ BP and $11,170 \pm 70$ BP uncalibrated) from TBAS 102 (Neeley 2009, 2010). In terms of site size TBAS 102 is the smaller of the two, covering about 300 m², whereas TBAS 212 is about 5,000 m² in area. Based on size differences, the initial interpretation of these sites suggests that TBAS 102 represents a small- to medium-sized, short-term camp and TBAS 212 represents a larger, longer-term occupation, possibly comprised of repeated, overlapping occupations. In both

cases, the material remains are more than just surface deposits and extend to depths of 35 - 50 cm below the modern ground surface. The depth of archaeological remains suggests that they were not deposited in a single event, but represent some repeated occupation or activity at both locations.

Given the potential high productivity of the marsh / pond setting, one expected outcome is that local settlement might emphasize longer-term base camp activities rather than highly specialized short-term encampments. This suggests that these occupations indicate sedentism, but a sedentism that was highly variable and continuous in its divisions. Thus, TBAS 102 might represent a shorter-term, seasonal sedentary camp, whereas TBAS 212 may fall closer to a longer-term sort of occupation. Support for these different interpretations can be found in the significantly greater density of artifacts and cores at TBAS 212.

Patterns in the Data

In addition to the two sites from Wādī Quṣayr, nine other sites were selected for comparison (FIG. 1). Seven of the nine are from Jordan and none are from the traditional Natufian core region. The main criterion for selection was the presence of sufficient information to calculate the volume of sediment excavated, along with site size, and artifact and core counts. A number of sites, some rather large, were excluded as the volumetric data was not available. This resulted in six sites assigned to the Late Natufian and five to the Early Natufian. The latter are included as a point of comparison with the Late Natufian. In addition, it was noted whether the excavators considered the sites to be base camps (more sedentary) or short-term extractive camps (high residential mobility).

For each of the sites, site size, artifact density and core density were calculated - for the latter two these were calculated per 0.1 m³ (TABLE 1). For site size and artifact density we



1. Location of sites used in this study.

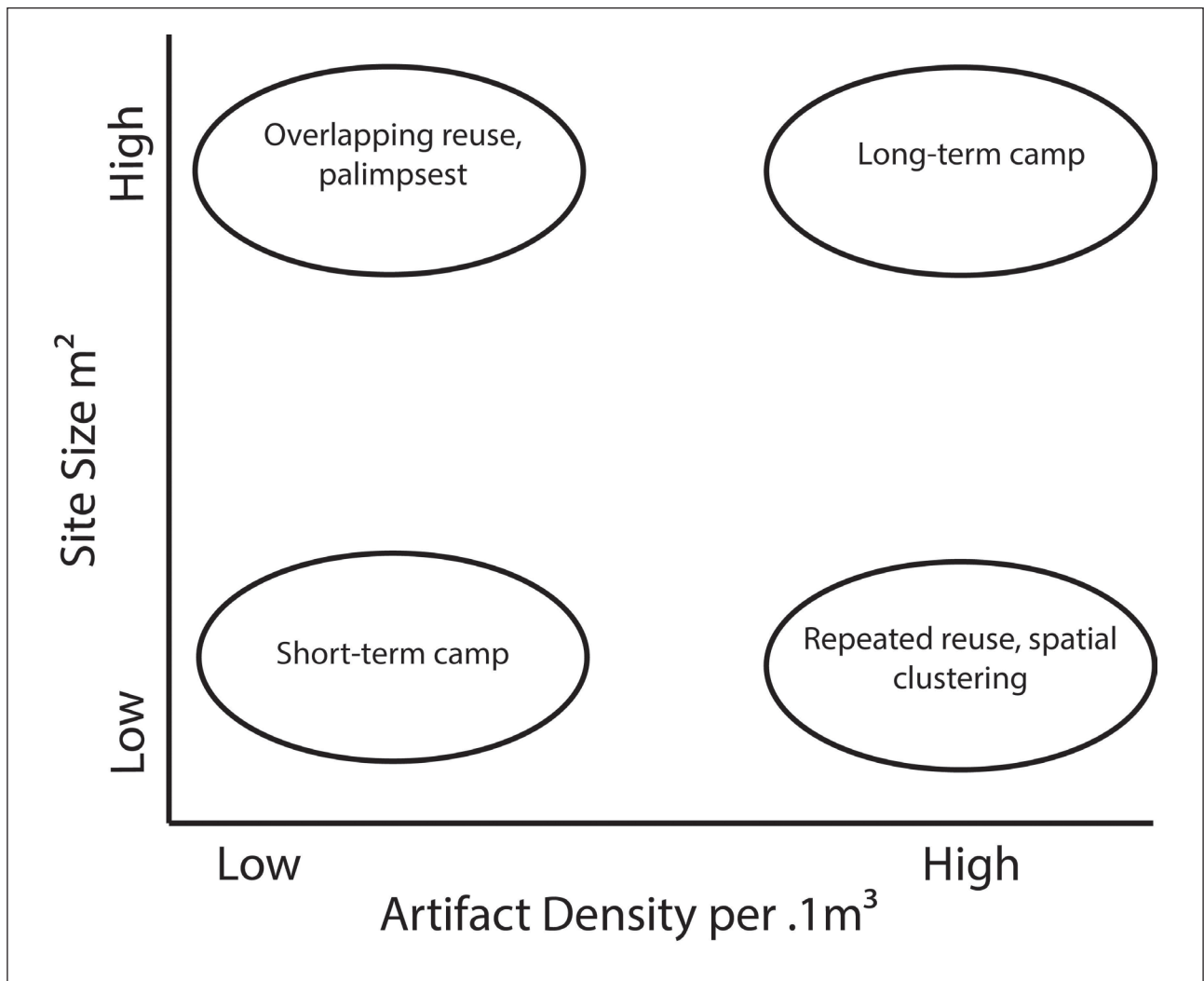
can generate some expectations for patterning in the archaeological data. Sites in the lower left of the figure, characterized by small size and low densities, might best be interpreted as short-term encampments (FIG. 2). Those in the upper right of the diagram fit the expectations for longer-term, more sedentary occupations. The upper left, with large site size but low densities, might correspond to short-term, overlapping occupations and reoccupations creating a palimpsest of material. Finally, the lower right of the figure with small site size and high densities might reflect repeated short-term

occupations, but ones that were much more spatially constrained. These occupations might correspond to the occurrence of a particular resource (*e.g.* lithic raw material; spring) that constrains the site size. In addition to using site size and artifact density as a marker of residential mobility, core density is a useful indicator of occupation duration as sites occupied for longer periods of time are expected to generate more discarded cores (upper right) than more mobile occupations in which cores are less intensively reduced and may be transported off-site (lower left) (FIG. 3). Sites

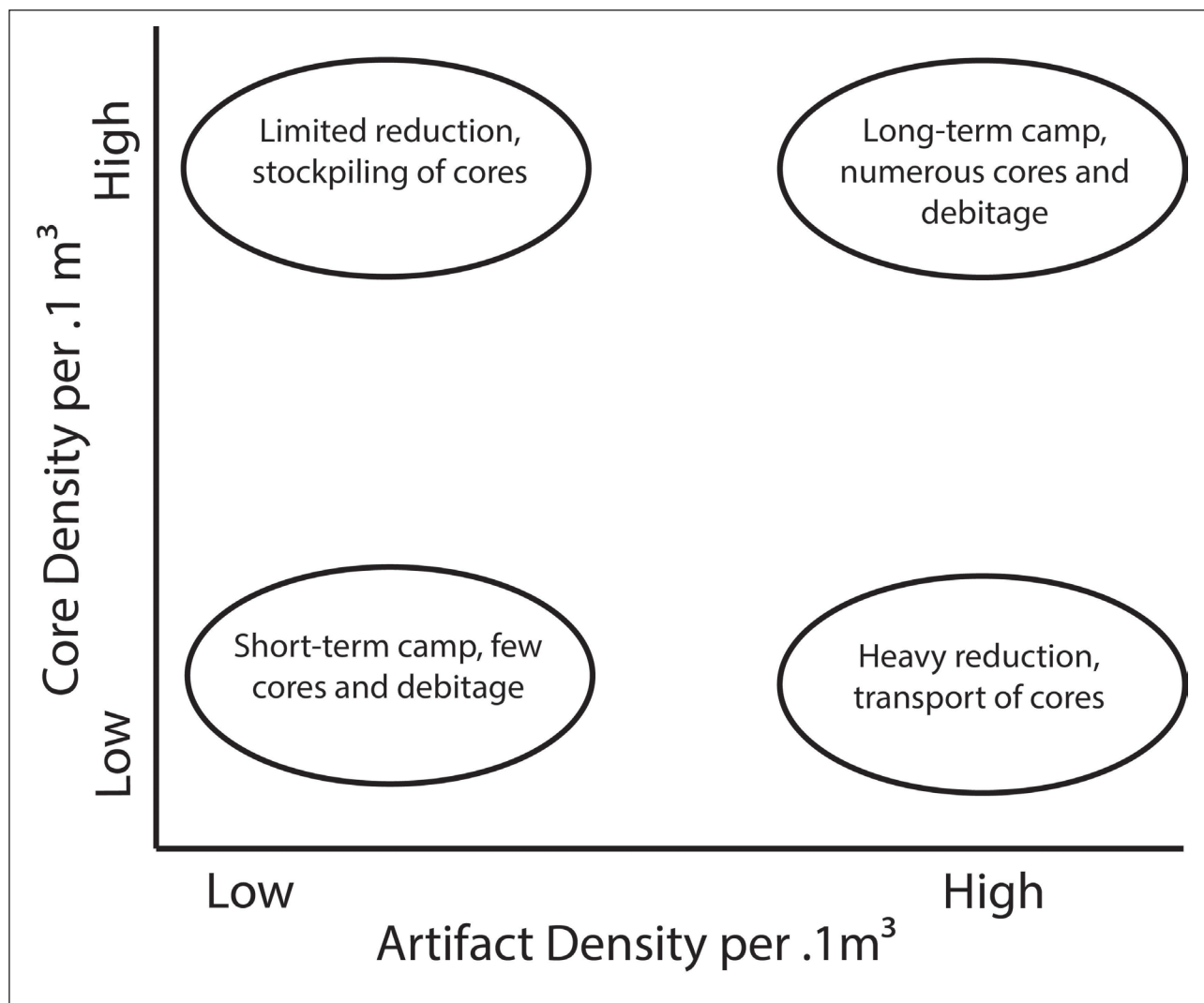
Table 1. Selected variables and sites used in this study.

| Site | Age | Mobility | Volume excavated | Artifact density per 0.1 m ³ | Core density per 0.1 m ³ | Site size |
|------------------------------|-------|----------|--------------------|---|-------------------------------------|-----------------------|
| TBAS 102 | Late | High? | 1.5 m ³ | 657 | 7.5 | 300 m ² |
| TBAS 212 | Late | Low? | 0.9 m ³ | 2503 | 23.4 | 5,000 m ² |
| Khallat ‘Anza ¹ | Late | Low | 3.6 m ³ | 140 | 1.1 | 2,000 m ² |
| Nahal Sekher VI ² | Late | High | 1.2 m ³ | 501 | 1.1 | 60 m ² |
| Wadi Humeima ³ | Late | High | 0.5 m ³ | 408 | 4.0 | 400 m ² |
| Rosh Zin ⁴ | Late | Low | 1.2 m ³ | 2969 | 11.6 | 900 m ² |
| Sunakh ⁵ | Early | Low | 6.4 m ³ | 80 | 1.0 | 12,000 m ² |
| Yutil al-Ḥasa ⁶ | Early | High | 1.4 m ³ | 253 | 4.6 | 320 m ² |
| Tabaqa ⁷ | Early | Low | 1.2 m ³ | 543 | 4.9 | 10,000 m ² |
| Wadi Judayid ³ | Early | Low | 2.4 m ³ | 1437 | 8.7 | 400 m ² |
| Azraq 18 ⁸ | Early | Low | 1.8 m ³ | 1796 | 23.6 | 1400 m ² |

1. Betts 1998; 2. Goring-Morris and Bar-Yosef 1987; 3. Henry 1995; 4. Henry 1976; 5. Hoffman-Pedersen 1995; 6. Coinman et al. 1999; 7. Olszewski et al. 1998; 8. Byrd 1988.



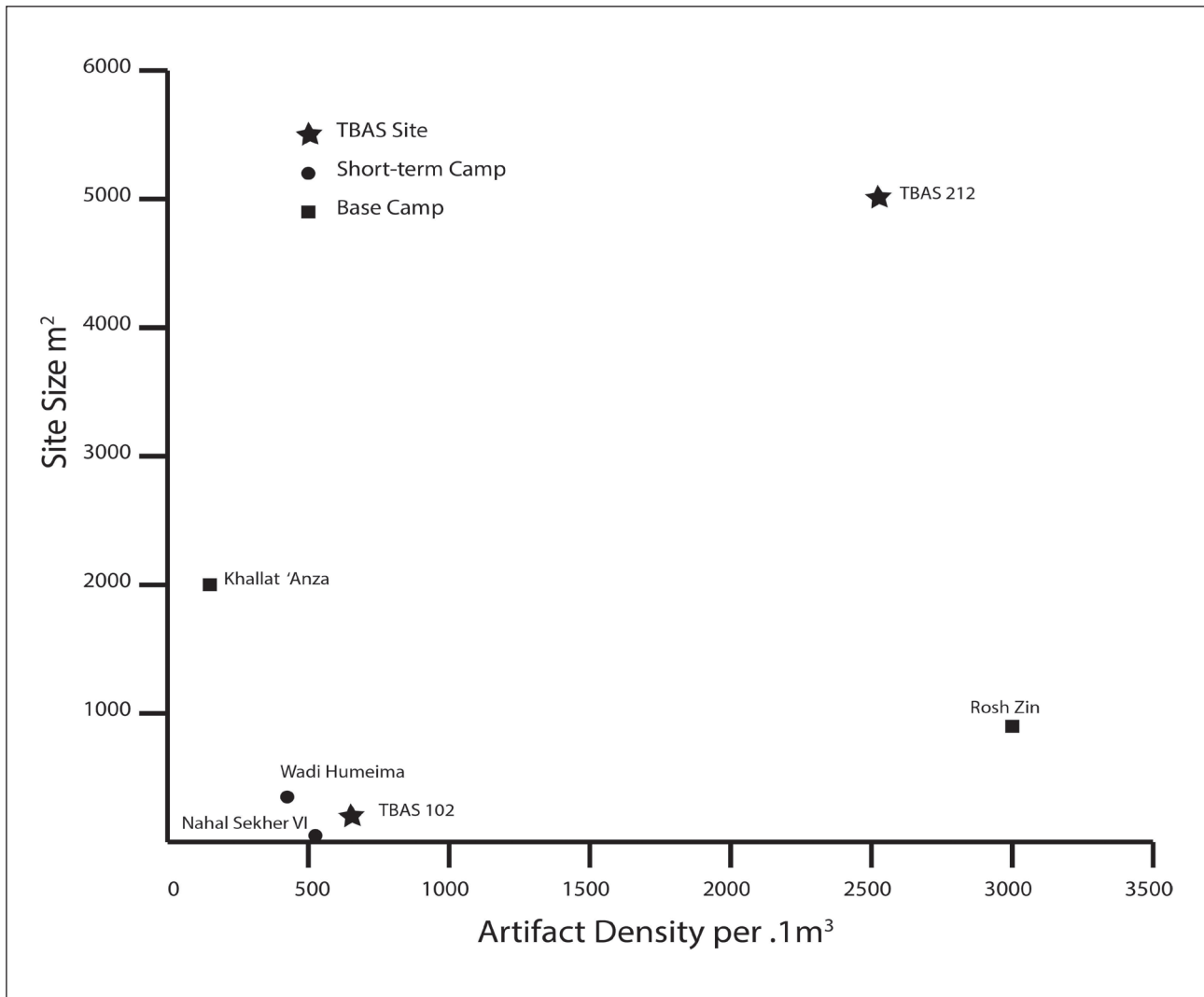
2. Expected patterns for artifact density by site size.



3. Expected patterns for artifact density by core density.

with very high artifact densities but low core densities may reflect behaviors associated with preparing cores for transport off-site, or perhaps situations of limited raw material availability that necessitated an intensive / economizing reduction strategy (lower right). Finally, sites with high core densities but low artifact densities might reflect specialized behaviors like stockpiling in advance of anticipated use of the raw material. Core densities may also reflect the local availability of raw materials, with high counts indicating local procurement. An exception to this expected pattern might occur when raw material availability is low, resulting in reduced quantities of chipped stone (both cores and debitage) in a more sedentary setting.

For the Late Natufian, examination of artifact density by site size reveals that three sites stand out in terms of size or density, two of which are identified as base camps (presence of architecture) (FIG. 4). The third one in this group is TBAS 212, which is large in size and artifact density. The remaining three sites are closely grouped (representing the small- and medium-size classes) and two of these are classified as short-term encampments. TBAS 102 is clustered with the short-term group, although it has slightly higher artifact density. Looking at artifact density as reflected by core density, two sites stand out from the rest: Rosh Zin and TBAS 212 (FIG. 5). Three sites comprise a second group with relatively low artifact and core densities. Two of these are short-term



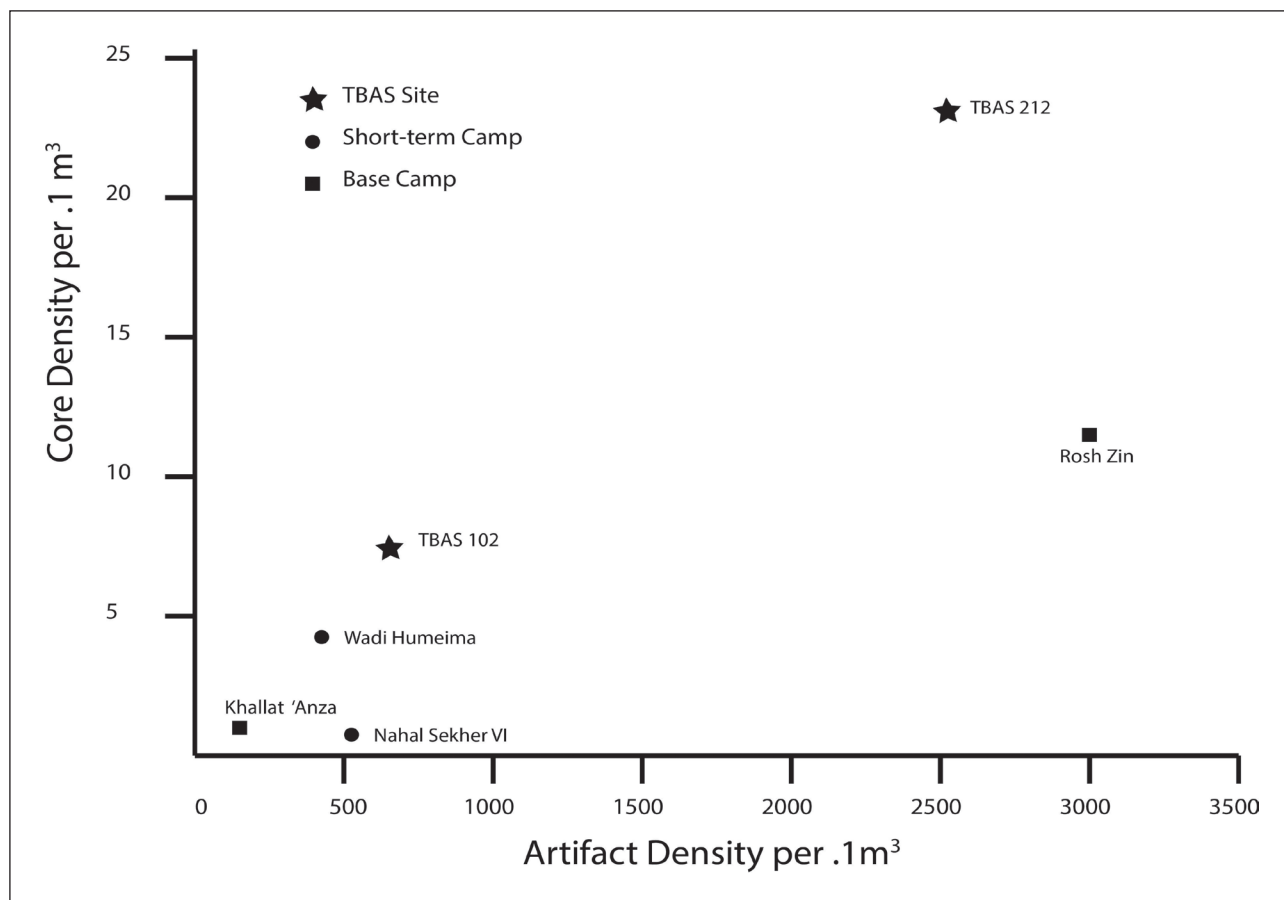
4. Plot of Late Natufian artifact density by site size.

camps and the third, Khallat 'Anza, is located some distance from raw material sources, a factor that may explain its lower values (Betts 1998:15). TBAS 102 is set apart from this group, particularly in terms of core density, yet appears to be different from the larger, more sedentary occupations. I would suggest that access to abundant local raw material sources may be a cause for this patterning at TBAS 102.

Among the Early Natufian sites, we see that two of the four base camps are clearly separated in terms of artifact and core densities (FIG. 6). One base camp site, Ṭabaqa, is closer to the values associated with the short-term camps, while the fourth is considerably lower. Assuming that access to raw material is not restricted there, the lower densities might result

from post-depositional factors - both sites are very large (>10,000 m²) and materials may have been spread out as a result. There is a wide range of variation in core and artifact densities at the Early Natufian sites, suggesting that base camps of this period exhibited a continuous range of variation and are not easily described by these methods.

Finally, a comparison of Early and Late Natufian assemblages by artifact and core density indicates that three of the six base camps (represented by circles) are distinctive in their distributions (FIG. 7). The short-term camps tend to cluster as well. The TBAS sites tend to fall into the base camp (TBAS 212) and possible short-term camp (TBAS 102) categories.



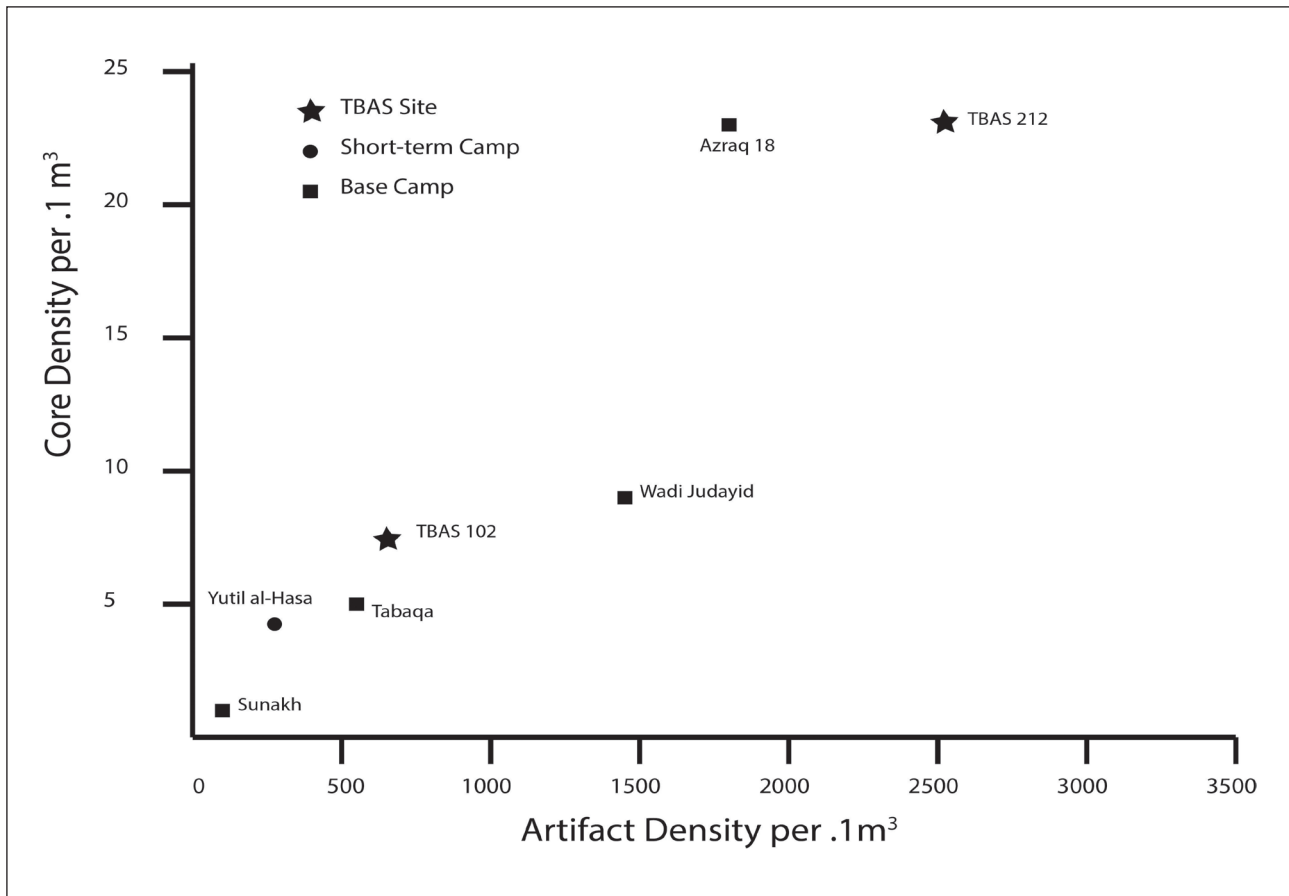
5. Plot of Late Natufian artifact density by core density.

Interpretation and Conclusions

Late Natufian settlement patterns encompass a range of settlement types. Clearly there are base camps characterized by lower residential mobility and specialized camps representative of higher residential mobility. Site size seems to be one way to make these distinctions, though we run the risk of jumping to conclusions if we assume larger equals less mobile without trying to demonstrate this through other lines of evidence. Examination of core and artifact densities seems to support the size trends for the Late Natufian, in that larger sites generally have higher densities of materials. However, variable access to lithic raw materials appears to have a significant impact on this patterning. When raw material is not locally available, core and artifact densities from lower mobility sites may be greatly reduced. Additionally, the Early Natufian examples indicate a more limited artifact density when site size is enormous,

potentially as a result of post-depositional processes that scatter the surface materials. One problem that emerges from this is the difficulty of putting sites into discrete categories (*e.g.* high / low; small / medium / large) when the observed variation is largely continuous. Although this might be the result of weaknesses in how we try to account for these behaviors, I suspect they reflect the continuous character of the underlying behaviors responsible for the archaeological record.

A few observations can be made about using artifact densities to assess sedentism. Clearly, the patterns here are not neat linear relationships but encompass a range of variability. This raises the question as to whether reported artifact densities are a reasonable approximation of mobility patterns. One area where some bias or distortion may be introduced is in the limited scale of excavation at these sites. Many of these sites are represented by soundings of 2 - 6 m² or

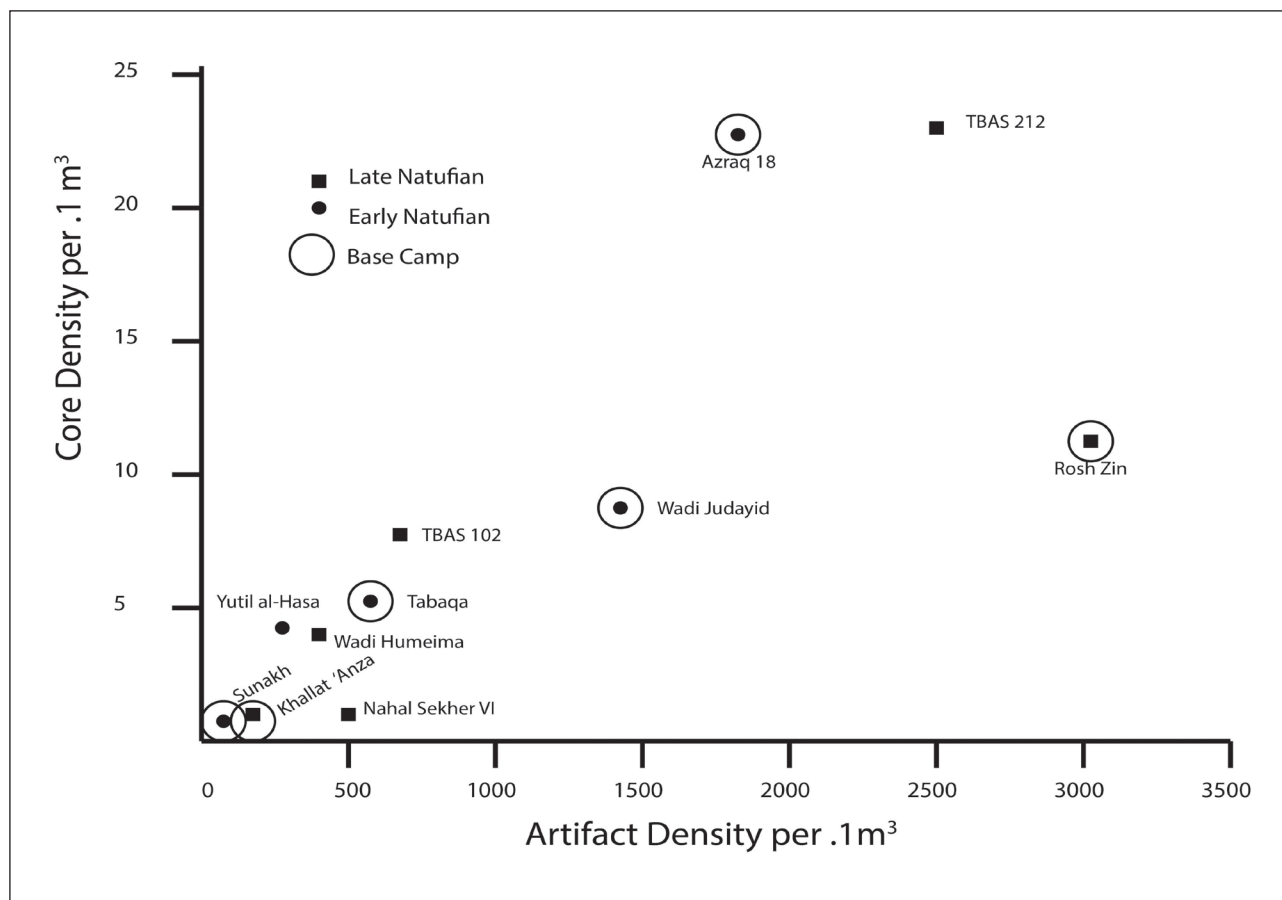


6. Plot of Early Natufian artifact density by core density.

consist of extensive surface collections. More extensive excavations might produce samples that are more helpful in addressing the question of mobility. Also, what spectrum of mobility is represented by Natufian populations? Should we expect them to have only long-term base camps and short-term extractive camps, or should there be a continuous range of site-types between these endpoints. Thinking of settlement in terms of continuous variability might account for those sites that do not fit the more limited view of high and low mobility. Finally, it seems that examples here indicate that in some cases situational factors, particularly the availability of lithic raw material, have an effect on the patterns generated and must be accounted for in any explanations of these patterns.

More specifically, what can we say about settlement in Wādī Quşayr? Based on excavation and survey data, there is reasonable evidence to support the notion of a range of

settlement types in the *wadi*. TBAS 212 appears to represent one end of the spectrum, *viz.* a base camp inhabited by larger groups for a longer duration and / or repeated occupations during the Late Natufian. The comparison of TBAS 212 with other Natufian base camps (both Early and Late) supports this interpretation. TBAS 102, with a much smaller site size and lower artifact densities, is more problematic as it is somewhat intermediate relative to comparable short-term and long-term camps. The depth of deposit suggests the reoccupation of the site or perhaps an extended occupation by a small group. I would suggest that this site is part of the continuous variation that exists between the high and low ends of the mobility spectrum. Local surface artifact densities in Wādī Quşayr suggest the presence of smaller, more ephemeral occupations. Higher core densities at TBAS 102 (and 212) strongly suggest the local availability of and access to high quality flint resources.



7. Combined plot of Early and Late Natufian artifact density by core density.

Where do these resources occur? No immediate source locations have yet been identified. It is worth noting that flint resources are abundantly available from the nearby Jabal Umm Rijām. However, the pattern of flint exploitation in the Middle Paleolithic, Upper Paleolithic and Early Epipaleolithic periods is very different to that of the Natufian and indicates the use of different types of raw materials in terms of size and texture.

With these two sites (and others), Wādī Quṣayr potentially encompasses a range of mobility patterns for the Late Natufian. The presence of variably sized camps in Wādī Quṣayr might also reflect seasonal patterns of aggregation and dispersal, a conclusion supported by the presence of other Wādī Quṣayr Natufian sites with a range of surface artifact densities. The likely key factor regarding settlement in Wādī Quṣayr is the presence of marsh / pond resources, which have also been

identified elsewhere in west - central Jordan. However, only Early Natufian remains have been identified from Wādī al-Ḥasā (Tabaqa; Yutil al-Ḥasā) and no Natufian sites are found near Jurf ed-Darawish. The absence of Late Natufian remains from either Wādī al-Ḥasā or Jurf ad-Darawīsh suggest a more rapid decline in those environments at the end of the Pleistocene relative to Wādī Quṣayr. The local relationship of pond / marsh environments with the Younger Dryas and Natufian settlement is a line of research that warrants further investigation.

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Bibliography

- Bar-Yosef, O. 1998. The Natufian Culture in the Levant, Threshold to the Origins of Agriculture. *Evolutionary Anthropology* 6:159-177.
- Bar-Yosef, O. and Meadow, R.H. 2005. The Origins of Agriculture in the Near East. Pp. 39-94 in T.D. Price and A.B. Gebauer (eds.), *Last Hunters-First Farmers*. Sante Fe, NM: School of American Research Press.
- Betts, A.V.G. 1998. The Epipaleolithic Periods. Pp.11-35 in A.V.G. Betts (ed.), *The Harra and the Hamad: Excavations and Surveys in Eastern Jordan, Volume I*. Sheffield: Sheffield Academic Press.
- Boyd, B. 2006. On "Sedentism" in the Later Epipaleolithic (Natufian) Levant. *World Archaeology* 38(2):164-178.
- Byrd, B.F. 1988. Late Pleistocene Settlement Diversity in the Azraq Basin. *Paléorient* 14: 257-264.
- Coinman, N.R., Olszewski, D.I., Abdo, K., Clausen, T.G., Cooper, J.B., Fox, J.R., al-Nahar, M., Richey, E., and Saele, L. 1999. The Eastern al-Hasa Late Pleistocene Project Preliminary Report on the 1998 Season. *ADAJ* 43: 9-25.
- Edwards, P.C. 1989. Problems of Recognizing the Earliest Sedentism: The Natufian Example. *Journal of Mediterranean Archaeology* 2: 5-48.
- Goring-Morris, A.N. and Bar-Yosef, O. 1987. A Late Natufian Campsite from the Western Negev, Israel. *Paléorient* 13: 107-112.
- Goring-Morris, N. and Belfer-Cohen, A. 1998. The Articulation of Cultural Processes and Late Quaternary Environmental Changes in Cisjordan. *Paléorient* 23(2): 71-93.
- Henry, D.O. 1976. Rosh Zin: A Natufian Settlement near Ein Avdat. Pp. 317-347 in A.E. Marks (ed.), *Prehistory and Paleoenvironments in the Central Negev, Israel Volume I*. Dallas: SMU Press.
- 1989. *From Foraging to Agriculture: The Levant at the End of the Ice Age*. Philadelphia: University of Pennsylvania Press.
- 1995. *Prehistoric Cultural Ecology and Evolution: Insights from Southern Jordan*. New York and London: Plenum Press.
- Hoffman Pedersen, C. 1995. *Natufian Chipped Lithic Assemblage from Sunakh near Petra, Southern Jordan*. Copenhagen: Museum Tusulanum Press.
- Moumani, K., Alexander, J., and Bateman, M.D. 2003. Sedimentology of the Late Quaternary Wadi Hasa Marl Formation of Central Jordan. A Record of Climate Variability. *Palaeogeography, Palaeoclimatology, Palaeoecology* 191: 221-242.
- Neeley, M.P. 2009. The Late Epipaleolithic: The View from West-Central Jordan. Pp. 847-852 in F. al-Khraysheh (ed.), *Studies in the History and Archaeology of Jordan X*. Amman: Department of Antiquities.
- 2010. TBAS 102: A Late Natufian Site in West-Central Jordan. *Neo-Lithics* 1/10: 86-91.
- Olszewski, D.I. 2004. Plant Food Subsistence Issues and Scientific Inquiry in the Early Natufian. Pp. 189-209 in C. Delage (ed.), *The Last Hunter-Gatherers in the Near East*. BAR International Series 1320. Oxford: John and Erica Hedges Ltd.
- Olszewski, D.I., Coinman, N.R., Schuldenrein, J., Clausen, T., Cooper, J.B., Fox, J., Hill, J.B., al-Nahar, M., and Williams, J. 1998. The Eastern al-Hasa Late Pleistocene Project A Preliminary Report on the 1997 Season. *ADAJ* 42: 53-74.
- Peterson, J.D., Neeley, M.P., Hill, J.B., Jones, J., Crawford, P., Kurzawska, A., Sullivan, N., Wasse, A., and White, C. 2010. The Origins and Development of Agriculture in the Wadi al-Hasa Region: 2006 Test Excavations at Khirbat Hammam (WHS 149), TBAS 102, and TBAS 212. *ADAJ* 54: 387-412.
- Schuldenrein, J. and Clark, G.A. 1994. Landscape and Prehistoric Chronology of West-Central Jordan. *Geoarchaeology* 9: 31-55.
- Valla, F. 1995. The First Settled Societies—Natufian (12,500-10,200 BP). Pp. 169-187 in T.E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London: Leicester University Press.

