

ABSTRACT

WENNER, SARAH E. Petra's Hinterland from the Nabataean through Early Byzantine Periods (ca. 63 BC-AD 500). (Under the direction of S. Thomas Parker, Jennifer Gates-Foster, Gary Mathews.)

Traditionally, research on Nabataea and Roman Arabia has focused on larger cities, centers of trade, and military sites. Hinterland sites, on the other hand, remain almost completely unexcavated. This means that little is known about non-elite or non-urban life from the Nabataean through the Early Byzantine periods (ca. 63 BC-AD 500), nor is Petra's true economic relationship with its periphery understood. When extensive excavation is impossible, surveys provide the best remedy for this knowledge gap, identifying smaller villages and even single farmsteads, examining field and water-management systems, and tracing general changes in landscape use over time.

All three topics are being explored by a Dutch-Jordanian team currently surveying the area around Udhruh, 15 km east of Petra in southern Jordan. In ca. AD 300, the Roman army built a legionary fortress for *legio VI Ferrata* in Udhruh, but the site's history began long before its construction, with significant occupation beginning in the Nabataean era. In the 1980s a British team led by Alistair Killick conducted a regional survey and excavated both the fortress and an associated pottery kiln, the latter only briefly mentioned in preliminary reports. A final report from this project was never published and, as a result, little is known about the site, which is now experiencing rapid development. Partially in response to this growing threat, a Dutch-Jordanian team began an ongoing survey in 2011.

This thesis uses ceramic data collected by the Udhruh Archaeological Project and other regional surveys, as well as other archaeological and documentary evidence, to address

changes in land use within Petra's hinterland between the Nabataean and Early Byzantine periods. It includes an analysis of various survey methodologies, a critical examination of recent surveys in Petra's hinterland, and a historical and archaeological study of diachronic change in Udhruh's settlement patterns from the Nabataean to the Early Byzantine periods using original survey data. On this basis, it becomes clear that Petra had an intimate relationship with the marginal desert environment, which in turn was connected not just to the Nabataean kingdom's core but also to the eastern Roman Empire based on the presence of fine wares and amphorae in Petra's hinterland. Upon Rome's annexation of Nabataea, it was not only Petra but also the hinterland that contracted, reflecting the close relationship between the Petra region and the larger Roman Empire. Petra's declining population only accelerated the process of nucleation that likely existed already in the Nabataean period. When Udhruh's legionary fortress was constructed ca. 300, the new urban city (later called Augustopolis) drew inhabitants away from the former Nabataean capital towards Rome's eastern frontier and back into Petra's hinterland.

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Petra's Hinterland from the Nabataean through
Early Byzantine Periods (ca. 63 BC – AD 500)

by
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BIOGRAPHY

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After working for two years as a Market Analyst in Madison, WI, Sarah began a Master's program under the guidance of S. Thomas Parker and began a study of Classical languages. She also had the opportunity to begin an intensive study of southern Jordan's Classical era ceramic tradition with Parker's materials from his 1994-2003 excavation of Roman Aila. This allowed her to join the Dutch-Jordanian team surveying Udhruh as the ceramicist in 2013 and 2014, when she also reviewed the 2011 material.

After graduation, Sarah will enter the University of Cincinnati's PhD program in Classics, with an emphasis on Classical Archaeology.

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Chapter I: Introduction

In many ways, antique cities were a symptom—not a cause—of their cultural context, identity, and geography. Urban sites were not separated from their hinterlands, and settlement networks were dense, complicated, and intrinsically linked. But the challenge of illuminating the webs in which they functioned has become more and more vital to the field of archaeology, especially with reference to the *longue durée* and World-Systems Theory. These theories attempt to address connectivity, economics, and social relationships between zones of consumption and production, and while accounting for the region’s political environment, they emphasize other trends not traditionally examined. At the same time, in order for new trends to be examined fully, the basic chronology and social history of a specific geographical place must be established. Once this is understood, longer trends—such as the delicate relationship between a political and economic capital and its agricultural hinterland—are better understood.

An examination of Classical Petra explores this very intricate and delicate relationship that an urban center (on the eastern frontier of the Roman Empire) had with its periphery. Petra was the capital of the Nabataean kingdom. Kings ruled this prosperous kingdom, rich from the incense trade, until Rome annexed it in AD 106.¹ As more monumental architecture is excavated, large questions remain unanswered. How connected were the Nabataeans to the greater Roman world, not just to the Roman East? Why did Rome wait so long to annex the Nabataean kingdom? If Petra was economically exceptional, how did its hinterland population survive? To what extent did the Roman annexation negatively

¹ For further history of Petra and the Nabataeans, see Taylor 2002.

affect those residing outside of the city? How did the population adjust to Roman rule? How did regional settlement change after the crisis of the mid-3rd century and why?

This thesis argues that Petra's hinterland during the Classical era was greatly affected by its administrative boundaries, first internally and then externally enforced. Change in Petra's settlement patterns was tied closely to the Roman annexation and the construction of a legionary fortress in Udhruh, 15km east of the former Nabataean capital at Petra (both are located in modern Jordan). Udhruh received much less archaeological attention for most of the 20th century, but research has shown that while it always attracted settlement due to its perennial spring, it became a thriving urban center during the Byzantine period (ca. AD 324-630) and in the later Islamic period (not discussed in this thesis). This chapter will explore the sparse historical sources addressing settlement patterns in Petra's immediate hinterland² from the Nabataean through the Early Byzantine periods (ca. 63 BC-AD 500) before introducing the subsequent chapters.

The Primary Sources

Unlike some parts of the Roman Empire or other Near Eastern polities, historical sources addressing Nabataea—and later Roman Arabia—between the Nabataean and Early Byzantine periods (ca. 63 BC-AD 106) are scarce. While more have been recovered recently and are still being published,³ this limited amount can only offer a hint of Petra during these periods. Archaeological excavation outside of Petra also remains relatively scanty and regional surveys, which have grown more systematic and intensive in recent decades, remain

² Sources specifically addressing Udhruh will be addressed later, in Chapter IV.

³ Specifically, the Petra Papyri.

largely unpublished in definitive form. Nevertheless, a significant amount of documentary and archaeological evidence is available and constantly growing. The following section will summarize the available evidence that addresses the hinterland⁴ from a critical perspective. Despite some serious limitations, the sources do permit some insights into the history of Petra's periphery.

In contrast to Petra itself, which has evidence of settlement from the 3rd century BC onwards (Kouki 2012, 35), there is little evidence of agricultural exploitation or settlement in the hinterland around Petra in the 3rd to 1st centuries BC, when the Nabataeans first appear in the historical record. The mid-1st century BC writer Diodorus Siculus, relying on the 3rd century BC author Hieronymus of Cardia, preserves the earliest evidence of the Nabataeans. He describes a Nabataean prohibition against construction of permanent houses, saying⁵ “therefore they bear their life in the open air, claiming a native land uninhabited with neither rivers nor abundant springs . . . It is their custom neither to sow grain nor plants which produce fruits, nor drink wine, nor construct houses: if anyone is found acting against this [prohibition], there is a penalty of death” (Diodorus 19.94.2-3).⁶ Whether such a strict penalty actually existed or was enforced in any way is unclear, but Hieronymus’s description suggests a thinly populated landscape inhabited largely by nomads.

In the early 1st century AD, Strabo, a Greek from Pontus (modern Turkey), compiled a geography that included a secondhand description of the Nabataeans and their kingdom. He

⁴ Sources specifically discussing Udhruh will be addressed in Chapter IV.

⁵ All translations are my own unless otherwise noted.

⁶ ἔχουσι τοίνυν τὸν βίον ὑπαίθριον, πατρίδα καλοῦντες τὴν ἀοίκητον τὴν μήτε ποταμοὺς ἔχουσαν μήτε κρήνας δαψιλεῖς . . . νόμος δ’ ἐστὶν αὐτοῖς μήτε σῖτον σπείρειν μήτε φυτεύειν μηδὲν φυτὸν καρποφόρον μήτε οὖν χρᾶσθαι μήτε οἰκίαν κατασκευάζειν: ὃς δ’ ἂν παρὰ ταῦτα ποιῶν εὑρίσκηται, θάνατον αὐτῷ πρόστιμον εῖναι.

wrote that Nabataea was “exceedingly well-governed...their homes, through the use of stone, are costly; but on account of peace, the cities are not walled. Most of the country is well supplied with fruits...The sheep are white-fleeced and the oxen are large” (Strabo 16.4.21-26). Although he misunderstood many aspects of Nabataean society, Strabo rightly noted that the kingdom, north of the Red Sea and east of the Roman province of Judaea, was prosperous and stable; it remained so even as a client state of Rome after 64 BC, when Pompey annexed Syria as a Roman province and began the era of direct Roman rule of the Levant.

All literary sources regarding the annexation of Nabataea in AD 106 come from later Roman writers such as Cassius Dio, Ammianus Marcellinus, and Eutropius. Writing in the early 3rd century, the relevant portion of the history of Cassius Dio is preserved only as a medieval epitome. It presents a brief passage on the annexation of Nabataea, stating that “around this same time Palma—the governor of Syria—both subdued [the portion of] Arabia at Petra and made it subject to the Romans” (*Historiae Romanae* 68.14).⁷ Ammianus Marcellinus offered even less by way of an explanation in the late 4th century, stating that “” “this [the Nabataean kingdom] was given the name of a province, assigned a governor, [and] driven to comply to our laws by the emperor Trajan, repeatedly crushing the uprising of the inhabitants when he was waging glorious war with Media and the Parthians” (Ammianus Marcellinus 14.8.13).⁸ Eutropius, another late 4th century historian, included the Nabataeans

⁷ κατὰ δὲ τὸν αὐτὸν τοῦτον χρόνον καὶ Πάλμας τῆς Συρίας ἄρχων τὴν Ἀραβίαν τὴν πρὸς τῇ Πέτρᾳ ἔχειρώσατο καὶ Ρωμαίων ὑπήκοον ἐποιήσατο.

⁸ *hanc provinciae imposito nomine, rectoreque adtributo, obtemperare legibus nostris Traianus compulit imperator, incolarum tumore saepe contunso, cum glorioso Marte Medium urgeret et Parthos*

in a list of peoples welcomed into an alliance with Trajan, which he later reduced to a province (Eutropius 8.3).

The only relevant author writing relatively close to the time of the Roman annexation was the mid-2nd century geographer Ptolemy. He devoted three chapters of his *Geography* to the region labeled “Arabia,” which was generally consistent with what had been considered Arabia in other sources from the Hellenistic through early Roman periods. But Ptolemy also broke with tradition, adding the additional subdivision of *Arabia Petraea* to the common division of *Arabia* between ἔρημος (desert) and εὐδαίμων (blessed) (Bowersock 1988, 47). But despite the fact that Petra was the capital of the former Nabataean kingdom, he failed to reference the Nabataeans themselves.

By the later Roman (ca. 106-324) and Byzantine (ca. 324-630) periods, ancient literary sources rarely speak of Petra directly. Episcopal lists beginning in the 4th century identify several Christian bishops of Petra. The *Notitia Dignitatum*, an official list of all Roman army units and their place of garrison at the turn of the 5th century, identifies several military units based in the Petra region (Seeck 1962).⁹

Turning to epigraphic evidence, some Greek and Latin inscriptions, mostly fragmentary, are known from Petra itself and the recent discovery of a complete Latin building inscription from the Roman legionary fortress at Udhruh identifies both the date of its erection and the original garrison.¹⁰ However, Latin milestone inscriptions from the 2nd through 4th centuries attest to the continued importance of the region. 42 milestones document 82 Roman miles of the southern *via nova Traiana* between Petra and Aqaba. Graf

⁹ See Chapter VI for detailed discussion.

¹⁰ To be discussed in Chapter IV.

found that some milestones were painted in the 3rd century, meaning that many texts may simply not have survived due to weathering. In the Early Byzantine period, it was common to plaster over previous milestones and paint new inscriptions on them (Graf 1995, 264). Only nine of the 42 milestones offer datable evidence (see figure 1).

The first milestones (n=4) date to Trajan between 111-114, likely in conjunction with Trajan's Parthian campaign in 114-116. Later milestones, mainly from the Hisma Desert south of Petra, date to the 2nd through 4th centuries, indicating that the "Trajanic road maintained its official character into the Byzantine period, although by that time alternative routes had developed to accommodate the growth and expansion of settlements as far east as the fringe of the eastern desert" (Graf 1995, 264-265). The first of these date to the end of the 2nd century under Septimius Severus (193-211). If no maintenance occurred between the road's construction and Severus's reign, it certainly was in need of much maintenance given that almost 100 years had passed since the road's original construction.

Maintenance occurred again ca. 40 years later under Maximinus Thrax (235-238), and the milestone (#1) is the earliest example of a painted milestone inscription currently known in either Palestine or Arabia (Graf 1995, 248). The next group of milestones dates to the end of the 3rd and beginning of the 4th centuries. One (#30) was an earlier milestone reused in the reign of Diocletian (284-305), two (#32-33) date to the reign of Galerius (293-311), and one (#5) dates sometime in the 4th century based on analysis of the Latin script. No later milestones have been identified, although this may simply reflect preservation bias as inscriptions were by then more commonly painted.

Milestone Number	Dating
1	Ca. AD 236-238 (Maximinus Thrax)
5	Ca. 4 th century
20	Ca. AD 197-200 (Septimius Severus)
30	Primary date: AD 112 (Trajan) Secondary date: ca. AD 293-305 (Diocletian)
32	Ca. AD 307-308 (Galerius)
33	Ca. AD 307-308 (Galerius)
34	Ca. AD 111-114 (Trajan)
35	Ca. AD 111-114 (Trajan)
38	AD 112 (Trajan)

Figure 1: Summary of milestones along the via nova Traiana in the Petra region (Graf 1995)

Additional evidence speaks more broadly to the state of Roman roads across the Empire. Diocletian's *Edict on Maximum Prices* (301) included costs of shipping via a camel versus oxen with a wagon. It lists a 20 *denarii* charge for carrying a 1200 Roman pound wagonload one mile and only an 8 *denarii* charge for carrying an 800 Roman pound camel load the same distance (Murray 1826). Considering that usually two oxen were required, there was a 20% saving when using a camel as opposed to a wheeled vehicle (Bulliet 1975, 20), which would also require the maintenance of paved roads (Graf 2001, 225). However, no evidence indicates that these regulations were strictly followed, and therefore all that can be ascertained is that road conditions were of concern to Diocletian. Milestones along the *via nova Traiana* dating to the reign of Diocletian and his successors also attest to concern for

the state of the roads in the Roman east in the early 4th century. In 399, the *Theodosian Code* speaks to the “immense ruin of the highways” (*Codex Theodosianus* 15.3.4),¹¹ suggesting that the roads were still a concern in parts of the Empire.

Finally, the discovery of a carbonized archive of ca. 140 carbonized Greek papyri of the 6th century in Petra’s Byzantine Church in 1993 has opened a unique window into the region in this period. The Petra Papyri represent the archive from a single local family, speaking to both public and private economic and social issues (Gonis 2005, 655-657). In a request for transfer of taxation dated 539-540, the author Theodoros refers to an uninhabited hamlet within the rural hinterland of the city of Augustopolis¹² (*Papyri Petra* 19.3-4 in Arjava *et al.* 2007). In another request for transfer of taxation dated to 544, Flavius Dusarios references a then uninhabited hamlet southwest of Petra (*Papyri Petra* 23.8 in Arjava *et al.* 2007). The mention in passing of two formerly occupied hamlets abandoned by the mid-6th century may suggest a contraction of hinterland settlement by the mid-6th century. Generally, the Petra Papyri imply the concentration of land-holding in fewer hands, suggesting the existence of large, hinterland estates (Kouki 2012, 17). With one exception, recent surveys have not identified any structures possibly associated with such estates.

As noted above, there have been few archaeological excavations in the region outside the city of Petra itself. Within the city itself, archaeologists have naturally focused on the monumental structures, with relatively little attention paid until recently to domestic sectors. Outside Petra, major excavations have focused on Wadi Musa, a ‘suburb’ just east of Petra,

¹¹ *inmensas vastitates viarum*

¹² Augustopolis was Udhruh’s name in the Byzantine period. For further detail, see chapter IV.

Udhruh (the city of Augustopolis by the Byzantine period), ca. 15 km east of Petra, and Bir Madhkhur—a major caravan station west of Petra in Wadi Araba. Only brief reports have thus far been published from these excavations but they do offer some insight into the region.

Thesis Structure

Given the limited documentary sources and the still largely unpublished excavations, archaeological surveys can attempt to address many of the questions raised by the gaps left by other sources, but they are also quite distinct from archaeological excavation and need to be considered methodologically before proceeding. Chapter II addresses various survey methodologies and the role survey can play in an exploration of diachronic change over time, before examining the Udhruh Archaeological Project's methodology and parsing the results.

Chapter III contextualizes critical surveys of Petra and its immediate hinterland. Surveys examined include Umm Rattam, Jabal ash-Shara, key parts of the Wadi Musa Wastewater project, Jabal Haroun, Bir Madhkur, and Wadi Silaysil. A synthesis of the evidence from these surveys reveals that regional settlement expanded greatly during the 1st century AD but seemed to contract after the Roman annexation of AD 106, certainly by the late 2nd and early 3rd centuries.

Chapter IV reviews Udhruh's historical sources, and all past archaeological excavations and surveys specific to this region. Central to this discussion is a summary of Alistair Killick's preliminary reports of his survey and excavations at Udhruh. Unfortunately, these reports only provide minimal information as he never published a final report. Other recent archaeological projects discussed include S. Thomas Parker's *The Limes Arabicus*,

Fawzi Abudanh's Dissertation Survey at Udhruh, the *qanat* system, the Udhruh Inscription, and Abudanh's later excavations at Udhruh.

Chapter V presents the ceramic material collected by the Udhruh Archaeology Project. The material is first discussed as a group, before the intensive surveys are discussed individually. The majority of the sherds were not well-preserved, and the numerous handle sherds—considered diagnostic—offer limited information. However, the presence of finewares and amphorae dating from the 1st century BC through the 6th century AD help articulate broad settlement patterns and seemingly support a Roman era settlement decline.

Chapter VI analyzes the Udhruh material and attempts to place Udhruh within the larger context of the Roman Empire. It especially compares Udhruh's results with those from Susan Alcock's *Graecia Capta* and concludes that nucleation is partially responsible for the constriction in regional settlement around Petra, likely triggered by the Roman annexation. When the Udhruh fortress was constructed ca. AD 300, it further established hinterland stability and security, drawing the population towards Udhruh and back into the hinterland, although not necessarily in the same locations as in the Nabataean period.

Chapter II: Survey Methodology and its Role in the Roman World

“We are plodders, and systematic plodding is more likely to lead to insight than is unsystematic plodding” (Plog, Weide, and Stewart 1977, 107)

Surveys are uniquely equipped to “locate and relate in a diachronic perspective all remains of human activity across a landscape” (Alcock 1993a, 33). While they cannot address individual places, events, or relationships with accuracy, surveys incorporate a wide variety of materials produced by humans, many of which are not included in traditional, historical sources (Alcock 1993a, 33–34), such as environmental resources or land-use trends. Additionally, survey is a uniquely ‘scientific’ method as “the crucial difference between survey and excavation is of course that, subject to the effects of deep ploughing, land abandonment and so on, survey—unlike excavation—is essentially a repeatable exercise” (Barker 1991, 7), meeting the ‘reproducibility’ requirement of the scientific method. But despite survey’s definition of “a principal means by which archeological resources are identified and characterized,” the method still remains underappreciated and critics continue to ask if a survey is “skimming the surface or scraping the barrel” (Bowden et al. 1991, 107–116). More beneficial criticism includes concerns about regional landscape databases and the comparison of one data set to another, but these issues can be addressed and do not negate a survey’s usefulness in determining the “spatial distribution of rural material culture” (Banning 2002, 10). This chapter examines survey methodology and specifically the problems to which surveys are prone in order to analyze Udhruh’s survey methodology.

Braudel, Binford, and Survey

Survey offers perhaps the most direct method through which ancient historians and archaeologists can align themselves with Fernand Braudel and the so-called *annales* school. Braudel (1902-1985) understood history as the interaction among different forces that operated in concert over different timescales in a defined landscape. Through this method he could examine the interplay between short-term events (e.g., the traditional historical emphasis on great men and large battles), intermediate levels that can be broken down further into *intermediate-term conjunctures* (such as wages and price-cycles) and *long-term conjunctures* (such as demographic movements, the geography of empire, industrial growth, social mobility, etc.), and the *longue durée* (long-term processes of the defined landscape and the technologies available for exploitation) (Braudel 1949; Barker 1991, 1; Smith 1992, 25). The latter was by far the most important for Braudel as it is “man and his environment, a history in which all change is slow, a history of constant repetition, ever-recurring cycles” (Braudel 1972, 20). It is the almost impossibly sluggish backdrop in which history plays.

Braudel’s *annales* school can be viewed as related to Lewis Binford’s “Processual” or “New Archaeology,” as Binford understood a difference between “ethnographic” time and “archaeological” time. Following the premise of “archaeology as anthropology” (Binford 1962), ethnographic anthropology is fundamentally synchronic, and cannot, therefore, address diachronic cultural change. Archaeology, in turn, requires a view towards the larger time scale as opposed to the “space-scale” of other social sciences. It is not what Robert Ascher deemed the “Pompeii premise” in 1961, which is an “erroneous notion, often implicit in archaeological literature . . . [that archaeologists recover] . . . the remains of a once living

community, stopped as it were, at a point in time” (Ascher 1961, 324; qtd. in Smith 1992, 26). As archaeology must look more towards the archaeological time-scale, its focus is forced from the social sciences to the historical discipline (Smith 1992, 24).¹³

It was under Binford’s processual archaeology—with its attempt to produce non-biased and scientific results—that surface surveys became well defined and the relationship between Braudel’s processes were best exemplified. While excavation too often provides only a “comforting but fundamentally bogus prehistory, protohistory and history of invasions and destruction layers regarded with justified skepticism by historians,” archaeological data from surveys can readily examine Braudel’s second and third processes, in addition to the silent majority who inhabited the landscape (Barker 1991, 1).

Binford himself even designed what he believed was a statistically significant survey, yielding statistically significant results. To understand the complete cultural system of a specific region diachronically, the region must first be examined “with respect to classes of ecofactual phenomena” (Binford 1964, 434). What he termed ‘ecofactual phenomena’ refers to a wide range of data that address an area’s history and cultural potential, independently of the region’s human activity (types of plants present, the region’s geomorphological history, available resources, soil type, etc.).¹⁴ After the initial analysis, the region can be subdivided into smaller areas based on the region’s ecofactual phenomena, usually in the smallest, most specific groups possible. A grid is overlaid on the landscape in manageable and easily-

¹³ Binford himself had a number of problems with the historical discipline, arguing that history “particularized” while science “generalized.” The former was bad and the latter good (Binford 1964; Smith 1992, 24). More recent historians reject this supposed dichotomy (Smith 1992, 24).

¹⁴ This specific method of analyzing landscape independently of human activity, also known as the “Paleolandscape” model, is discussed further in the discussion of survey models.

dividable amounts (Binford recommended .5 mile groups, but advised that the unit depended heavily on the region). In each group, approximately 20% of the grids chosen randomly will be examined to offer a representative sample (Binford 1964, 434).¹⁵

Binford argued that his method, controlled by ecofactual phenomena, could illustrate site density and past activities, and should remove the surveyor's potential biases. No matter how aware of his own actions, a surveyor tends to focus his efforts on areas where he expected past activity. Binford did not want his 'scientific' process to be corrupted by preconceived notions of the past, which falsely colored survey results. But at the same time, he realized some amount of flexibility was required, based on the presence of modern communities and the distribution of agricultural land (Binford 1964, 435).

Once the grid had been applied to the land, Binford argued that the randomly selected units should be surveyed entirely to understand the *loci* of cultural activity. While surveys only provide "limited data," the collection of surface material provides a method to classify sites. It specifically provides information on the size and density of the cluster of cultural items, the population (types) of cultural items, and the homogeneity of the material culture (Binford 1964, 435).

Additionally, Binford believed that small, everyday items reflect larger social structures and religious beliefs. Specifically, Binford argued that

the intimate systemic articulation of localities, facilities, and tools with specific tasks performed by social segments results in a structured set of spatial-formal relationships in the archaeological record. People do not co-operate in exactly the same way when

¹⁵ Sometimes laying out a grid proves time consuming, so Binford even offered an alternative for the field-walker. If the belt attached the individual to a spike in the middle of the unit, the individual could easily collect all cultural material within their range of movement (also known as the 'dog-leash' method) (Binford 1964, 436).

performing different tasks. Similarly, different tasks are not uniformly carried on at the same locations. As tasks and co-operating groups vary, so do the implements and facilities of task performance . . . we can recover, both from the nature of the populations of artifacts and from their spatial associations, the fossilized structure of the total cultural system (Binford 1964, 425).

Many archaeologists find the relationship between the *annales* school and Binford's processual archaeological theory comforting as they "have no choice other than to study these material traces" (Greene 1990, 9).

Survey Concerns

One of the questions most asked of archaeological survey is the relationship of the material culture collected from the surface with that buried under the surface. Many specialists view the data emerging from surveys as flawed or a distortion of reality that can only be rectified through excavation. Even Binford himself, in many ways the strongest supporter of a scientific approach to survey, believed that surveys were only minimally useful in isolating possible excavation sites (Binford 1964, 436, 434). Some scholars disagree, believing that this ignores the simple fact that all excavated material once sat on the surface and was exposed to the same elements as survey material (Banning 2002, 11). Moreover, survey data should not be considered 'invalid' if it fails to match the stratigraphic layers beneath it; after all, one stratigraphic layer does not necessarily have to reflect those directly above or below it (Dunnell 1988). But even considering that surface artifacts might have been disturbed by modern agriculture in such a way that it seemingly interferes with archaeological observations, surveys can still offer a broad—if incomplete—picture of an area's archaeological resources (Cherry and Shennan 1978, 26).

This misunderstanding of the relationship of surface material to that which remains underneath correlates strongly with the supposed presence of sites. On various excavations in Italy and Greece, archaeologists uncovered structures with little to no surface material indicating a site's presence (Ward-Perkins, Kahane, and Murray Threipland 1968). Sometimes dense concentrations of artifacts are the only remains of a large site or archaeological structure that has since been destroyed and the remains brought to the surface. On the Montarrenti survey—an early medieval settlement in central Tuscany that Barker surveyed in the 1980s—test pits, dug where dense concentrations of sherds were identified, revealed no sub-surface archaeology. Barker argues, nevertheless, that it might indicate “ephemeral structures such as temporary camp-sites,” but there was no direct evidence to support this (Barker 1991, 5). Even if dense surface collections generally indicate a sub-surface site, other conditions—such as erosion, vegetation, industrial dumping from construction, etc.—must be taken into consideration.

Even with an understanding of the relationship between stratigraphy, geology, and deposition, survey data can create a false model of the landscape based on inherent biases, which occur upon the collection of data. Surveys cannot collect all data in an unbiased manner, as some types of data are much more likely to be recovered—ceramics versus botanical remains, for instance. In order to correct this issue, surveyors must carefully select their field methodology. As Barker argues, “the principal lesson we have learnt or should have learnt in the past decade or so is that ‘survey archaeology’ is just as complicated as ‘excavation archaeology.’” But despite his indication that survey methodologies still lack nuance, he sees reason to hope, as “we are increasingly aware of our woeful ignorance about

the nature of the archaeological record, its formation by cultural and natural agencies, its relationship to the original human behavior from which it stemmed, and our ability to investigate it in a scientifically repeatable manner” (Barker 1991, 2).

With specific regards to survey methodology, the search for ‘sites’ as the unit of study has become increasingly problematic. Historically, surveys have focused on larger sites with architectural remains and largely ignored low-density artifact scatters. Activity in the past did not only occur in specified locations surveyors might recognize as “sites,” but rather over the entire landscape, with varying degrees of intensity. In this way, zones of activity that should have become apparent are overlooked in favor of locations with denser material culture concentrations (Banning 2002, 12).

Without mistaking only dense concentrations of objects for activity, how should surveyors interpret fluctuations of materials from different periods, as an indication of a change in population or settlement? And, Barker asks, “can changing numbers of pots be equated roughly with changing levels of population?” (Barker 1991, 6). Given all the amount of discussion around the definition of a site and survey methodology, a direct relationship between pottery and population was accepted until the 1990s (Millett 1991, 18). As this issue speaks directly to the subject of economic systems and their success in a specific region during the Classical period, some understanding of the relationship between the number of sherds and population density is vital.

The assumption that pottery directly reflects population is based on the assumption both that pottery was supplied at the same rate during the survey’s different periods of study and that all sites in a particular period had equal access to the pottery (Millett 1991, 18). In

regards to the total pottery supply, soil erosion does account for some variation in the amount of surface pottery (Bintliff and Snodgrass 1988b), and excavation reports that provide the quantities of pottery per unit volume excavated have shown that production seems to fluctuate (Millett 1991, 18). Even fine wares like *terra sigillata* and African Red Slip, believed to have had fairly consistent productions based on demand, had uneven supply patterns overtime (Marsh 1981; Fentress and Perkins 1987).¹⁶ There is simply no evidence that *terra sigillata* was replaced with African Red Slip with no change in access or function (Witcher 2006, 46).¹⁷ Millet argues that because “these patterns do not seem to be a function of competition with other sources of supply . . . it is likely that there were periods of both glut and shortage of particular wares which probably also occurred with other pottery types and at other periods” (Millett 1991, 20). Given that surveys often rely heavily on diagnostic material provided by fine wares,¹⁸ the issue is aggravated further upon analysis and publication. Additionally, sites may have gained and lost their ability to obtain pottery not only when supplies were low, but also as their function, status, and economy changed during their periods of use (Millett 1991, 20).

¹⁶ Millett offers an analysis of the dramatic change in land-use in Southern Etruria at the start of the 2nd century AD. The survey material seemingly suggested an unprecedented scale of farming during the later time, greater even than at the height of the late Republican period. Millett instead argues that it only reflects the fact that Campanian ware was less widely circulated than *terra sigillata* (Millett 1991, 20).

¹⁷ This is supported by the empirical fact that different fine wares usually had different vessel forms. *Terra sigillata* was mostly available in plates and cups while African Red Slip was mostly offered in the form of dishes (Witcher 2006, 46).

¹⁸ Witcher offers other issues regarding the use of fine ware sherds for dating, specifically relating to how typologies are created. Some fine ware, such as *vernice nera*, can only be dated generally to the Republican period without a rim sherd. Other fine ware, such as African Red Slip, is more useful as it considers both fabric and form. However, the surveyor should not compare *vernice nera* and African Red Slip as “the methodological value of pottery is variable; we are not comparing like with like” (Witcher 2006, 45-46).

Unfortunately, the best answer to this problem depends on quantified data discussing the quantity of pottery per volume unit. As this is often not available (and presently not known for southern Jordan, or almost any other Classical city), the *Ager Tarracensis*'s survey methodology offers one solution: variation in supply can be formulated using a survey's complete dataset and calibrated by excavation data; first the median value of the quantity of pottery per volume unit is calculated, then the quartile and octile units. If the median, quartile, and octile units remain the same, then there was consistent supply over time. If these units do not remain the same over time, as expected, then the top eighth of the values provides the threshold density value for each chronological period. For the *Ager Tarracensis*, Iberic period 'sites'¹⁹ had a threshold density of 63 sherds-per-hectare while Late Empire 'sites' only had a 1 sherd-per-hectare threshold density (Millett 1991, 23) (see figure 2). Unfortunately this method can only be employed for a survey with a consistent collection methodology.

¹⁹ The *Ager Terraconensis* team does not typically refer to these as 'sites' but rather Abnormal Densities Above Background Scatter (ADABS). This is still problematic, as Miller himself notes, as it focuses on identifying settlement nodes rather than the region's total activity pattern (Millett 1991, 23). See earlier discussion.

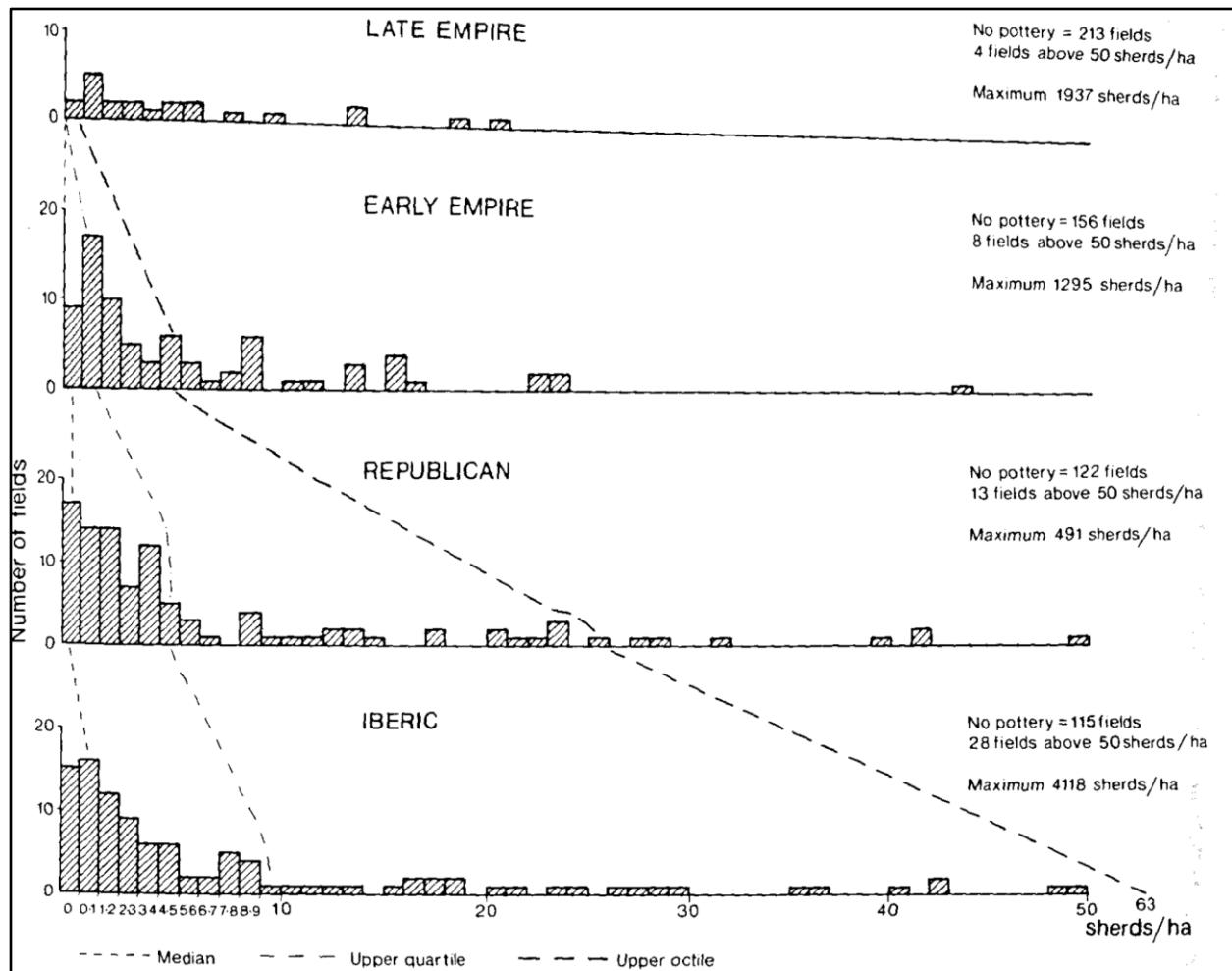


Figure 2: *Ager Terraconensis* number of fields and pottery per hectare (Millett 1991, 23)

If a specific activity is suspected during a pre-defined period, can surveys investigate that period? For most surveys, the goal is to examine diachronic change, but Barker and Lloyd argued in 1991 that a synchronic perspective was not only possible but also necessary (seemingly in contradiction to Binford, but referring more to a specific century than a single event). While targeting a specific period in order to answer historical and archaeological questions might not seem radical to surveyors in other geographic locations, it had rarely been suggested before Barker and Lloyd (Alcock 1993a, 110). Surveys can answer specific

chronological questions, but only with an adapted survey methodology and complete publication.

All of the above discussion gives surveys a processual tint, and marks the methodology with “a [Marxist] emphasis on agricultural production, slavery, villas and amphorae” (Witcher 2006, 41). Why can surveys of the Mediterranean world not speak to power and resistance,²⁰ identity, memory, or phenomenology, questions that the post-processualists wish to explore? Witcher argues that surveys are not just data collecting missions and can do more than simply collect and report facts,²¹ but often the surveyor does not examine the process in which material culture was obtained, used, and discarded (Witcher 2006, 45-48).

Witcher argues that this flaw can be overcome with the understanding that “material culture is sensitive to context; it is mutable and multiple, and is constantly negotiated and challenged to create and recreate social identities. Artefacts therefore are better conceived not simply as objects, but as social objects, or even social agents” (Witcher 2006, 49). However, the material culture recovered from surveys is often more fragmentary than that recovered from excavations and, if not previously known, it lacks the chronological structure to interpret it. Despite these limitations, survey material can raise interesting questions about the lack of material, such as lamps, in rural contexts (Eckardt 2002), which could imply different attitudes towards lighting, life structure, or even social identity (Witcher 2006, 50).

²⁰ Susan Alcock’s 1993 book *Graecia Capta* does offer this sort of survey interpretation for the Greco-Roman world, but it is rare (Alcock 1993a).

²¹ Specifically, Witcher believes that interpretation starts the moment a team enters a field. If this is true, it is impossible to understand surveys as the collection of objective data (Witcher 2006, 44).

Witcher also argues that the use of distribution maps reduces the complexity of the landscape. Space and time are not abstract, universal concepts but rather are understood in relation to human experiences as both the means and the results of social actions taken by the inhabitants. The distribution maps beloved by surveyor offer little cultural context as the landscape can only be observed, as opposed to experienced (Witcher 2006, 52-53). Separate dots on a map no more indicate a lack of relationship than a broken pot.

This conception of land and power as related to dots on a map is best exemplified by field-manuring.²² It is very unlikely that a land's previous inhabitants were unaware of their own cultural material within their fields, material that identified them as belonging to a certain group and providing a sense of identity. Some surveyors have even argued that inhabitants might have purposefully incorporated their material culture in their fields as a method to increase their cultural identity (Evans 2003; Witcher 2006, 54). Sherds could certainly mark territory as belonging to someone, and they may indicate the "active establishment of territory and identity at times of demographic and settlement disequilibrium or change" (Evans 2003, 140). If this is the case, the scatter of sherds not only represents the presence or absence of people, but the very expression of power over a place.

²² Manuring is often a marker of intensive farming, where fields are weeded and even irrigated if necessary. Intensive farming is thought to be reflected in the archaeological record based on the density of pottery. The densest pottery should be closest to the settlement, where the plants in the need of the most attention were located. On the other hand, extensive agriculture is usually associated with cash crops and large amounts of capital necessary to support such a large organization. This type of agriculture is more difficult to detect as does not necessarily leave material remains (Kouki 2012, 96-97).

Survey Design

The first task the surveyor faces is designing collection and analysis methodologies. In that, he must first consider the environment. Geomorphological changes—such as erosion, colluviation, and alluviation—may have covered or moved sites from their original locations. Annual vegetation also proves difficult in many areas, and roots can destroy sites or bring artifacts to the surface (Barker 1991, 4). Fortunately, the vegetation at Udhruh remains minimal and the hinterland not densely inhabited, in comparison with the neighboring Wadi Musa. However, the region is subject to erosion from wadi runoff and residents continue to utilize the ancient field systems to grow crops.

The survey designer must also consider less well-documented factors that have the potential to affect a survey's outcome. The field-walkers' schedule is important as even the most experienced surveyor can overlook details at the end of a long day in the field. Finally, a concern for every archaeological field project is preservation bias. Excavations must face this problem, but in some instances the environmental conditions can preserve even the most fragile material. This is not generally the case with surface collection. Ceramic sherds create the overwhelming majority of the corpus at most survey projects, but unless fine ware is collected, sites that are more rural and lower on the social scale remain difficult to date (Barker 1991, 5). Some surveys have increased their focus on coarse wares, but fine wares remain the backbone of most Classical surveys.

Survey Models

By far the oldest survey approach, the “Monumental Model” (named by E. B. Banning) focuses on sites which are both obvious on the modern surface and which had

supposedly been the center of activity during the past. “Monumental” surveys tend to cluster around urban centers with easily discernable architectural features or artificial landscape modifications such as mounds and ditches. Over time, large collection of artifacts began to be recognized as sites as well, but these sites still implied a defined boundary that could be considered. However, this type of survey can be useful to locate a specific target, such as a fort or burial mound (Banning 2002, 13).²³

American archaeologists often overlook the “Earthwork” survey model, but it plays a crucial role in the analysis of large-scale landscapes. Described as a “more extensive variety of the monumental model in that it emphasizes constructed landscape features, such as mounds,” the Earthwork model depends on the repeated usage of a space over a prolonged period of time (Banning 2002, 13-14).

The “Uniform Distribution” model considers sites as a discreet collection of remains (material, chemical, etc.) that is more concentrated than the rest of the space in the “background.” Specifically, every spot within the survey area has the same probability of having some sort of remains, which is referred to as the mean; sites have a much higher mean than the background. In actuality, the background is usually patchy or clumpy as opposed to uniform, and this method sometimes requires the application of the Poisson distribution model (discussed further below). The Uniform Distribution model is still used by archaeologists to define the edges of sites through spatial analysis (Banning 2002, 14-15).

Various mathematical models directly contradict the Uniform Distribution model, arguing that instead of abrupt edges, the number of artifacts on sites gradually decreases

²³ There are new, statistical methods for finding single sites that are now more appropriate for identifying discrete entities. These can often save time and money (Banning 2002, 13).

further away from the center until it perfectly merges with the background mean. This model group includes the “Hemispherical Distribution,” the “Conic Distribution,” and a variant of the “Fried-Egg Distribution” that utilizes bimodal normal distribution (Banning 2002, 16-17).²⁴

The “Fried-Egg” survey model recognizes spots with high artifact densities as locations with repeated or continuous human activity. However, this method assumes a one-to-one ratio of artifacts and locations of human activity, as well as a correlation between the artifacts discovered and the location’s original use. These relationships are not necessarily true in areas subject to frequent geological processes, which move the surface material away from its original drop-spot. This is a special problem in the Great Lakes region of North America (Banning 2002, 15), but probably not in Jordan.

The “Palimpsest” survey model is a site-based method used to account for the spatial distributions of artifacts accumulated over time. This means that “site” is defined as a “high-density cluster of material remains” (Banning 2002, 18). This site is not necessarily associated with the traditional site of an actual historical activity, but could indicate several traditional sites that overlap due to time, erosion, plowing, etc. Banning offers an example from Wadi al-Hasa, in Jordan, to explain. The plateau overlooking the canyon offered almost 1 km of lithics of varying densities. Although the densities varied, Banning could not break the lithic groupings into discrete sites, but rather argues that they “resulted from the cumulative discards of millions of artifacts on the landscape over hundreds of thousands of years, and wind has eroded the sediments away to collapse the artifacts onto a single,

²⁴ For further details, see Chapter 6 in E. B. Banning’s *Archaeological Survey*.

deflated surface” (Banning 1988). From this example it can clearly be understood that a cluster of artifacts does not necessitate the presence of a site or even intense activity (although in periods of high artifact density—like the classical period in Jordan—a cluster of artifacts likely does indicate a site as there was less time to shift artifacts).

All the above models focus on sites, but the “Off-Site” model applies to projects that do not focus on sites. Site-based models can be problematic, as “comprehensive air photographic coverage and several pioneer intensive fieldwalking campaigns had shown [by the 1970s] that the traditional concept of a series of discrete archaeological sites scattered at wide intervals across the countryside was totally anachronistic” (Cherry and Shennan 1978, 17). Although they do not ignore high-density clusters of artifacts, these surveys instead recognize that low-density clusters offer evidence of “off-site activities” (Banning 2002, 19). Most often, these off-site activities relate to agricultural work, such as the manuring of fields (Banning 2002, 20). Another alternative to the site focused survey is the “Place” model, which conceives the landscape as a group of “places.” Each place has a varying probability of attracting settlement depending on its potential economic or cultural value (Banning 2002, 20-21).

The final model, called the “Paleolandscape” model, does not consider a relationship between surface artifacts and what remains under the surface. Instead, it focuses on the potential depths of contexts and the geomorphological experiences that affected the landscape to predict the location of buried material culture (Banning 2002, 22).²⁵ The

²⁵ John Cherry spoke out against this turn towards the examination of “evolving landscapes” in 1978, arguing instead that emphasis must be placed on the “human populations which exploited the landscape” (Cherry and Shennan 1978, 19). He goes onto say that “the

Paleolandscape model directly relates to the *longue durée* in the *annales* school in its understanding that shorter term patterns interact with longer term movements, such as environment. Additionally, Vita-Finzi likely utilized this method in his 1969 book on valleys in the Mediterranean, which showed that alluvial sequences contained pottery dating to the middle centuries of the first millennium AD; the expansion was not due to human agency but rather climate change. Van Andel and Runnels' 1988 contradictory study instead found that sedimentation occurred as a result of settlement patterns and land-use. More specifically, various authors point to debris overflows and gully erosion, triggered by periods of agricultural intensification, abandonment, pastoralism, clearing activities, and modern monoculture among others (Barker 1991, 7). Likely, both long and short-term trends affected each other, and archaeologists and historians still struggle with this issue (Horden and Purcell 2000; Broodbank 2013).

The Wadi Faynan Landscape Survey best exemplifies how the Paleolandscape model correlates with other, historical questions. For the first three years, the team's geomorphologists and palaeoecologists studied diachronic changes to the landscape, with a special emphasis on climate fluctuations and changes to the physical landscape. With this analysis, they were able to postulate that the area's earliest inhabitants occupied a land much wetter and more vegetated than today. Around 5500 years ago, the area's inhabitants

landscape is merely the parchment (or rather, palimpsest) on which the story of such exploitations over time is written. The landscape archaeologist preoccupied with the kinks in his parish boundaries can be as obscurantist as the most unrepentant pottery typologist" (Cherry and Shennan 1978, 19). In direct opposition to Cherry's strong and unrelenting assertion, the Wadi Faynan Landscape Survey, discussed further below, shows that the Paleolandscape model is uniquely qualified to address exactly how humans could have exploited their landscape.

practiced floodwater farming; not coincidentally, this time also marks the beginning of aridification in the region and the systematic mining and smelting of copper. Water techniques became more sophisticated during the Iron Age, as industrial activity also increased, and both industry and water management were refined further during the Nabataean period. After the Roman annexation, inhabitants began mass processing minerals in earnest, an action that suggests a state-controlled industry. Additionally, there appears to have been a more unified approach to landscape management, “presumably to feed the administrative personnel and, in particular, the large work-force engaged in mining and mineral processing” (G. W. Barker et al. 2000, 28). After the Late Roman or Byzantine period (presumably 4th-7th centuries), the team discovered that industrial pollution declined, suggesting an end to smelting activity until the Mamluk period (Barker et al. 2000, 28).

The team focused on different research areas each season. In the 1996-98 field seasons, the field and wall systems were explored in depth (Barker et al. 1997). The 1999 season examined the larger landscape in its context through field walking and recording of the terrain around ancient field systems. Rectangles were superimposed on a map at a north-east orientation covering 30.5 sq. km. With carefully designated limits on all borders, the map’s grid was then realigned with Universal Transverse Mercator coordinates. In this new map, the landscape was further divided into 122 systematically surveyed 500x500 meter squares. GPS points were taken inside the grid for archaeological sites (Barker et al. 2000, 29-31). The number of artifacts identified outside the field system was very low, standing in direct opposition to the dense concentrations of material identified in the main field systems (Barker et al. 2000, 31).

Representative/Probability/Systematic Sampling

J. Cherry argued in 1983 that the best results came from projects with 4-6 trained archaeologists walking a field at 5, 10, or 15 meters apart. Using this method, surveys found up to 70 times the number of sites compared to earlier surveys. But Barker argued that even broad collection methods, such as that from a vehicle, could produce useful results as long as the methodology matches the questions (Barker 1991, 3). In theory, trained archaeologists would intensively walk every track. In reality, archaeologists are usually forced to limit their survey area. There are three well-accepted methods of sampling: purposeful, haphazard, and probability sampling. The first type of sampling often occurs when the surveyor either consciously or unconsciously selects his area of investigation, for example because of a threat to the site's preservation.²⁶ This type of sampling can obviously create a false reality, no matter the intention. However, it is useful when applied to probability sampling, as sites that were not accessible during the survey's chronological timeframes should obviously be excluded (Cherry and Shennan 1978, 23).

Haphazard or grab sampling requires little explanation and it is hoped that very few surveyors employ this method, which takes "the first unit that offers itself" (Cherry and Shennan 1978, 25). When haphazard sampling does occur and is published without explanation, it presents a distorted scale between the diagnostic material (probably imported fine ware) and the local coarse wares (Witcher 2006, 49). It is occasionally used at the start of a project with no other guidelines for locating or identifying sites, as this survey method usually centers on areas that require the least effort to identify (i.e. those by modern roads

²⁶ In theory, if this is the case, an argument can be made for more money to support a more "total" survey (Cherry and Shennan 1978, 24).

and on relatively flat terrain). This can be partially overcome with other aids, such as air photography, but should only be employed when restrictions prevent a different sampling method (Cherry and Shennan 1978, 25).

Probability or random sampling must be held in check by three main points: the initial research design or question; number of units from which the sample can be drawn; and criteria for determining the population's social and economic stratification—in order to ensure every group will be well-represented. Surveys utilizing probability or random sampling are actually strongly regulated with predetermined constraints (Cherry and Shennan 1978, 24). This regulation usually results in the sampling of 5-10% of the total survey area. In exceptional projects, the landscape is stratified first into natural sub-regions (soil type, geographic features, etc.), and a set percentage is surveyed in order to ensure representative coverage (Barker 1991, 3).²⁷

Various tests of representative sampling have provided mixed results. In 1978, Cherry and Shennan tested the efficiency of representative sampling with encouraging results (Cherry and Shennan 1978). Other experiments were not as successful. In 1964, Mayer-Oakes and Nash used Lewis Binford's probabilistic sampling methodology in the Valley of Mexico, only to discover that while a sample of small sites would be discovered, the large city of Teotihuacan was not located (Mayer-Oakes and Nash 1964 in Barker 1991,4).

Another issue, which is rarely addressed, is the fact that there is little quantitative evidence regarding the changes inflicted on a surface from year to year. Is the same material

²⁷ Lewis Binford believed that only the initial unit should be selected at random; all the others should be purposefully selected based on a pre-determined interval. This method seemingly ensures both the equal spacing of units and easier spatial measurements (Binford 1964, 435).

brought to the surface annually or does each year's surface material illustrate different settlement patterns? Barker sought to address this issue at his Montarrenti survey, and collected material culture from the same grid for five consecutive years. He found that "while the amount of material on the surface each year varied enormously in different conditions of plough-soil or vegetation, the essential characteristics of the sites – the shape and size of the artifact concentrations, the chronological range of the material recovered – remained quite stable" (Barker 1991, 5). Despite the consistency the Montarrenti survey suggested, this test seems to have been rarely repeated and more evidence is desperately needed before it can be incorporated into survey methodology.

The City and the Survey

John Bintliff and Anthony Snodgrass issued a call to arms in their 1988 paper titled "Mediterranean Survey and the City," which argued that the use of survey in a city's hinterland in order to better understand the rural environment was a survey's original purpose (Bintliff and Snodgrass 1988a, 57). Surveyors had begun examining the city's relationship with its hinterland in the 1980s, and this has only increased in the past decade. But while technological innovations make archaeological survey a more vigorous field of study, very little literature has addressed how these technological advances could and should be utilized. This is especially problematic as "there is a danger that data-collection will become increasingly divorced from historical debates and interpretations" (*Archaeological Survey and the City* 2012, 1). Paul Johnson and Martin Millett attempted to remedy this situation in a 2010 conference at Cambridge University addressing issues of archaeological interpretation in Mediterranean cities (*Archaeological Survey and the City* 2012, 1).

One of the primary flaws in the study of Roman urbanism is the misunderstanding that city and countryside were separate entities, although multiple analyses of Roman thought and administrative structures reveal the “legal unity of city and countryside within an administrative boundary” (*Archaeological Survey and the City* 2012, 9). A city cannot any more be defined by an orthogonal street-grid than it can be defined by its monumental architecture. And even if the streets did, once, accurately reflect the boundaries of city space, the constant changes made to the city over its lifetime erase the preconceived boundary. With the urban/rural dichotomy having been proven false, it is much easier to understand the gradual thinning in population density often detected by surveys (*Archaeological Survey and the City* 2012, 12).

The urban/rural dichotomy can partially be blamed on the primitivist/modernist debate, effectively triggered by Moses Finley and the ‘Cambridge School’ of ancient economics. This debate forced the ancient world into the ‘consumer city’ model, and both sides of the debate rely heavily on implicit differences between the role of the city and the role of its hinterland. It also denies choice and cultural identity to those individuals in the rural landscape. In other words, those in urban centers carefully crafted their social identity and communicated complex statements of their status, while those in rural surroundings only used their material culture for production, storage, and other utilitarian acts. But if the majority of individuals lived in the rural hinterlands, the largest consumer group was located there (Witcher 2006, 50) and this fact presumably forced producers to market their products at least partially towards the cultural identity of the “culturally void.”

Despite the false dichotomy between city and hinterland created by the primitivist/modernist debate, archaeologists and historians still employ surveys in the hopes of determining the nature of the Roman economy. Analyzing the ratio of local, imported, and exotic goods to each other can illuminate how easily specific groups (rural, urban, wealthy, subsistence, administrative, etc.) in a defined space (city, hinterland, etc.) accessed local to empire-wide commercial networks (Barker 1991, 6). Moreover, it may better indicate how the land's inhabitants conceptualized their world. What was their primary zone of interaction? Did they mostly interact with the small cottages nearby or did they regularly interact with the larger city or even beyond?

Udhruh's Survey Methodology

In 2011, Mark Driessen and Fawzi Abudanh launched a joint Dutch-Jordanian survey to “better understand the rural development and major societal transformations of the Udhruh region” in antiquity, especially in relation to the major center at Petra. Emphasis was placed on the examination of agricultural intensification, water management, caravan routes, and communication and security networks. The survey covers 48 square km surrounding Udhruh (see figure 3). The landscape was subdivided into units, called tracts, distinguished by topographic and geomorphic features. Teams surveyed tracts through both intensive and extensive surveys. They collected ceramic and other material culture from 2011 through 2014. Collection complemented non-destructive exploration methods—such as ground penetrating radar and magnetometry. Optically stimulated luminescence samples of mortar, plaster and soil date crucial structures. The results of these analyses are not yet available.

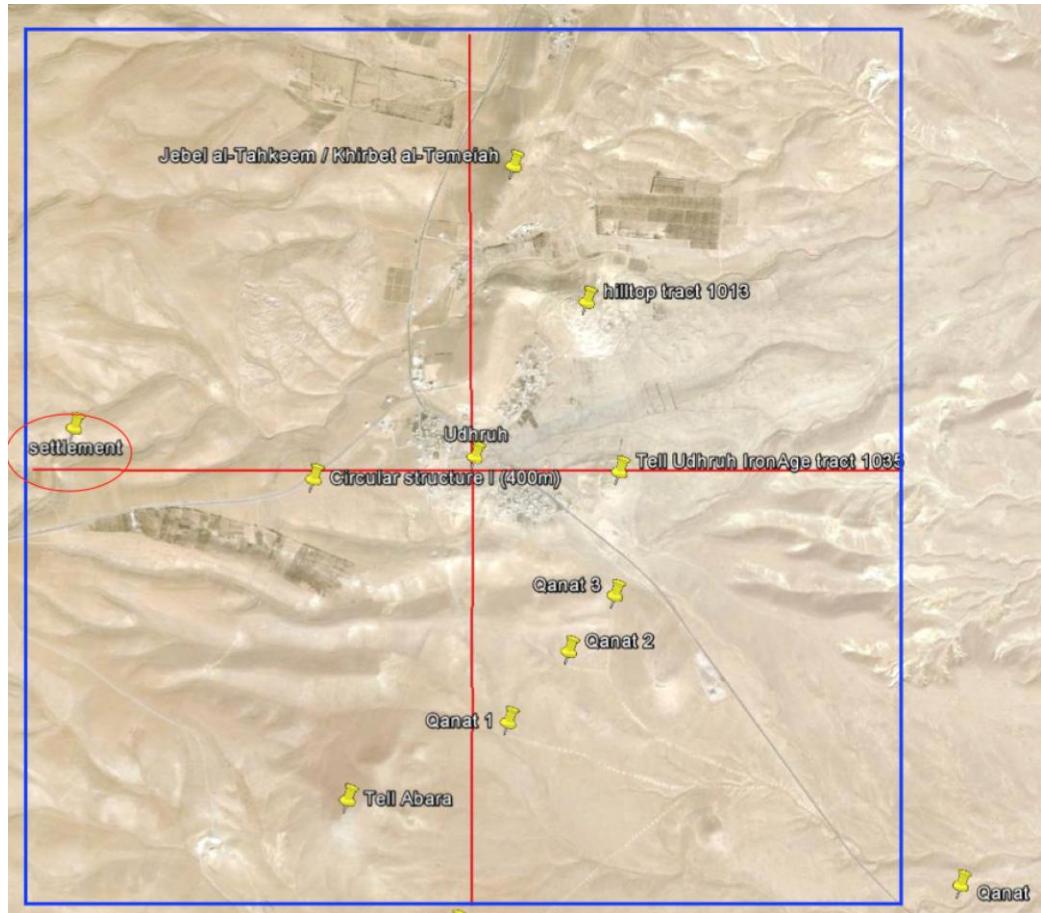


Figure 3: Udhruh survey area

The team was subdivided into groups, each headed by a senior staff member responsible for 2 or 3 field school students from the University of Leiden. The number of field school students varied depending on the day's goal. Additionally, students rotated among groups in order to gain experience with different tasks.

Unfortunately, the collection methodology was not consistent from season to season. The team started the 2011 season with the intention of only documenting the landscape with a total station. However, several groups started collecting unique sherds they considered

diagnostic as they came upon them.²⁸ As there was no ceramicist with the project at the time, it seems that this practice continued haphazardly throughout the season. It appears that in the next year collection started from the beginning but the collection methodology was not consistent among teams. Some collected everything they found at dense concentrations of sherds, taking a GPS point there, while others just picked up diagnostic sherds when they came across them. The latter was most often the case on the teams documenting the geomorphology and the sherds were almost always Nabataean Painted Fine Ware. The change in collection methodology reflects the project's shifting goals; in the beginning, the team sought to map the geomorphological features but over time sought to examine native and Roman presence at Udhruh during the Roman period (ca. AD 106 to the construction of the Udhruh fortress ca. 300).

The collection methodology is problematic and prevents a number of analyses, especially of the sort employed by the *Ager Tarracensis* survey. The application of their technique would have been exceptionally useful in regards to the paucity of Roman period ceramics, or the abundance of Nabataean period ceramics. However, given that selection bias resulted in more Nabataean wares being collected, this analysis is almost impossible to perform, and instead the extensive survey material must be analyzed based almost entirely on the presence of different materials. While there can be some minimal analysis regarding the absence of imported fine wares—which should have drawn the attention of surveyors based on color, finish, and uniqueness—other material, like amphorae, may be under-represented as they mainly survive as body sherds.

²⁸ Upon review of this material in 2014, it became obvious that there was an obvious bias towards Nabataean painted and unpainted fine ware, and imported fine ware.

In 2014, the team began intensive surveys at four unique sites with a goal of 100% collection. Two large circular structures of uncertain purposes were intensively surveyed, as was a long and narrow strip (20 x 900m) south of the fortress as a control. The final intensive survey occurred at a so-called “extra leugam settlement,” 1 *leuga* or 2.2 km west of the fortress. These intensive surveys, in addition to an intensive field survey in 2013 by a Leiden doctoral student for his dissertation,²⁹ offer the most compelling data. However, these areas were purposefully selected, not randomly selected. Neither do they represent a statistically significant amount of the survey’s area, so their findings do not necessarily reflect the larger, hinterland environment.

Conclusion

Although the Udhruh material was not collected systematically or methodically for the first few seasons, the materials from the intensive survey do offer a method to explore population change and the economy in Petra’s hinterland. The survey’s goals changed over the four seasons and these evolving goals have, rightly, served as a catalyst for shifting the survey’s methodology. Utilizing a mixture of purposeful, haphazard, and probability sampling, the results explored here can establish a diachronic pattern from the Nabataean through Early Byzantine period, especially for hinterland sites surveyed intensively. The results testify to the presence of imported fine wares covering the entire Classical period, and

²⁹ Given that the team was able to identify the intensive survey site as a field system, it is likely an example of intensive farming based on the distribution of sherds over the landscape. Extensive agriculture may have taken place but as it leaves few physical remains, it is difficult to determine its location in Petra’s hinterland. But it certainly occurred in 4th century because the soldiers at the fort needed supplies.

support the modernist claim that the region was sufficiently stable economically to witness the trade of not only amphorae but inter-regional coarse wares (see chapter V).

Chapter III: Previous Surveys of Petra's Hinterland

Petra, the enigmatic capital of the Nabataean kingdom from ca. 312 BC until the Roman annexation in AD 106, has attracted attention since its rediscovery by Johann Burckhardt in 1812. Archaeologists such as Rudolf Brünnow and Alfred von Domaszewski, Alois Musil, and Nelson Glueck explored the isolated region in the late 19th and early 20th centuries. Throughout the 20th and into the 21st century, monumental tombs, religious sanctuaries, and kingly edifices continued to enthrall scholars as testimony to a people who constructed a thriving civilization on the edge of an agriculturally inhospitable territory. However, it is only in the last few decades that archaeological surveys have attempted to place Petra within its larger regional environment and to clarify the role Petra's hinterland played in supporting the rose-colored city's earliest inhabitants from the Neolithic period through the Islamic Era.

This chapter summarizes the results of archaeological surveys from the last 20 years in an attempt to understand the larger environment surrounding Petra from the Nabataean through the Early Byzantine periods (ca. mid-1st century BC until AD 500). Only surveys within 20km of Petra which utilized modern survey techniques and had access to the Nabataean Painted Fine Ware typology development at Zantur—Umm Rattum, Jabal ash Shara, Wadi Musa, Jabal Haroun, Bir Madhkur, and Wadi Silaysil. This examination makes clear that Petra's hinterland experienced an enormous expansion during the 1st century AD, only to witness a decline in settlement after the Roman annexation of AD 106. This region also witnessed the beginning of a shift in settlement eastward into more marginal land near Udhruh at the beginning of the Early Byzantine period in the 4th century.

Historiography

Because the historical sources do not make clear the changes between the Nabataean, Roman, and Early Byzantine periods (see Chapter I), modern scholars have turned to surveys in an attempt to synthesize a chronological settlement pattern in Nabataea. In 1992, S. Thomas Parker analyzed from the late Hellenistic period (ca. 200 BC) through the Byzantine period (ca. AD 636) from several archaeological surveys³⁰ in addition to his own *Limes Arabicus* Project. Despite the fact that these surveys covered large portions of central and southern Jordan and used differing methodologies, Parker nevertheless argued that they suggested remarkable consistency in settlement patterns (Parker 1992, 322). In the Hellenistic period, evidence of occupation was found only at 14% of all sites,³¹ decreasing from the end of the Iron Age. Around 200 BC, the Hesban region was resettled and occupied site numbers begin to increase. By the start of the Early Roman period (ca. 63 BC- AD 106),³² settlement had increased dramatically, and was by far the most well-represented of all periods, evidenced at anywhere from 25-67% of all sites in the four survey areas. However, after the Roman annexation of 106, Parker found evidence for the abandonment of many sites: in the Hesban region, occupation went from 39% to 30%; on the Kerak Plateau, settlement decline was even more dramatic, dropping from 74% to 14%. In the Byzantine

³⁰ These surveys included the Tell Hesban survey, the Wadi al-Hasa survey, and the Central Moab Survey.

³¹ At the time, Parker believed this low number might have resulted from a lack of knowledge regarding the early Nabataean pottery tradition (Parker S. T., 1992, p. 322).

³² Parker's 'Early Roman' period covers the same period as this work's Nabataean period.

period, Parker describes occupation as increasing again, specifically in the 4th and 5th centuries,³³ before it dropped back in the 6th (see figure 4; Parker 1992, 322-323).

Parker interpreted this pattern as a result of the Nabataean kingdom's effectiveness in providing security to an area previously plagued by numerous disruptions, including the Syrian Wars in the 3rd century and the subsequent ethnic warfare after the collapse of Seleucid rule (Parker 1992, 323). However, lack of security cannot explain the changes in settlement patterns after the Roman annexation, when security should have been increased further because of the Roman military presence and by the newly constructed roads. Parker supports no single explanation for this phenomenon but does note the possibility that a drier climate could have reduced viable land, as F.L. Koucky argued in 1987 (Koucky 1987, 24-25). A cooler, wetter climate did return during the Byzantine period and offers some explanation for the possible resurgence, supported by an increase in troops along the frontier, making the region more secure from the incursions of Arab nomads (Parker 1992, 324).

³³ Excavations in the Hesban indicated that the city reached its peak between AD 363 and 527 (Storfjell, 1983, pp. 54, 112)

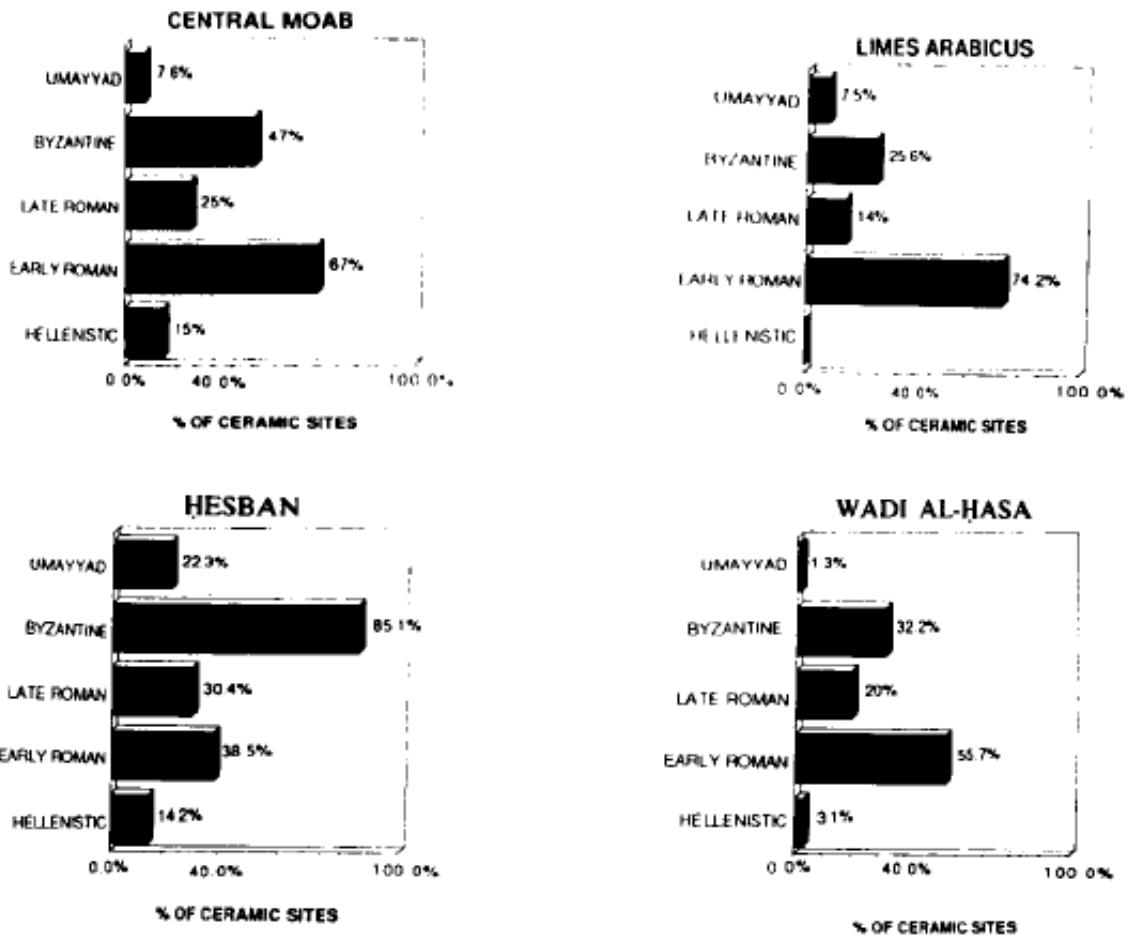


Figure 4: Parker's comparison of four surveys in Jordan by periods of occupation (Parker 1992: 321)

In David Graf's review of Petra's early imperial period settlement patterns, he claims that there was no evidence of a decline in Petra after the Roman annexation, especially in light of the "transportation lattice of the region" which was elucidated by his 1986-1989 road system survey (Graf 1992, 254, 257). Settlement did shift after the Roman annexation; the outlying Nabataean settlements of Rujm Batra, Khirbet Nasara, Khirbet Thalajeh, Shudayyid, and Fuweilah virtually disappear (see figure 5). Later, in the Byzantine period, occupation surged in new locations on the plateau east of Petra between Udhruh and Ma'an. This change, Graf suggests, is a result of Rome's construction of a new road system through the

former Nabataean kingdom which only adopted the northern incense routes—named the *via odorifera*—which had stretched from southern Arabia to Syria-Palestine and the larger Mediterranean world. Still attempting to connect the new, incense rich province, the Roman *via nova Traiana* ran right through Petra (Graf 1992, 256),³⁴ likely to maximize economic opportunities. Other routes of lesser importance, which were Nabataean in origin, also developed further after the Roman annexation, and all held Petra as their nexus. Graf believes that the “maintenance [of these lesser routes] reveals that Petra continued to function as the central terminus and nucleus for the local population and traffic through Arabia Petraea [and t]heir multiplicity serves to indicate just how important the former Nabataean capital remained during the Roman occupation of the region” (Graf 1992, 259).

He noted that this changed during the Early Byzantine period in his 2001 contribution to *Urban Centers and Rural Contexts in Late Antiquity*. In Roman Syria, densely populated prospering villages studded the countryside (Graf 2001, 219). While this pattern has not been established by surveys in Jordan, Graf believed that the Petra region—which “dominated the plateau up to the escarpment above the Hisma desert” (Graf 2001, 225)—continued to prosper until the 6th century, despite the departure of Roman military groups (beginning slowly in the late 4th century).³⁵ On these plots, non-veterans might have constructed yet

³⁴ Prior to Graf's article, scholars believed the *via nova* circumvented Petra in favor of Udhruh to the east (Parker 1986, 87; Killick 1983, 110). Graf argued three points for the *via Nova*'s presence in Petra. First, early milestones found between Bostra and Amman calculated the distance from Petra. 2nd, in the medieval copy of the Roman imperial road system—the *Tabula Peutingeriana*—Petra is listed as the only north-south route in Arabia. 3rd and most convincingly, Brunnow and Domaszewski reported a paved route with milestones between Shobak and Petra. The road running past Udhruh Graf considers a secondary route that developed later (Graf 1992, 256).

³⁵ He instead argues that land plots were not just given to veterans.

undiscovered villas in order to exploit the countryside, and Graf argues it is likely that they should be expected in Transjordanian urban centers.³⁶ On the edge of centers, he expects rural markets existed—near important junctions of inter or intra-regional trade routes. This indicated to Graf that Petra and its hinterland did not decline but rather shifted in ways not yet identifiable archaeologically.

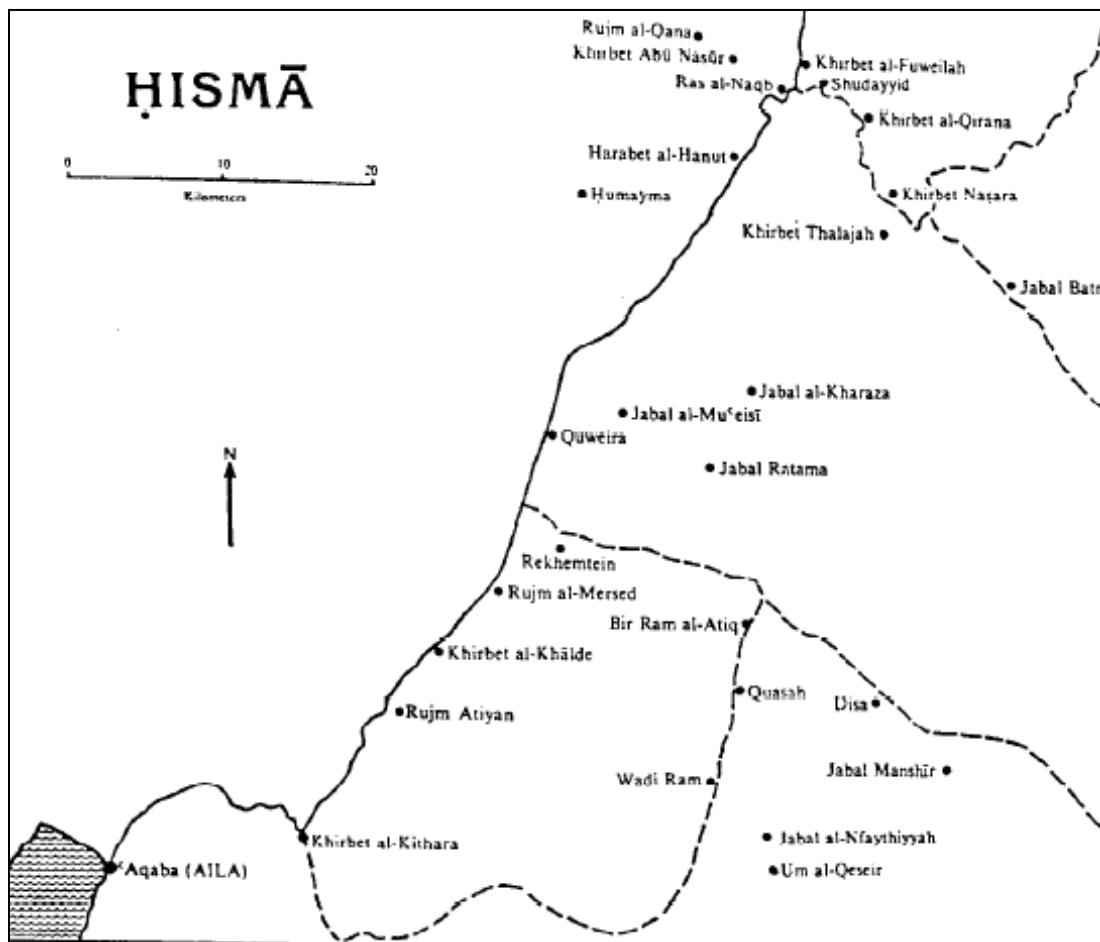


Figure 5: Map of Hisma sites, some of which were abandoned under Roman rule (Graf 1992, 256)

Fiema again revisited the topic in 2002 and 2003, first in an article addressing Petra after the 363 earthquake, then in a later article discussing the period between the Roman

³⁶ This is seemingly supported by ‘Amr’s villa in Wadi Musa, discussed more below.

annexation and 363. Fiema postulated that Petra did not immediately shrivel but actually developed further, before the eventual Byzantine decline (Fiema 2003, 38-39). Other scholars point to Rabbel II's removal of the capital to Bostra as an indication that Arabia had entered an "Era of Bostra" (which Fiema disputes in any case as an erroneous reading of an inscription), but the honorifics piled atop Petra during the Roman period suggest to Fiema that this simply was not the case. When considering the location of the Roman road system and the additional epigraphic evidence (Fiema 2003, 45-46), Fiema argues that the Romans looked to Petra, as opposed to the other Nabataean capital at Bostra, as the center of their Arabian province. While Petra itself mainly witnessed construction activities from the late 1st century BC through the 1st century AD, Fiema does note some evidence of building activities after the annexation. The massive ceramic dump filled with late 1st century AD material at el-Katute suggests clearing activities early in the provincial period, and the Colonnaded Street has a *terminus ante quem* of 114. The Great Temple also witnessed substantial rebuilding during this period (Fiema 2003, 48-49). Fiema also reviews the material uncovered by the Wadi Musa Wastewater Project.³⁷ Citing Schmid, he argues that because the Nabataean pottery tradition continued at least until the 3rd century, "there was a decline of occupation in the Petra area, as indicated by the number of sites, but this decline occurred only in the Byzantine period" (Fiema 2003, 51).

But Fiema believes that even the Byzantine decline was more complicated than previously understood. Many individuals had speculated about the decline of Petra after the 363 earthquake, based on a supposed lack of archaeological data and the city's disappearance

³⁷ Discussed in detail below.

from most historical records in the Late Byzantine period. However, Fiema argues that the 6th century Petra papyri (discovered in 1993, after Parker's and Graf's publications) suggest an “image of an average Near Eastern provincial city,” even if the city’s state in subsequent centuries remains uncertain (Fiema 2002, 238). Time had dealt several fatal blows to the city so that it was no longer the same vibrant commercial and political hub as in the 1st and 2nd centuries AD. The combination of natural disasters, the decline of caravan trade leading to the loss of a privileged economic status, unstable political conditions, and warfare beginning in the mid-3rd century dried up the previously rich center, especially as the inhabitants failed to adopt a non-luxury product which would have allowed them to retain their connection with Arabian trade (Fiema 2002, 238).

The Umm Rattam Survey

Umm Rattam, located southwest of Petra, is included in this collection of surveys because the study area contained the main approaches to Petra from the west. The survey centered on a presumed Late Roman qasr, 7.5 km from Petra—called either Qasr Umm Rattam or Qasr Wadi Musa (Lindner, Hubner, & Hubl 2000, 535).³⁸ The authors of an article reviewing the survey materials had not participated in the original collection and therefore only offered analysis of the data as a sample of the region (Lindner, Jansson, Gerber, & Fiema 2007, 244). Yvonne Gerber analyzed the ceramic material but was not able to provide statistical analysis. She instead dated each collection of pottery, representing specific survey

³⁸ The so-called “fortress” (Lindner, Hubner, & Hubl 2000, 535) was not included in S Thomas Parker’s discussion of Roman and Byzantine forts in Jordan (Parker 1995). This is perhaps explained by the belief that the fort was associated with internal security and economic and administrative functioning instead of for defensive purposes (Lindner, Hubner, & Hubl 2000, 537).

areas, by the most diagnostic sherds. These were most often comparable with those from ez-Zantur at Petra (Lindner, Jansson, Gerber, & Fiema 2007, 245).

Five collections of sherds represented general Umm Rattam surface finds. The first of these—UR GS, Bag 1—Gerber dates to the second half of the 1st century AD, and more specifically to AD 70-100. The associated NPFW sherds dated no later than Dekorphase 3b.³⁹ A few sherds were associated with a 4th century date (Lindner, Jansson, Gerber, &

³⁹ Prior to Nelson Glueck's contributions in 1932, Kammerer understood the Nabataeans as "eschewing industry and architecture . . . and employing what artistic talents they had only on the carving of rupestrian funerary monuments at a few religious centers (Parr 1970, 348)." This view is largely held to be inaccurate, which Parr attributes in large part to Glueck who credited the Nabataeans as building as sophisticated a community as any in the Levant at the time. Glueck came to this conclusion based chiefly on his findings of Nabataean painted pottery, shifting the field from the study of monumental architecture to the chronology and typology of pottery. The Horsfields had identified the first painted pottery at Petra in 1929 but Glueck was the first to engage with it. Glueck was also the first to propose a "Madaba-Dead Sea Line," a northern boundary for the geographic distribution of NPFW. However, Benjamin Dolinka notes that excavations in the Hauran slightly modify this boundary and Glueck's southern limit has since been revised to Meda'in Salih in Southern Arabia (Dolinka 2003). Philip C. Hammond later identified two "form classes" in his early 1960's excavations of the main theater at Petra and even recognized most of the pattern families still used. Unfortunately, Schmitt-Korte noted that "the various patterns were dissected into such minute detail that the understanding of the . . . arrangement as a whole is largely lost" (Schmitt-Korte 1971, 53)

Unlike Schmid's later work, Peter Parr examined the entire corpus of pottery based on chronological phasing. His article detailed the establishment of a pottery sequence from his excavations at Petra from 1958-1964, as well as investigated the architectural development. The pottery in Phases I and II/III was mostly "hard orange or gray ware, often with a thin white slip on the outside" (Parr 1970, 354), containing small grits which created a sandpaper-like texture. Phases IV and V held pottery seemingly well-made although still coarse and gritty. The additional pottery contained in Phase V may have been intrusive because it was the first example of fine ware. A *terminus post quem* for phase V was provided by a coin of Aretas II (ca. 100 BC) and Parr uses this to determine that painted fine ware emerged under the king's reign in conjunction with building activities. The carefully painted decorations were initially naturalistic with bright orange or light red paint and last until Phase IX. Phase VI pottery was similar to Phase V but contained a larger amount of local painted fine ware. Phase VII may have been contemporary with Phase V because of another coin dating to the reign of Aretas II. Phase VIII correlated with a destruction layer

and contained several published forms, none appearing to be NPFW. Parr identified Phases I-VIII as a small building phase of “unpretentious design” (Parr 1970, 369).

Phase IX, when “the layout of this part of Petra, as we see it today, originally dates,” continuing through Phase XII had a *terminus post quem* from a coin dating to Aretas IV (8 BC to 40 AD). Parr identified this as a phase of “monumental structures belonging to an ambitious civic plan” (Parr, 1970, p. 369). He noted that the fine painted pottery that emerged in Phase V morphs here to a more formal, heavier style of painting in a purplish-red pigment. From this point onward, Phases were difficult to date relative to one another because the continual use of the Byzantine shops resulted in a removal of archaeological evidence rather than an accumulation. The third major phase Parr identifies was Phase XIII, or the construction of the paved street. The final stage or Phases XIV-XVIII was synonymous with some destruction and abandonment.

Parr postulates that the pottery found in Phases X-XII were not a homogenous group. Because of the lack of strategic evidence, the pottery could not be analyzed chronologically. The published pottery from this excavation included many different colored fineware including pink, gray, and red with various uses of slip. Some of what are now recognized as Schmid’s phases were identified not by the painted motives but by the fabric of the vessel. Parr insisted that the few pieces of pottery he published “cannot be used as evidence either to date the phases from which they come or to illuminate the problems surrounding these pottery types themselves” (Parr, 1970, p. 372). Instead, he relied heavily on coins to suggest the dates for building activities as opposed to developing a pottery chronology. This may be because of the limitations imposed by the short time to publication, but the lack of a pottery chronology made it difficult to date the shops and wall, found without coins *in situ*.

Stephan Schmid’s work at az-Zantur dramatically changed the study of NPFW and pushed back the initial production to *ca.* 150 BC, an entire century prior to the date proposed by research from the Negev. Petrographic analyses have now confirmed NPFW originated in Petra (Amr 1987). Schmid divided NPFW into four Dekorphasen with subphases under Dekorphasen 2 and 3. Dekorphase 1 extends from 150-50 BC and is distinguished by “straight or curvy lines that intersect at the bottom of the vessel, and are carelessly painted with thinly-applied pale red paint” (Dolinka 2003, 53). Dekorphase 2 is also characterized by red paint on red fine ware. The fabric generally is fine and well levigated. Sub-phase 2a extends from 50 to 30/20 BC and is characterized by a floral motif. Sub-phase 2b is differentiated by a circular trim around the top and abstract fine line decoration, almost like pine tree needles, dating from 30/20 BC until the turn of the first century AD. Sub-phase 2c most notably has squid-like details and dates through the first 20 years of the first century AD. The paint color changed as well, from “the previously strong red to something rather violet or brownish” (Schmid 2003, 78).

Dekorphase 3, which is generally finer than previous forms, begins around 20 A.D. and Schmid identifies it as continuing through the beginning of the second century AD. Sub-phase 3a (*ca.* AD 20-70/80) is “characterized either by clusters of small raws and peacock-eyes in various combinations or by trellised motives of ivy and lancet-shaped leaves in violet or light brown” (Schmid 1997, 413). Sub-phase 3b (*ca.* AD 70/80-100) utilizes geometric shapes and the pomegranate fruit set on top of a bed of lines, covering the body of the fine

Fiema 2007, 245-246).⁴⁰ The second collection—UR GS, Bag 2—represents a settlement area that had witnessed recent looting, therefore likely exposing ceramics from deeper deposits. This collection included a 1st century BC fine ware bowl, a NPFW Dekorphase 2b bowl (ca. 30/20 BC-AD 1), and a collection of fine and coarse ware from the end of the 1st century AD. Additionally, Gerber identified four lamp fragments ranging in date from the beginning of the 1st century AD to the beginning of the 2nd century AD (Lindner, Jansson, Gerber, & Fiema 2007, 247-248).⁴¹ UR GS Bag 3 contained material dating from last quarter of the 1st century and from the 4th century (likely pre-363; see figure 6).⁴² UR GS Bag 4 also contained material from the last quarter of the 1st century AD and from the late 3rd/early 4th century.⁴³ UR GS Bag 12 contained material from the last half of the 1st century to the early 2nd century AD, including Dekorphases 2b through 3c NPFW (Lindner, Jansson, Gerber, & Fiema 2007, 248).

ware, ranging in color from brown to black paint. Sub-phase 3c (ca. 100) is similar to 3b in that the shapes and motives are along the same theme, but the former is much cruder, appears to have been made with less care and lacks the fine lines. The transition to Dekorphase 4 could not be clearly defined because occupation ceased at az-Zantur in the early 2nd century but occurred sometime between 150 and 250 (recent work at on Petra's North Ridge suggests that this occurred closer to 150) and most likely lasted until the beginning of the 4th century. It is similar in appearance to sub-phase 3c but more sloppily made and less finely levigated. Later bowls in Dekorphase 4 often have a straight, but slightly everted profile, not unlike Hayes forms 49 and 50 (Hayes 1972, 67-73).

⁴⁰ Gerber included numerous drawings of the Nabataean ceramics, including two triangular rimmed cooking pots, another triangular rimmed vessel Gerber labeled a jar, two ribbed neck jars which likely saw similar use as amphorae, a neckless storage jar, a jug, a juglet, and a bowl. The Byzantine period was represented by an imported amphora neck and handle sherd as well as a pilgrim flask rim with two attached handles.

⁴¹ This material included two triangular rimmed cooking pots and a fine ware sherds with a stamped pattern which Gerber compares the Schmid's fine ware phase 3 (Schmid 2000).

⁴² Material includes three cooking pots and a folded rim jar.

⁴³ Forms from the Nabataean period include a triangular rimmed cooking pot and a ribbed triangular rimmed bowl with two handles. Early Byzantine period forms include a later variant of the triangular rimmed cooking pots, a rounded rim cooking pot, and a casserole.

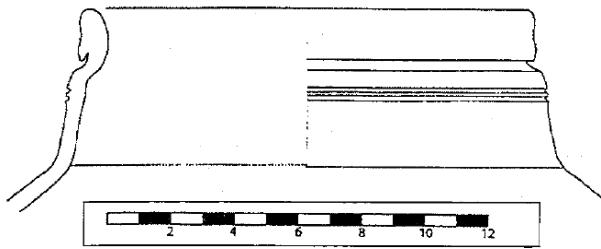


Figure 6: Folded rim jar from UR GS Bag 3 dating to the Early Byzantine period (Linder, et al. 2007, 248)

Pottery from Qasr Surface Bag 9 at Qasr III—or the main structure of the Umm Rattam fortification (Lindner, Hubner, & Hubl 2000, 548)—dated from the last quarter of the 1st century AD to the early 2nd century and to the 4th or early 5th centuries (see figure 7). The latter was mainly represented by a basin trimmed with fingerprints. Collected around Qasr II, three additional assemblages⁴⁴ have closing dates in the 4th century AD (and likely before 363). A remnant of the NPFW tradition⁴⁵ was identified from UR I Bag 6 that parallels those found at ez-Zantur in 4th century contexts (Lindner, Jansson, Gerber, & Fiema 2007, 249). UR II Bag 7 included lamp fragments uncommon at Petra but sufficiently resembling Petra pottery to suggest a 4th century date like the other materials in the bag (Lindner, Jansson, Gerber, & Fiema 2007, 251). Earlier material dating to the 2nd and 3rd centuries was only evident in the final assemblage: UR Stratum III. Local coarse wares mostly made up this group, but one African Red Slip—Hayes form 50A dating from ca. 230/240 to 325) offers more precise dates (Lindner, Jansson, Gerber, & Fiema 2007, 251-252).

⁴⁴ UR I (with bags 5 and 6), UR II (with bag 7), and UR III (with bag 8).

⁴⁵ Presumably Dekorphase 4.

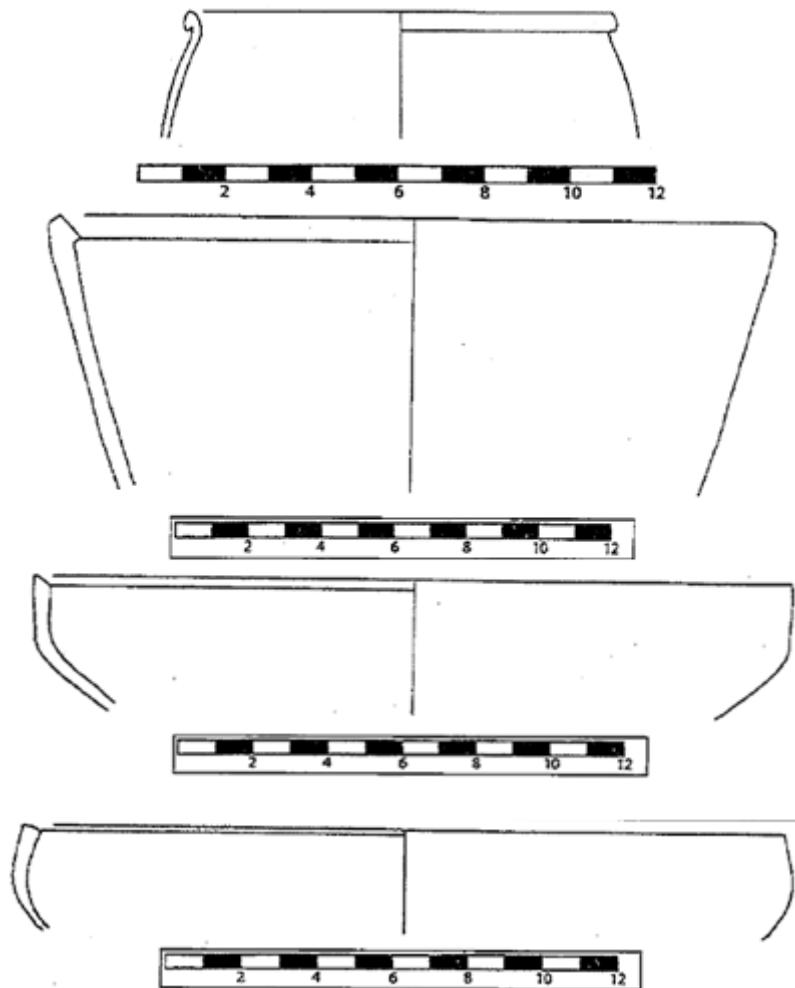


Figure 7: 2nd and 3rd century materials from UR III (Lindner, et al, 2007, 251: figures 48-51)

Material representative of the 2nd century came from three sites: the Tower, the UR cistern, and the Roman or Nabataean Gardens. The tower located east/northeast of Qasr Umm Rattam yielded sherds dated exclusively to the beginning of the 2nd century. Finds were numerous and included a small bottle, several jars and jugs, and a few cooking bowls. The nearby Nabataean cistern also contained 2nd century AD material, but Gerber capitulated that there was only one diagnostic sherd, which she identified as a “green ware amphora” (Lindner, Jansson, Gerber, & Fiema 2007, 253). Finally the Roman or Nabataean Gardens,

on the plains at Sayl Wadi Musa and complete with cross-walls dividing the surface into plots (Lindner, Hubner, & Hubl 2000, 533-554), contained sherds from the 2nd and 4th centuries AD (Lindner, Jansson, Gerber, & Fiema 2007, 253). Gerber neither specifically identifies the 2nd century material nor a specific portion of that century.

The Umm Rattam survey produced generous amounts of ceramic material dating to the Nabataean period, mainly from the 1st and early 2nd centuries AD. Lindner and Fiema believe that this area possessed sufficient water resources to attract and support agricultural production, with settlement possibly beginning as early as the 1st century BC and intensifying in the 1st century AD (Lindner, Jansson, Gerber, & Fiema 2007, 255), as at Jabal ash-Shara. The authors also believe expansion occurred because of the presence of the Petra-Gaza road,⁴⁶ a commercial route which might have passed through Bir Madhkhur (see figure 8). Material dating to the 2nd and 3rd centuries was less common but present at a number of sites, many of which did not contain earlier materials, suggesting that occupation did not cease at Umm Rattam in the Late Roman period but rather relocated, possibly as the space was utilized for different purposes. Early Byzantine material was again common and associated with both Nabataean and Roman ceramics. Most of it dates to the 4th century, although there are some likely 5th century sherds. No 6th century ceramics were identified. Gerber seems to suggest that most Early Byzantine occupation terminated at the 363 earthquake and does not

⁴⁶ Scholars disagree when the Petra-Gaza road went out of use. Some believe it was abandoned ca. AD 106 while others believe the Romans might have improved the Nabataean road. The latter explanation explains the presence of Roman milestones (Cohen 1982, 242), which Isaac found so problematic in 1980 (Isaac 1980). Erickson-Gini and Israel's 2013 article describing excavations along the Nabataean incense road in Israel argues persuasively that the road reached its apex only after the Roman annexation of Nabataea, eventually declining during the Crisis of the 3rd Century (Erickson-Gini & Israel 2013).

offer any evidence for later reoccupation. Other investigations along the Petra-Gaza road suggest that many earlier sites were abandoned in the 3rd and 4th centuries (Cohen 1982; Erickson-Gini & Israel 2013),⁴⁷ possibly because caravan traffic was also decreasing at this point (Lindner, Jansson, Gerber, & Fiema 2007, 255).

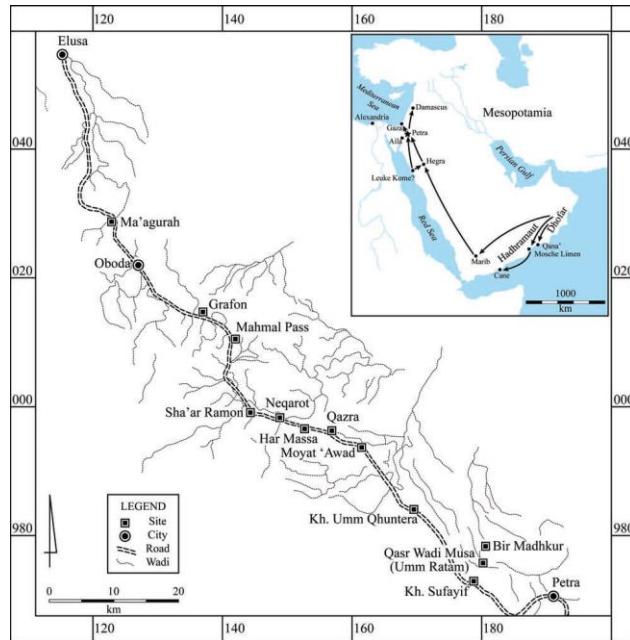


Figure 8: Sites along the Incense Road between Petra and Gaza (Erickson-Gini and Israel 2013, 26)

The Jabal ash-Shara Survey

The Jabal ash-Shara survey, launched by the French Institute of Archaeology in the Near East as a complement to their inventory of Petra's monuments, aimed to examine the main

⁴⁷ In 1982, Rudolph Cohen synthesized his own work along the Petra-Gaza road, as well as the research of others in order to argue that the Petra-Gaza Road was not abandoned after the annexation of Nabataea in AD 106. Based on evidence from Moje Awad, Qasra, and Avdat, traffic continued to utilize this road in the 3rd and 4th centuries. He does admit to a gap in occupation, however, between the road's use in the Roman period and the reoccupation of numerous sites along the road in the mid-6th century (Cohen 1982, 246). Revisiting some of Cohen's sites, Erickson-Gini and Israel agree with his preliminary conclusion (Erickson-Gini & Israel 2013, 50-51).

periods of occupation in Petra's hinterland. Additionally, the team sought to determine to what degree the surrounding mountains contributed economically and agriculturally to Petra, to map possible eastern routes into the well-guarded capital, and to establish the region's balance between agricultural and military purposes (Tholbecq 2001, 400). The survey excluded the areas along the modern road of at-Tayyiba and parts of Wadi Musa, the latter of which was being surveyed by the Wadi Musa Water Supply and Wastewater Project (discussed below). The survey did include the Wadi Musa drainage basin, extending from Petra north from the northern al-Hayy ridge, and to Umm Sawwana in the south. The eastern limit was marked by the ash-Sharah Mountains near Udhruh while the sandstone/limestone transition marked the western limit. In total, the surveyed region encompassed approximately 72 square km, 15 km north-south and up to 6 km east-west (Tholbecq 2001, 399) (see figure 9).

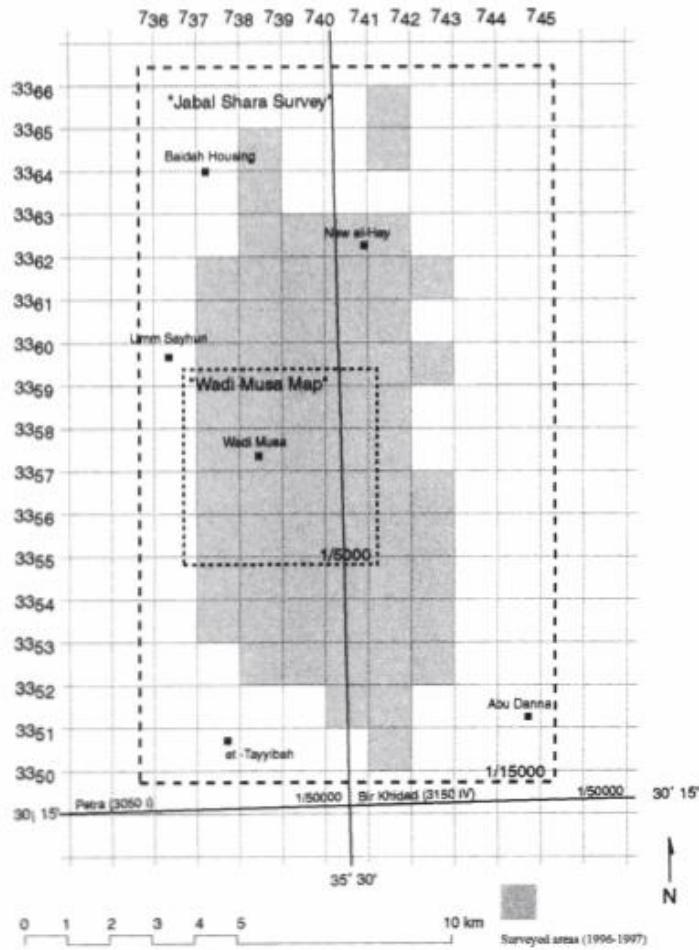


Figure 9: Map showing the extent of the Jabal Shara Survey (Tholbecq 2001, 401)

Tholbecq himself admitted the limitations of the survey methodology in a 2013 article, saying “the work carried out between 1995 and 1998 was ‘site orientated’ and does not meet current survey standards” (Tholbecq 2013, 295). The team kept only diagnostic sherds, preventing the data from being quantified in a meaningful way, and disregarded all lithic material. There was occasional collection of sherd scatters not associated with structures, but these represent only a fraction of the actual amount and prevented detailed statistical analysis. Nevertheless, Tholbecq concluded that the dating of these sites derived from

associated ceramics, while not completely accurate, is generally reliable (Tholbecq 2013, 296).

The Jabal ash-Shara mountain itself is defined by a distinctive natural context, rising to a maximum elevation of 1784 m. The region is higher in humidity, rainfall, and natural springs than Petra itself due to its limestone geomorphology. Because of these natural characteristics, the Nabataeans used water from the mountain to supply the capital city before the Roman annexation of 106 (Tholbecq 2001, 399). The climate of the Jabal was favorable to the cultivation of cereals. The higher elevations over 1600 m were most likely forested during antiquity and provided favorable pastoral land (Tholbecq 2001, 403), making the region attractive to Nabataean residents in the capital city.

The Nabataean Period of the Jabal ash-Sharah Survey

Using aerial photography, 160 sites were visited, sherded, and sometimes sketched in order to develop a typology applicable to sites with several functions (Tholbecq 2001, 400). Of the 160 sites, 88 or 55% of them contained Nabataean pottery, dating between the 1st and early 2nd centuries AD (Tholbecq 2001, 402).⁴⁸ These results indicated to Tholbecq that Nabataean settlement was intensive, although difficult to quantify based on a field survey.

Nevertheless, Tholbecq argued that almost all natural pathways into the mountains were settled during the Nabataean period. The Wadi Musa basin was marked by multiple sites, including sites interpreted as small forts and watchtowers, which connected with long walls along the ridge and secured defiles or gorges (Tholbecq 2001, 403). While the walls could

⁴⁸ Tholbecq does not state how Nabataean pottery was differentiated from Roman or Hellenistic pottery, but as Schmid published his extolled Nabataean painted fine ware typology in 1997 and 2000, the ceramicist was most likely familiar with the new dating Schmid's work provided.

not be definitively dated using surface sherds, it seems likely that this vital agricultural area was protected beginning in the Nabataean period. Due to the basin's proximity to the Nabataean capital, entrance into the vital agricultural zone had to be secured. Entrance from the eastern steppe was also controlled—probably beginning in the Nabataean period by the above-mentioned small forts and watchtowers—but to a lesser degree than the Wadi Musa basin. Other walls were built on the tops of hills and divided the slopes into parallel sections of land (Tholbecq 2001, 404), presumably for agricultural purposes.

Cisterns of the Nabataean and Roman periods were common and likely connected with nearby farm units or other architectural features. Most identified cisterns were not purposefully built but natural, with the exception of the well-known but poorly documented Bir Sarah, which suggests that other purposefully built cisterns remain to be discovered. Similarly, the team did not identify any canal systems or *qanawat*, both attested on the eastern steppe, but stone stacks testify to the generations of occupants who utilized the slopes and terraces for agriculture (Tholbecq 2001, 404). Additionally, Tholbecq's team noted winepresses at the sandstone/limestone limit on the western slope, most likely representing activity associated with the Bayda plain.

The presence of these features allowed Tholbecq to conclude not only that the area provided necessary natural resources for Petra but also that vegetation could thrive in such landscapes. Numerous traces of agriculture in intermediate zones⁴⁹ were found: retaining walls,⁵⁰ natural caves interpreted as agricultural sites, and other unidentified features

⁴⁹ Tholbecq does not explicitly define this term but it likely refers to the area that is neither the most suitable for agriculture nor the marginal, more arid lands further east.

⁵⁰ Difficult to date to either the Nabataean or Roman periods with any certainty.

demonstrate that the Nabataeans commonly used “marginal” land. Moreover, these sites serve “as an omnipresent testimony to the agricultural activity of generations of cultivators,” suggesting that the technique continued after and possibly predated the Nabataean and Roman periods (Tholbecq 2001, 403).⁵¹

Having established this pattern of occupation in the Nabataean period, Tholbecq concluded that the Nabataeans were not simply attracted to Jabal ash-Shara because of the road which would become the *via nova Traiana*—the explanation most often cited as an explanation for the dense sherd concentration. Rather, Tholbecq argued it was the area itself which the Nabataeans found appealing, especially ‘Ayn at-Tinah (or possibly ‘Ayn Amun), which provided abundant clay, as well as the water and fuel necessary to run ceramic kilns (Tholbecq 2001, 405). His conclusion agrees with the work of ‘Amr, who noted that the Jabal’s clay formed a 15 meter thick band, over three times as thick as other possible clay sources at Mahis and Ghawr Kabid ('Amr 1997, 121). Prior to the discovery of the clay source at Jabal at-Tinah, neutron activation analysis confirmed that one clay source in the Petra area was responsible for the majority of Nabataean pottery from the 2nd century BC through the 6th century AD ('Amr 1987, 199). The clay from Jabal at-Tinah did not match the Nabataean pottery exactly, but was the closest match to the pottery sample, which ‘Amr explained by the processing and levigation of the clay before firing, thus removing the heavier particles required for an exact match ('Amr 1997, 123).⁵²

⁵¹ Hellenistic (2nd and 1st century BC) ceramic material was identified at less than 5% of sites (Tholbecq 2001, 402).

⁵² Opposite the clay mine at ‘Ayn at-Tinah, Wadi Qrara offers a structure revealed by the wadi cut consisting of several rooms. As the pottery workshop Zurraba is located in Wadi Musa, the structures would not have represented kilns. However, ‘Amr does note that the

Tholbecq believed that ceramic production accounted for only one of the many possible production activities that stimulated Petra's economy in the 1st century. Based on the various sites he surveyed, he postulated that "caravans coming from the Far East"⁵³ stopped at Jabal ash-Sharah for rest, while the goods were transformed, redistributed and transferred through Petra to reach the western emporia of the Nabataeans" (Tholbecq 2001, 405).⁵⁴ Given not only the prosperity of the city itself during this period (Fiema 2003) but also its growing hinterland, many resources were imported from across the Nabataean kingdom and beyond in order to meet the demands of wealthier occupants, such as those at ez-Zantur.

The Jabal ash-Shara survey also sought to locate where caravans entered the city, but Tholbecq could not establish this from his archaeological evidence. Nevertheless, he states with certainty that the region could have provided supplies to caravan travelers (Tholbecq 2001, 403). The caravan route from as-Saha likely passed through Wadi 'Uqbat Hammad, where two possible animal enclosures in a larger quadrangular structure perhaps served as the last station before Wadi Musa. Other roads noted by the survey included a north-south road running parallel to the *via nova Traiana*, along the western edge of the plateau, and an east-west road connecting Bayda to the steppe, but avoiding both Petra and Wadi Musa (Tholbecq 2001, 403). Tholbecq suggested that the *via Nova Traiana* ran north-south through

site where clay would have been levigated has not yet been found, and it is possible levigation occurred within these structures ('Amr 1997, 125). The stones making the walls are mostly unhewn limestone and the pottery collected from in and around the structure ranges from the Neolithic to Nabataean. 'Amr notes that there was a 2nd century AD cooking pot sherd found but does not provide any further details. An additional wall approximately 5 meters in length and associated with Nabataean pottery was also identified, but does not appear to correspond with clay excavation at Jabal at-Tinah ('Amr 1997, 124-125).

⁵³ Tholbecq does not define Far East.

⁵⁴ This likely occurred outside of the city both because of space constraints and because the noise and smell contradicted Petra's royal and religious sanctity.

Udhruh at the eastern edge of the survey, instead of through Petra itself.⁵⁵ Differentiating between Nabataean and Roman occupation along the *via nova Traiana* is difficult without extensive excavation but Tholbecq noted that the valleys provide natural access through the Jabal ash-Sharah mountains and into the Wadi Musa basin along a path likely utilized since the Classical period (Tholbecq 2001, 405). Given it was the most obvious entrance, Nabataean presence should be expected prior to construction of the *via nova Traiana*.

The Roman and Early Byzantine Periods in the Jabal ash-Sharah Survey

Although numerous features could not be closely dated to either the Nabataean or Roman periods, Tholbecq argued that the quantity of Roman pottery he dated to the 2nd and 3rd centuries suggests that the economy remained steady through the annexation period on a number of terraced sites (Tholbecq 2001, 404). However, Roman pottery dating to the 2nd and 3rd centuries only accounts for approximately 30% of the survey's total pottery corpus, which he states "could indicate that the apparent slow-down of the international trade of Petra was balanced by the development of local or inter-regional trade" (Tholbecq 2001, 404).

However, there are several other possibilities. The Roman annexation of 106 could have lessened hinterland settlement, or the 2nd century Roman sherds—often in the same vein as the late 1st century AD Nabataean pottery tradition—was classified as "Nabataean." Later in the Roman period, the crisis of the mid-3rd century, which is well attested within the Roman world but with effects not clearly understood in Petra or its hinterland, could explain the dip in Roman pottery. As neither the fine ware nor amphorae were mentioned, assuming

⁵⁵ Directly contradicting Graf who is generally accepted as correct on this matter.

any were found, which could provide a more nuanced chronology in the mountains during this period, it is difficult to discern the level of international trade.

Any such trade during the Roman period was centered on the *via nova Traiana*, constructed in 111-114. The team surveyed part of the Roman road in the area of al-Hayy and noted several associated structures. Specifically, a large enclosure was once connected directly to the road, but modern construction has since destroyed this site. Additionally, the team located several sites where the *via nova Traiana* crossed east-west accesses to Gaia. Finally, the team noted several cemeteries (in 'Ayn Musa and an-Naqla) that Tholbecq theorized could have been *necropoleis* of Gaia nearby (Tholbecq 2001, 404).

By the Byzantine period, only 10% of the sites appear to have been occupied, and settlement seems to have moved east towards the city at Udhruh/Augustopolis (Tholbecq 2001, 405), ca. 15 km east of Petra. Perhaps because Udhruh surpassed Petra itself during this period, farmers found it more advantageous to sell their surplus to the newly prospering city.

Wadi Musa Salvage Excavation and Survey

A Nabataean cistern revealed by new construction in Wadi Musa in 1996 initiated a salvage project by the Department of Antiquities. The cistern sat under a modern street and could not be fully excavated, although enough was uncovered to reveal intact arches and steps leading down into the belly of the structure. Fill did not reach the top of the cistern, which contained mainly Ayyubid/Mamluk pottery ('Amr 1997, 469). The DOA team placed a sounding outside of the northern wall of the structure and found sherds dating to the turn of the 1st century BC/AD and no later, suggesting that the area was cleared during the

Ayyubid/Mamluk period ('Amr 1997, 470). South of the cistern, a sounding (3x7m) was excavated down to strata from the turn of the 1st century BC/AD ('Amr 1997, 470). The site possibly dates earlier as bedrock was never reached, although it seems likely that this was the first period of intense occupation.

This discovery led to excavation of a Nabataean villa north of the cistern. The building was rich in archaeological material including lamps and an *unguentarium*. Late first century BC pottery was found under the villa's floor and atop it were coins and pottery from the early to late 1st century AD. It was destroyed ca. AD 100 and was only reused as a dump in the 3rd/4th centuries ('Amr 1997, 470). It seems clear that the main period of occupation began during the intensification of building activity at Petra and ended abruptly around the annexation. While its destruction seems to hint at a larger event, it is unclear whether this was an earthquake or the annexation itself.

The villa itself contained "architectural-style frescos in bright colors of crimson red, golden yellow, olive green, grayish blue as well as black and white" along the east hall wall and further frescos of natural elements in another room ('Amr 1997, 470). A mosaic of geometric patterns was found in a possible *apodyterium*⁵⁶ leading to the *caldarium* and containing a fountain with a limestone lion's head and Nabataean Painted Fine Ware (see figure 10) ('Amr 1997, 470). Smashed cooking pots were identified in the northern corridor ('Amr 1997, 473), but it is not noted whether they were charred in apparent domestic use or if they were uncharred, indicating use as a serving vessel. Unfortunately the partial demolition of the building in July 1996 by modern development limited further research.

⁵⁶ 'Amr never offers an interpretation as to whether the bath it was semi-public or only for the occupants of the house.

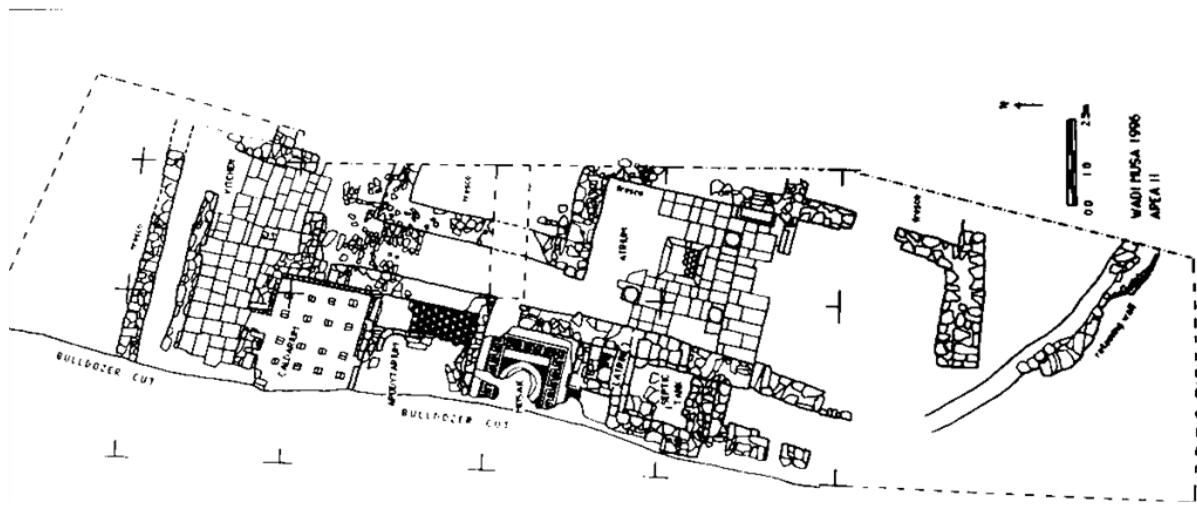


Figure 10: Villa in Wadi Musa ('Amr 1997, 471)

After the 1996 excavation in Wadi Musa, the “Wadi Musa Water Supply and Wastewater Project” was started as part of a study on the environmental impact of new water-pipes. Because the archaeological survey was so short (approximately 4 weeks), the survey was restricted to the proposed pipes’ route. The area was divided into sectors as follows (including the number of sites identified in each sector): Bayda (30), Umm Sayhun (3), Wadi Musa (24), at-Tayyiba (12), al-Qa (10), and Ayl (6)⁵⁷ (see figure 11) ('Amr 1998, 503). The publication included coordinates, altitude, site description, and dating. Little flint was collected due to the difficultly of dating these objects and few Bronze Age sites were noted. Identification of Roman sherds was rare, but not unexpected as “the Nabataean tradition of pottery production continued well after the Roman annexation of the Nabataean kingdom. Even the “‘Classical’ Nabataean pottery ... produced in the 2nd century AD, and the coarser wares of 3rd century southern Jordan were also of pure Nabataean character” ('Amr 1998, 504). Therefore, much of the “Nabataean” pottery may actually date to the post-

⁵⁷ ‘Ayl will not be discussed in this chapter as it is not in Petra’s immediate hinterland.

annexation era, and the term “Nabataean” not only refers to chronology but also to the cultural identification of the residents. Only sites relating from the Nabataean through the Byzantine periods will be discussed in depth below.

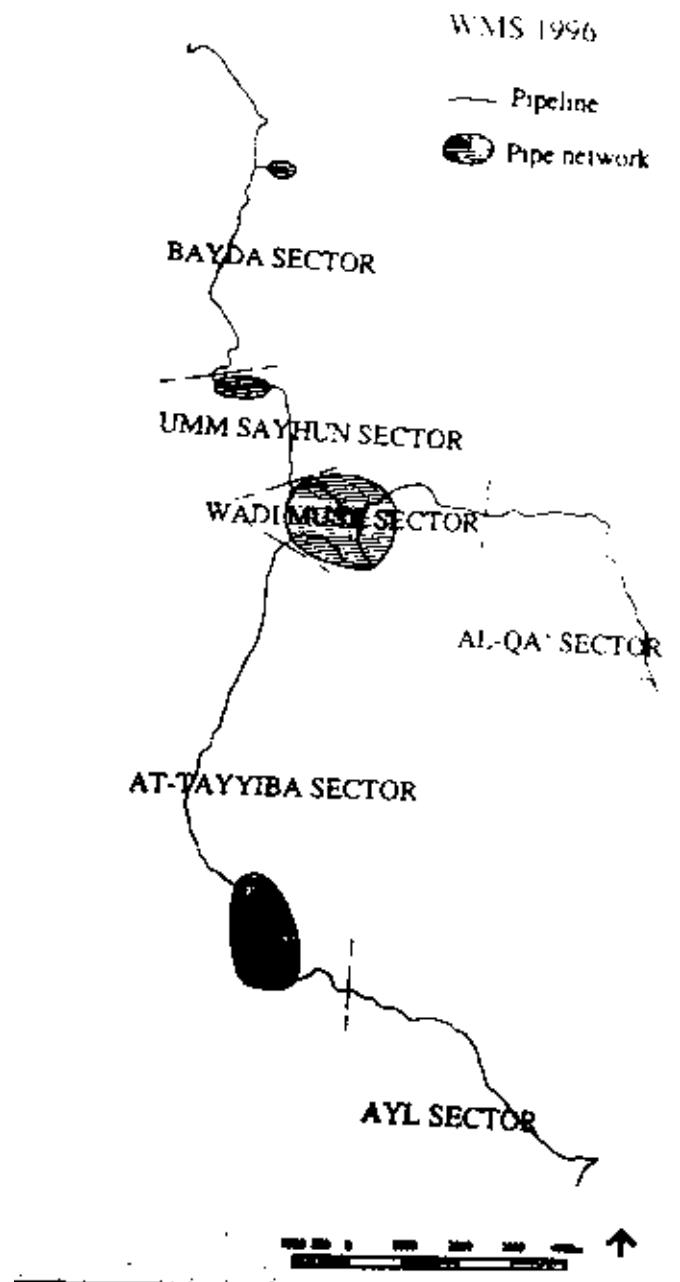


Figure 11: Wastewater Sector Map ('Amr 1998)

Bayda

The Bayda sector contained sandstone outcrops and evidenced both prior and current agricultural use, even though it was partially within the borders of the Petra National Park where agriculture is no longer allowed. ‘Amr noted the importance of the area as both a “major agricultural suburb of Petra” and alongside a major caravan route, thus making the entire sector from Siq Umm al-Hiran to Umm Sayhun one large archaeological site as opposed to thirty separate ones ('Amr 1998, 504). Of the 30 identified sites along the pipeline route, all contained Nabataean remains while only six yielded either Roman or Late Roman evidence.⁵⁸ Five sites contained evidence of terracing while six held wine presses. Thirteen sites included basins or cisterns. At least two Bayda sites were interpreted as domestic in nature while two others seemed to have a Nabataean military function ('Amr 1998). Other sites were interpreted as cultic in nature as some contained Nabataean graffiti and a few held *triclinia*. The main purpose of most sites could not be discerned and, as noted earlier, the results suggest that all these sites might have actually comprised one large site with intensive Nabataean occupation.

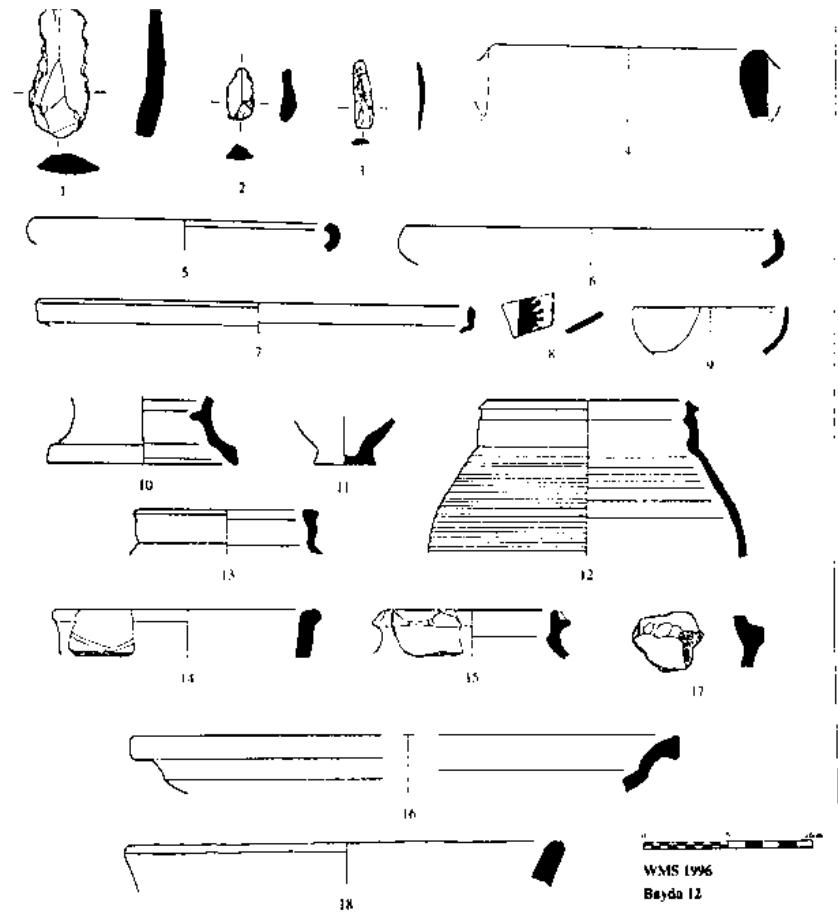
The six sites with Roman occupation varied in purpose. Thin terrace walls, barely visible, at Bayda 1 suggested some sort of agricultural use perhaps continuing from the Nabataean era ('Amr 1998, 504). The other Roman site associated with agriculture, Bayda 22, was more complicated and contained rock-cut chambers, a *triclinium* with a “wash feature,” and a second smaller open-air (possible) *triclinium* in addition to agricultural fields

⁵⁸ The difference between Roman and Late Roman was not defined.

with wall lines and terraces ('Amr 1998, 512). Bayda 20 was a domestic site containing a rock-cut house, an obelisk with an inscription below the base,⁵⁹ and masonry built structures. The house contained a large hall with niches, but was badly weathered ('Amr 1998, 511). Given its extensive features, the house was most likely an upper class residence. It would be interesting to note upon excavation if it also witnessed destruction at the start of the 2nd century AD.

The purpose of the other three Roman sites was unclear. Bayda 12 witnessed sporadic occupation from the Neolithic to the late Islamic period. It contained rock-cut installations, quarries, cisterns both open and roofed, rock carvings of animals, Nabataean graffiti, and numerous steps and channels ('Amr 1998, 507-508). Published diagnostic pottery from the site included a fragment of Nabataean painted fine ware of the 1st century AD ('Amr 1998, 509). The size of the sherd prevents closer identification but it could be either Dekorphase 2b or 2c (ca. 30/20 BC-AD 20). Another Roman era site, Bayda 21, also contained a Nabataean painted fine ware sherd, perhaps Dekorphase 3a (ca. AD 20-70/80) but possibly earlier (see figure 12). A rock-cut wine press and basins were found under the modern agricultural field. The final Roman site, Bayda 16, was unique among the sites surveyed, with rock-cut installations possibly associated with a sacred high place. However, it also contained wine presses like Bayda 21 and terraced agricultural fields.

⁵⁹ No further details (not even the language of the text or a translation) were included in the publication.



WMS 1996 site Bayda 12 (Khirbat Bayda, Umm Qusay) flint and pottery (drawn by A. al-Momani and L. Mohammadieh). 1. Blade fragment, grey; 2. borer, grey with extensive hydration; 3. sickle blade, light grey; 4. jar, red with wide grey core, abundant mineral and grog inclusions, very rough, Chalcolithic(?); 5. bowl, yellowish pink ware, Nabataean late 2nd-early 1st cent. BC; 6. bowl, fine light red ware, Nabataean 1st cent. BC-early 1st AD; 7. bowl, fine red ware, Nabataean 1st cent. AD; 8. bowl, fine red ware, red paint, Nabataean 1st cent. AD; 9. bowl, fine red ware with light grey ext. rim, Nabataean early 1st cent. AD; 10. base, fine red ware, Nabataean 1st-early 2nd cent. AD; 11. string cut base, red ware with light grey core, thin cream slip ext., abundant sand inclusions, Nabataean 2nd cent. AD; 12. cooking pot, red ware, thin cream slip ext., sand inclusions, Late Nabataean 3rd-early 4th cent. AD; 13. jar, incised decoration, red ware with abundant sand inclusions, Byzantine 5th-6th cent. AD; 14. jar, thumb impressed decoration, red ware, light grey slip ext., Late Roman-Early Byzantine 4th cent. AD; 15. jar thumb impressed decoration, red ware with very wide grey core, Late Islamic; 16. "Late Roman Red" bowl, 4th cent. AD; 17. body sherd, impressed rope decoration, red ware with very wide grey core, abundant chaff impressions, Late Islamic; 18. jar, red ware with very wide grey core, burnished red slip, abundant chaff impressions, Late Islamic.

Figure 12: Pottery from Bayda 21 (Amr 1998)

The sites with some Roman era occupation were not related to military purposes, as other surveys suggest. Some in fact seem related to agriculture, wine production, or water storage. Half yielded pre-Nabataean occupation, suggesting the desirability of the site.

The eight sites in Bayda with an Early Byzantine presence included Bayda 1, 11-12, 15-16, and 20-22 ('Amr 1998, 504-515). All had earlier Nabataean evidence and all except Bayda 11 had some sort of Roman presence as well, although Bayda 15's Roman occupation might have only extended into the beginning of the 2nd century and was therefore not included in the previous discussion of Roman Bayda. Four Byzantine Bayda sites (Bayda 1, 15, 16, and 22) were associated with agricultural purposes, which speaks to the continued viability and fertility of the soil throughout the Classical period. Another site—Bayda 21—witnessed recent agricultural use. That these agricultural sites continued to be utilized throughout the Nabataean to Byzantine periods is not unexpected given Bayda's proximity to Petra and the demands the capital must have placed on its hinterland.

The Roman and Byzantine sites without an obvious agricultural association—including Bayda 12, 20, and 21—also witnessed long periods of use. These sites are associated with architectural features such as cisterns, rock-cut steps, and even an obelisk with an inscription in addition to surviving rock-cut structures, making their function impossible to define. Nevertheless, intermittent use from the Neolithic until the Late Islamic periods suggests that these sites were attractive throughout the area's history.

The Byzantine sites without a definite Roman presence⁶⁰—Bayda 11 and 15—offer the only evidence from Bayda of a so-called “Byzantine explosion” into the hinterland.

⁶⁰ Because the ceramic tradition immediately before and after the Roman annexation of AD 106 appears so similar, as 'Amr noted herself ('Amr 1998, 504), I have interpreted a lack of definitive 2nd and 3rd century pottery to indicate that occupation at these sites ceased at the Roman annexation. While I offer no interpretation as to why this might be the case, I believe that the evidence offered in this thesis will convince readers that hinterland sites contracted immediately after the Roman annexation. I interpret 'Amr's lack of Roman dated pottery as evidence to support this assumption.

Surprisingly, Bayda 15 does seem to be associated with agriculture ('Amr 1998, 510) and the lack of a Roman era presence is unexpected especially in light of the extensive hydraulic system and numerous visible wall lines. Perhaps the site did not offer enough security or was destroyed or abandoned in the early 2nd century.

Umm Sayhun

The Umm Sayhun sector reached north from the road to Bayda, through the village at Umm Sayhun, to the southern roads traveling to the az-Zurraba district in Wadi Musa ('Amr 1998, 515). Only three sites were recorded, one in the village itself, but additional agricultural terraces and small wadi barriers were noted above Umm Sayhun. All three sites were strictly Nabataean in date. Umm Sayhun 1 contained a small triclinium and a shaft cut tomb alongside several wadi barriers. Umm Sayhun 2, near the medieval fort of al-Wu'ayra, contained a rock-cut chamber with niches but no apparent agricultural associations. Umm Sayhun 3 included a small tunnel possibly related to water collection, but contained no obvious evidence of hydraulic mortar ('Amr 1998, 516).

Wadi Musa

The paucity of sites identified in Umm Sayhun was not unexpected, especially given recent construction, but stands in direct opposition to the sheer number of sites in the Wadi Musa sector. Perhaps this dichotomy is simply a result of the sector size but more likely reflects the desirability of land in the Wadi Musa basin even over long periods of time. 'Amr notes the rich agricultural land and several water courses ('Amr 1998, 516) which should have attracted settlement in ways the drier Umm Sayhun, which lacked water, could not. All

time periods were represented in the region. Some sites had been excavated previously while some agriculture terraces and wadi barriers were not recorded (see figure 13).



Figure 13: Wadi Musa sites ('Amr 1998)

Of the 24 sites recorded, sixteen yielded Nabataean occupation (Wadi Musa 1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16, 19, 20, 21, 23, and 24) and five evidenced Roman occupation (Wadi Musa 1, 4, 6, 10, 16). Sites 9 and 23 may have been minimally occupied during the Roman period but this remains unclear. Additionally, Wadi Musa 18—the possible ancient site of Gaia—was surveyed briefly but could not be recorded in full due to modern construction and time limitations. Five sites yielded possible Early Byzantine occupation (1, 4, 6, 8, 9) and

another six sites (5, 6, 8, 9, 10, 19) witnessed pre-Nabataean occupation. Wadi Musa 23 may date to the Hellenistic period, eleven sites evidenced Islamic (Umayyad/ Mamluk/Ayyubid) occupation (6, 9, 44, 11, 12, 13, 14, 16, 17, 19, 21), and three sites yielded Ottoman evidence (10, 16, 22). The dating of Wadi Musa 7 was not discernible.

Nabataean features ranged from agricultural terraces, a pottery production site (az-Zurrabah), cisterns (rock-cut and stone), clay mine (Ayn at-Tinah), natural spring, olive press, column drums, caves, and ancient roads ('Amr 1998). It thus appears the Wadi Musa basin was a prosperous and intensively occupied region. Ayn at-Tinah provided clay for the az-Zurrabah production center, which primarily provided ceramics to Petra and the surrounding region. However, Petra ceramics have been identified across the Arabian Peninsula and the Mediterranean ('Amr 1997; 'Amr 2004; Schmid 2004).

Some Roman sites seemed to show use patterns similar to the Nabataean period. The az-Zurrabah kilns—Wadi Musa 4—continued to produce pottery. Olive presses at the site may have provided fuel for the kilns, despite the problems posed by such fuel during experimental firings ('Amr 1998, 518; Mason and 'Amr 1995). Like the kilns, the Nabataean agricultural terraces at Wadi Musa 1 continued to be used through the Roman and Byzantine periods ('Amr 1998, 517). Wadi Musa 6 may have had some agricultural associations, as indicated by a spring and wadi cut, and modern agricultural terraces. However, any archaeological remains once in the wadi were eroded down to bedrock. Sherd and flint suggested occupation in the Neolithic, Nabataean (1st through 3rd centuries AD), Byzantine, and early and late Islamic periods ('Amr 1998, 519), demonstrating that the spring must have flowed at least seasonally for long periods in antiquity. Despite the absence of Roman sherds,

the long periods of use both before and after the Roman period suggests that it was likely also used throughout the Roman period. The remaining two sites—Wadi Musa 10 and 16—were harder to interpret. The former was a major Iron Age settlement but contained Late Roman sherds, a rare example of a Roman site without prior Nabataean occupation ('Amr 1998, 520). Wadi Musa 16 dated from the 1st to 3rd centuries AD and contained stone block structures, badly eroded and disturbed by a modern road ('Amr 1998, 521).

The ancient site identified as Gaia lay alongside trade routes and had plentiful water. It was the largest site recorded by the survey and is currently densely populated. This restricted the team's ability to document its exact boundaries and they noted features instead ('Amr 1998, 522). On its eastern sector was a chamber at a spring, still flowing during the survey. The chamber included three columns as later additions to further support the central arches (see figure 14). The floor channels run west under a modern street into an open cistern with terraced orchards. Associated sherds suggest that the site “seems to have originally been Nabataean but reused in later periods” ('Amr 1998, 522). No further explanation is offered in regards to either the site’s dating or the sherds found. Also on the east edge of the site was a row of well-built structures, many plastered and some with flagstone pavements. Pottery dates the site from the first through 3rd centuries AD ('Amr 1998, 522). The third eastern site also contained well-built structures with a ceramic water pipe, drains, and retaining wall, with pottery of the 1st centuries BC/AD ('Amr 1998, 524).



Figure 14: Possible ancient site of Gaia ('Amr 1998)

The northern-most feature was in a modern cemetery and contained a column drum and “traditional” room ('Amr 1998, 524). Sherds date from the 1st through 3rd centuries AD, although local residents reported that later pottery, coins, and decorated architectural fragments were found when digging new graves ('Amr 1998, 524), suggesting that the site's dating should be revised. The road cut at the southern half of the site exposed monumental buildings, some of which have been incorporated into modern structures. Local rumors

asserted that they are remains of an ‘archaeological’ mosque, but only Nabataean sherds were found ('Amr 1998, 524-525). Southwest of the monumental walls, a ceramic channel with hydraulic mortar lay under a modern agricultural terrace wall. The channel starts at the ‘Ayn al-Bassa spring, noted in the Petra Papyri ('Amr 1998, 525)⁶¹. At the center of the site, ancient houses are intermingled and reworked into modern ones. Other reused architectural fragments included Nabataean oblique-trimmed masonry, doorjambs, column drums, and aqueduct blocks, but few sherds were found, making dating difficult ('Amr 1998, 525-526). On the western edge, an ashlar block wall may have once been the village boundary, broken by a gate later blocked by a rough wall. No sherds were found ('Amr 1998, 526).

In the Early Byzantine period, occupation in the Wadi Musa basin seems constricted even more than during the Roman period. Occupation ceased at three sites (10, 16 and 23) and only began at one new location (8) ('Amr 1998). All sites had witnessed previous occupation and at least three had been continuously occupied since the Nabataean period. That Early Byzantine inhabitants continued to utilize these well-known places instead of expanding into newer territory does not need further explanation.

It is possible that Early Byzantine occupation in the Wadi Musa basin was even more restricted than ‘Amr herself believed. ‘Amr dated the pottery kilns and connected workshop from the 1st through 6th centuries AD based on her work with the DOA team ('Amr 1998, 518). ‘Amr claimed that the most problematic kiln—Kiln V—was dug into a kiln dump

⁶¹ ‘Amr cites Kaimio and Koenen, who simply state “in 1995 we had already identified a number of places in the wider area of Petra: as-Sadaqa, al-Hammam, Ail, Udhruh, and Braq. We are now adding – to mention just a few – al-Bassa, Kaffat al-Hawawir, ‘Ayn al-Eis (all three in the town of Wadi Musa), and al-Rafid (5 km north on the high plateau overlooking the Bayda in the wadi to the west)” (Kaimio and Koenen 1997, 460). The spring could not be located in the published Petra Papyri, volumes 1, 3, and 4.

which contained pottery dating to the 2nd century AD. In a side wall, 'Amr identified a large storage jar handle dated to the 6th century and states that almost the entire corpus from the kiln dates to the Late Byzantine period (ca. 6th and early 7th centuries, see figure 15) ('Amr 1991, 315).⁶² In between the arches of the kiln a “comparatively coarse red ware” bowl with black paint on the interior emerged (see figure 16) ('Amr 1991, 318). Given that the fabric was not completely coarse and the vessel is still thinner than the debased Dekorphase 4 vessels, it appears to be a Nabataean painted fine ware bowl transition from Dekorphase 3c to 4. While the transition between these two Dekorphases is not completely clear, Stephan Schmid dated it between AD 150 and 250, not to the 6th century. Other 6th century sites in Petra itself do not report this form, including the Petra Garden and Pool Complex (Koulianos 2014), Qasr el-Bint (Renel 2014), and Petra North Ridge Project.

⁶² None of these sherds were published so I cannot verify their dating.

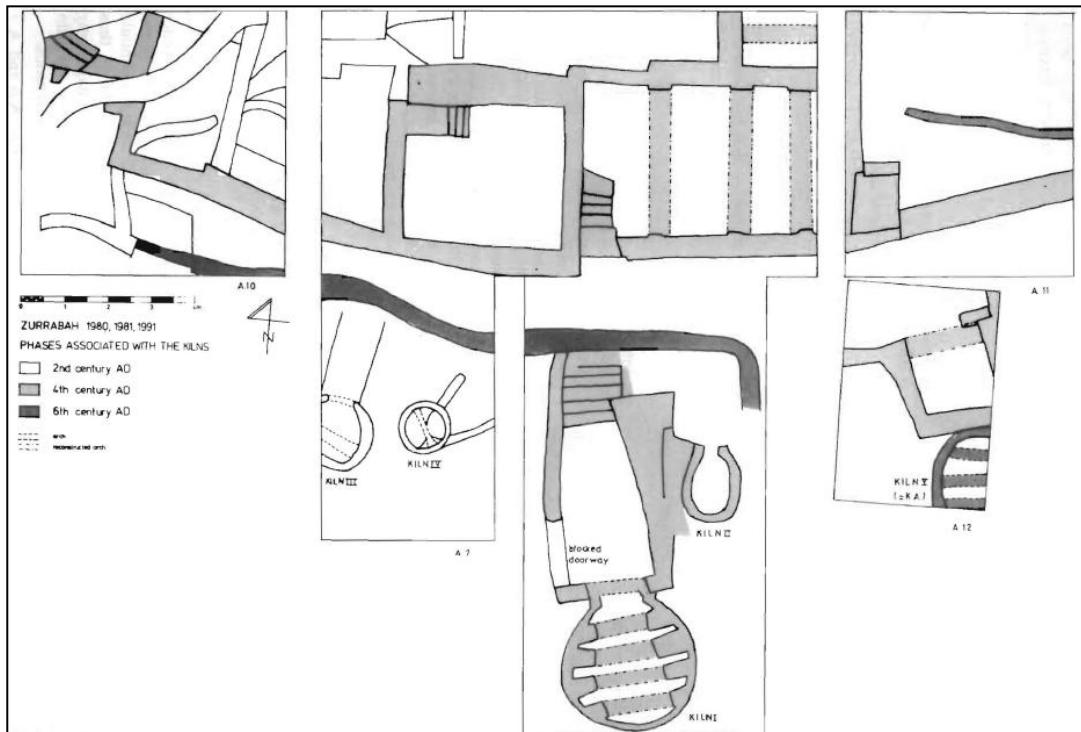


Figure 15: Phases associated with Zurrabah kilns ('Amr 1991, 314)

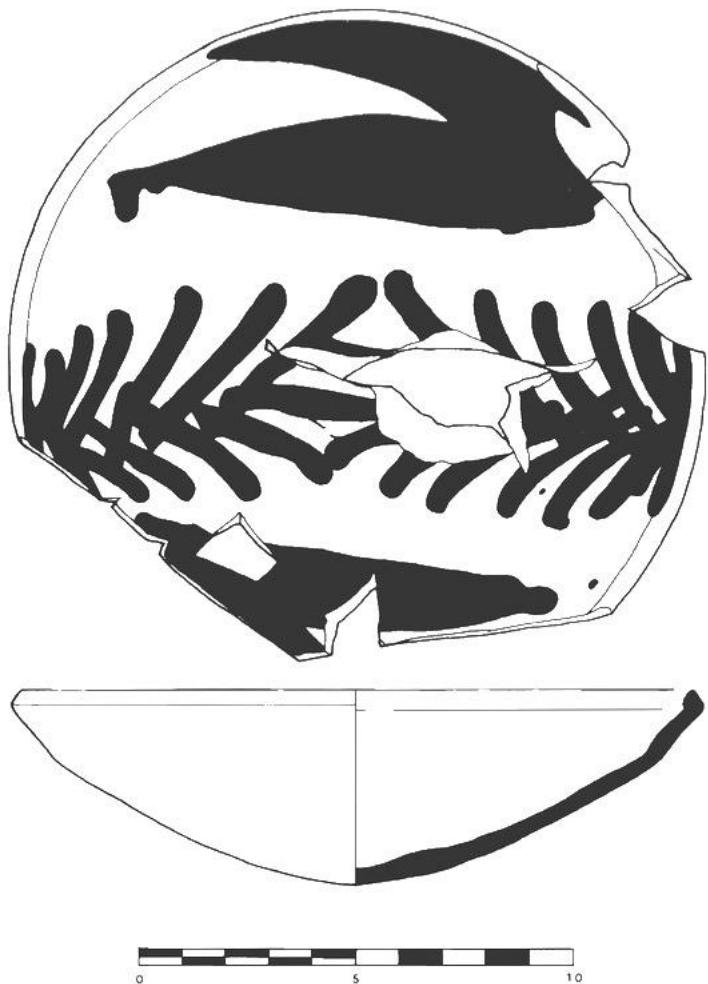


Figure 16: Nabataean painted fine ware bowl which 'Amr dates to the 6th century ('Amr 1991, 319)

Additionally, it is difficult to believe that the kiln continued to function into the Late Byzantine period. 'Amr's survey found very little Roman and Early Byzantine occupation in the Wadi Musa basin, and during the Early Byzantine period Petra only retained a fragment

of its former glory.⁶³ Finally, the Nabataean ceramic tradition was certainly dead by the late 4th century. With so few inhabitants in the general vicinity, it seems more likely that Byzantine potters would construct their kiln in the Udhruh region that seemingly was more densely settled at the time.

At-Tayyiba

The at-Tayyiba sector connects the towns of Wadi Musa, at-Tayyiba, and Ayl. 'Amr notes that water resources were sufficient to support small agricultural villages and the presence of agricultural terraces and wadi barriers (most of which were not recorded in the survey) support this conclusion. Flint scatters on several sites suggest the area was also fertile hunting ground during the Paleolithic, Epipaleolithic, and Neolithic periods ('Amr 1998, 529-532). 8 of 12 sites were interpreted as Nabataean (Tayyiba: 2, 6, 7, 8, 9, 10, 11, 12) while 5 were identified as Roman (Tayyiba: 5, 6, 9, 10, 11). Most of the Nabataean sites were related to agriculture. The structures suggest an affinity for elevated and more secure locations ('Amr 1998), but could have been less susceptible to water erosion and thus present some sort of preservation bias.⁶⁴ The Nabataean structures were generally constructed of stone.

Roman occupation was generally apparent at larger sites, with the exception of Tayyiba 5—a small rectangular, stone-block structure on a mountain slope interpreted as Nabataean. But if in fact the earliest pottery is 2nd century AD ('Amr 1998, 533), it seems

⁶³ The Garden and Pool complex was used for farming (Koulianios, 2014), residents had ceased to use Qasr el-Bint (Renel, 2014), and along the North Ridge domestic structures were destroyed in the 363 earthquake and never reoccupied (all knowledge of the Petra North Ridge project, unless otherwise stated, comes from the author's experience as a ceramicist for the project).

⁶⁴ This settlement pattern is not out of sync with settlements from other periods, also located on hilltops and on the mountain slopes.

more likely that the site was constructed in the Roman period. 'Amr also differentiates between the Nabataean and Late Roman periods (4th century), ('Amr 1998, 533) perhaps reflecting the crisis of the 3rd century.

Tayyiba 6, 9, and 10 were all extensive sites, apparently domestic. The first—Tayyiba 6—has been noted by many previous scholars.⁶⁵ Dating from the Nabataean to the Islamic periods, the extensive village contained agricultural terraces, structures, cisterns, and a temple at a flattened site on the mountain slope ('Amr 1998, 533). Tayyiba 9 covered two hills, the structures of which stretched continuously through the intervening wadi. Modern clearance destroyed most of the southern half where a roofed cistern may have been located. The northern sector hints at ancient pavements and a spring. Sherds suggested a break in occupation between the 3rd and 5th centuries AD ('Amr 1998, 543). Tayyiba 10 contained a large concentration of stone-block structures on a hill along a mountain slope, although a smaller concentration of structures lay on a small hill and wadi to the south. Agricultural fields and a Byzantine tombstone suggest an agricultural village of the late 1st to 6th centuries AD ('Amr 1998, 524). The final Roman site, Tayyiba 11, was located on a hilltop above the town and consisted of medium and large stone blocks. The exact type of structure remains unclear but the size and position led 'Amr to argue that it was a watchtower ('Amr 1998, 534-536).

Qa'

All ten sites discovered in the Qa' sector contained Nabataean era pottery, seemingly from the 1st century AD. However, the sites that contained only Nabataean period ceramic

⁶⁵ Including Musil 1908, Glueck 1935, Parr 1960, Tholbecq 1996.

material (Qa' 1, 2, 4, 5, and 9) were mainly farmsteads, not unexpected result given that 'Amr describes the Qa' section as an "ancient agricultural area" ('Amr 1998, 539). None of the remaining structures were complex and, when described, were referred to as rectangular in shape. Often these sites only contained a scarce scatter of sherds.

The 'Qa sites that contained Roman or Early Byzantine material were either more architecturally impressive or at a crucial junction ('Qa 3, 6, 7, 8, and 9). 'Qa 3 was described as a large complex (see figure 17), complete with corrals and shelters, and contained ceramic material from the 1st, 2nd, 4th centuries and later periods.⁶⁶ A cistern partially housed by a natural cave ('Amr 1998, 540) suggests longer-term occupation. 'Qa 6 contained the remains of three structures built atop three distinct but low hills. Like 'Qa 3, 'Qa 6 had access to water through a round well fed by ceramic water pipes from the west. Threshing floors and corrals are also linked to the site that 'Amr believed was occupied continuously from the 1st through 5th centuries AD ('Amr 1998, 541-542). 'Qa 7 did not offer a ready water source but contained the remains of a complex structure surrounded by agricultural fields ('Amr 1998, 542). The Nabataean and Roman structures at 'Qa 8 were disturbed by modern building activities but yielded ceramic evidence from the 2nd-4th centuries, as well as the later Islamic period ('Amr 1998, 543).

⁶⁶ The lack of 3rd century material is suspicious and I suspect that the complex was abandoned shortly after the annexation.

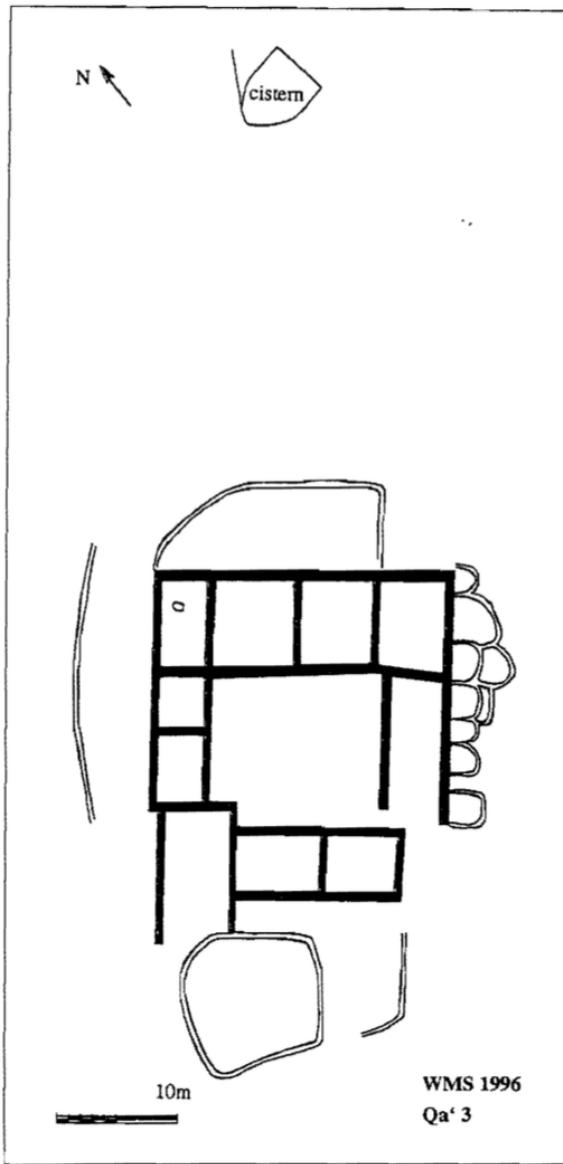


Figure 17: 'Qa 3 ('Amr 1998, 540)

Two sites are exceptional in this period: 'Qa 9 and 10. 'Qa 9 was the only Nabataean era site later reoccupied in the Byzantine period. Located on a hilltop, it now contains a modern house and school. However, older walls suggest the site had ancient origins and a sherd scatter of the 1st, 2nd, 6th, and 7th centuries suggests that the site was not occupied in the

Roman period. ‘Qa 10 sits at the junction of three ancient roads—from Udhruh, at-Tayyiba, and Wadi Musa—and offered a cave with stonewalls, used as a cistern. Terraced walls are visible beyond the structure (‘Amr 1998, 543).

Finnish Jabal Haroun Survey

A Finnish team surveyed Jabal Haroun (the “Mountain of Aaron”) to understand rural settlement from 300 BC until the early 7th century AD. They found that settlement around Petra began in the last two centuries BC, and intensified and expanded during the 1st and 2nd centuries AD. Hinterland settlement contracted in the 3rd century and continued through the 4th century. By the start of the 5th century, settlement patterns had changed completely so that “nucleated agricultural villages and towns” replaced large cities with extensive hinterlands (Kouki 2012, 7). The team claimed that the change did not occur because of environmental reasons as evidenced by a shift to marginal land use during a period of greater aridity (Kouki 2012, 7), seemingly contradicting Parker’s claim (Parker 1992, 329) that the drier and hotter period resulted in settlement constriction at more northern sites.

Using a modified version of the chronology developed by Homes-Fredericq and Hennessy in 1986 (Homes-Fredericq, D, and J.B Hennessy 1986) based on Sauer’s 1973 chronology, Kouki dated ceramics to the nearest century as “the accuracy of dating of survey pottery for these periods is generally within a century, and archaeological materials seldom rapidly reflect the historical events signifying the boundaries of archaeological periods” (Kouki 2012, 31) (her revision of the Homes-Fredericq and Hennessy schema is in the figure 18). Kouki included several sites outside of the team’s original survey in her analysis—including Sabra, Abu Khushayba, Umm Rattam, Bir Madkhur, as-Sadeh, Udhruh, and Wadi

Musa (Kouki 2012, 77-78). As a result, the discussion below includes some sites already examined previously in this chapter. Agricultural sites were defined as meeting all of the following four characteristics: remains of structures, pottery associated with the structures, no suggestion of a purely cultic or funerary context, and no evidence of primarily military use.

PERIOD	CONVENTIONAL DATING	MODIFIED DATING
Hellenistic	332 – 63 BC	300 BC – 100 BC
Nabataean-Early Roman Late Roman	63 BC – AD 106 AD 106 – 324	100 BC – AD 100 AD 100 – 300
Early Byzantine Late Byzantine	AD 324 – 491 AD 491 – 634	AD 300 – 500 AD 500 – 600
Islamic	AD 634 onwards	AD 600 –

Figure 18: Kouki's dating groups (Kouki 2012, 31 - Table 1)

Petra has yielded evidence of settlement dating to the 3rd century BC. The Jabal ash-Shara Survey produced no evidence of this century and only one 2nd century BC settlement. The earliest evidence of occupation from the Finnish Jabal Haroun Survey (hereafter FJHS) appeared at only two sites in the 1st century BC (see figures 19-20). Early occupation centered close to Petra or along the major routes leading into the city. No early settlements were identified along Petra's eastern periphery (Kouki 2012, 84). This changed during the 1st century AD, when settlement exploded everywhere, including the east (see figure 21). Most of the new eastern settlements were small or medium sized; there were some possibly larger settlements at Jarba and Udhruh, although the extent of their 1st century size is difficult to establish given the intensive later activity that occurred (Kouki 2012, 85). Settlement appeared steady through the 2nd century AD, although this was likely difficult for Kouki to

determine because the 1st and 2nd century pottery traditions differ only slightly. This assessment contradicts the Wadi Musa Survey, in conjunction with excavated evidence of destruction dating to the early 2nd century. Therefore it seems more likely that settlement did contract around the time of the annexation.

	SITE SIZE	2 nd BC	1 st BC	1 st AD	2 nd AD	3 rd AD	4 th AD	5 th AD	6 th AD	7 th AD	8 th AD
WMS											
new	S	1	0	15	1	1	0	0	0	0	0
	M	0	0	11	1	1	0	0	0	0	0
	L	0	2	9	0	0	0	0	0	0	0
resettled	S	0	0	0	0	0	2	0	0	0	1
	M	0	0	0	0	0	0	1	1	1	0
	L	0	0	0	0	0	1	1	1	1	0
settlement continuity	S	0	1	1	15	7	3	3	3	0	0
	M	0	0	0	11	10	6	3	1	1	2
	L	0	0	2	11	9	7	8	8	6	4
ABUDANH'S SURVEY											
new	S	0	0	49	6	3	3	0	3	0	0
	M	0	1	14	2	0	0	0	0	0	0
	L	0	0	3	0	0	0	1	0	0	0
resettled	S	0	0	0	0	0	9	1	6	0	0
	M	0	0	0	0	0	2	0	5	0	0
	L	0	0	0	0	0	3	0	1	0	0
settlement continuity	S	0	0	0	47	13	5	17	15	10	5
	M	0	0	1	15	6	3	5	5	5	1
	L	0	0	0	3	3	3	5	6	4	3
FJHP AND WESTERN PERIPHERY											
new	S	0	2	3	1	0	0	0	0	0	0
	M	0	2	5	0	0	0	0	0	0	0
	L	0	0	2	0	0	0	0	0	0	0
resettled	S	0	0	0	0	0	1	0	0	0	0
	M	0	0	0	0	0	1	0	0	0	0
	L	0	0	0	0	0	0	0	0	0	0
settlement continuity	S	0	0	2	4	1	1	0	0	0	0
	M	0	0	2	7	3	2	2	1	1	1
	L	0	0	0	2	2	2	0	0	0	0
TOTAL SITES		1	8	119	127	59	55	47	56	29	17

Figure 19: Distribution of sites based on period of occupation (Kouki 2012, 80 - Table 2)⁶⁷

⁶⁷ Kouki defines small sites as a single isolated building, medium sites as a cluster of at least two buildings, and a large site as an extensive settlement such as a village (Kouki, 2012, p. 79).

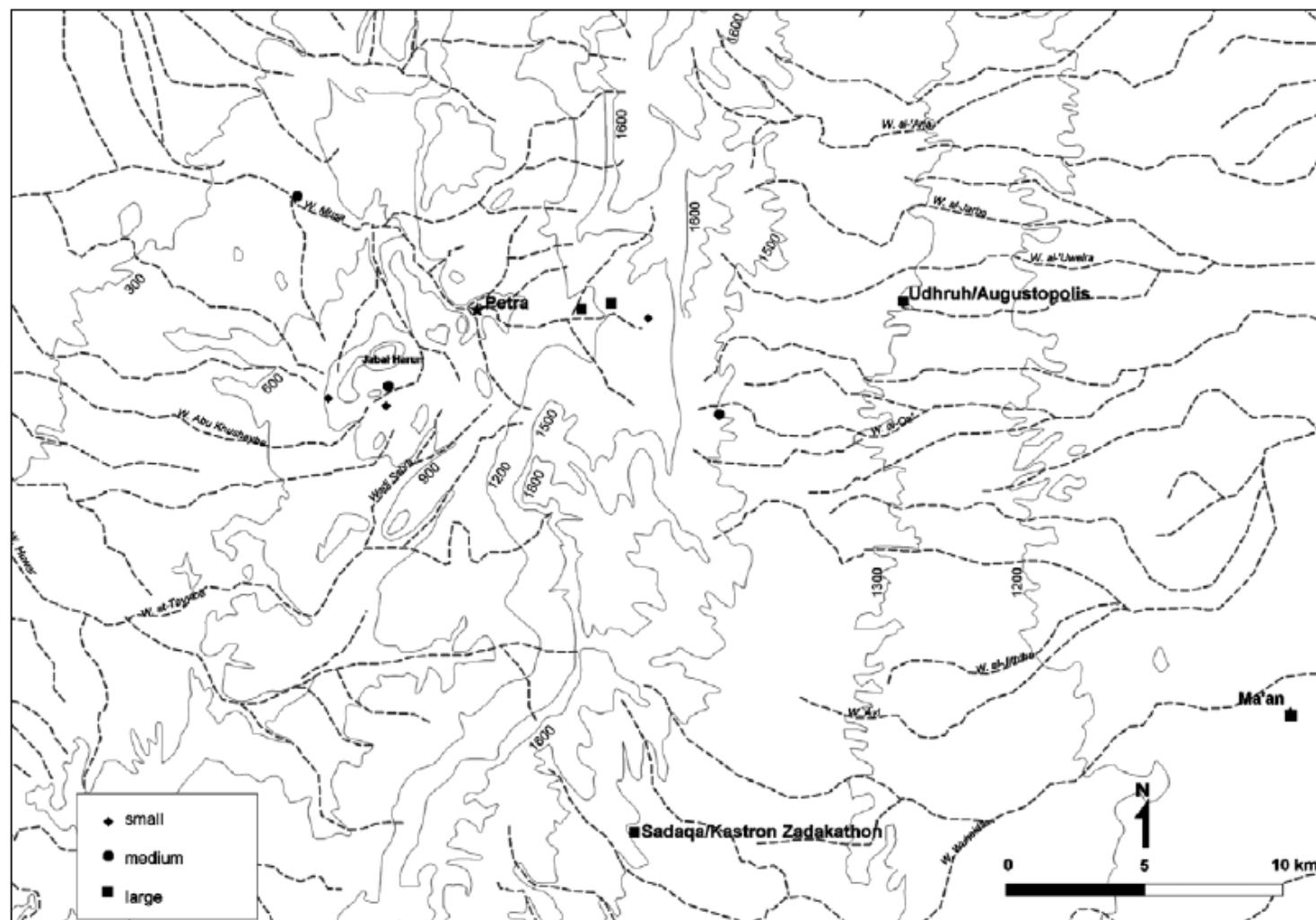


Figure 20: Sites dating to the 1st century BC (Kouki 2012, 86 - map 18)

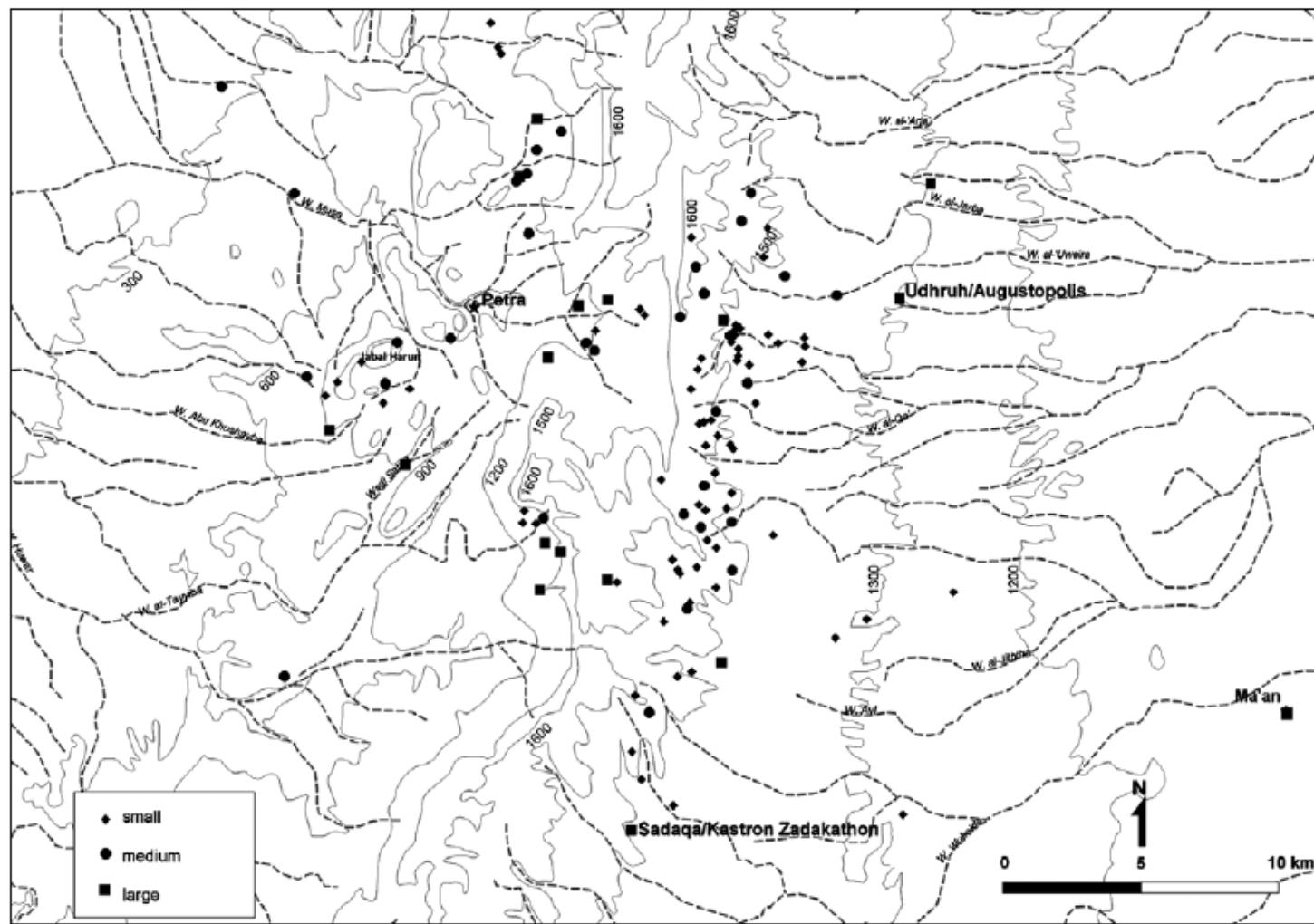


Figure 21: Sites dating to the 1st century AD (Kouki 2012, 87 - map 19)

Based on the distribution of rural sites during the 1st and 2nd centuries AD, Kouki argues for a three-tiered settlement hierarchy. The smallest sites were most numerous, followed by a slight decrease in the number of medium sites. Large sites were the most rare. This, Kouki postulates, directly reflects the social differentiation within Nabataean society and “the variability of small rural sites reflects actual differences in wealth” (Kouki 2012, 97). The three-tiered settlement pattern seems to continue after the Roman annexation of 106 (Kouki 2012, 97). If true, it might lend credence to the view that the Roman annexation witnessed little destruction in Petra’s hinterland. However, Kouki noted that several Nabataean traditions (ceramic and religious, as well as the continued use of the prosoponyms) continued after the Roman annexation, especially in the regions considered to have been the Nabataean heartland⁶⁸ (Kouki 2012, 40). However, it must be stressed that with so very few chronological markers to differentiate between the 1st and 2nd centuries, the evidence to support the continued existence of a three-tiered settlement pattern is lacking. Kouki did not publish her pottery so independent verification is impossible. My own interpretations of the Wadi Musa Wastewater Survey do not support Kouki’s interpretation.

The rapid expansion witnessed during the first century subsided during the 2nd century and continued into the 3rd century (see figures 22-23). Only a third (n=25) of the 74 small settlements of the 2nd century continued into the 3rd (Kouki 2012, 80, 85). The number of medium and large sites also decreased, although not as dramatically; just over half (n=20) of the 36 2nd century medium sites remained occupied as did and almost all (n=14) of the 16 large 2nd century sites (Kouki 2012, 80, 88). Settlements disappeared from all areas but

⁶⁸ Kouki notes that this does not seem to be the case in more northern regions.

especially east of Petra, where they had been clustered in a dense line running north to south—an area in the Jabal ash-Shara region that received the most rainfall (Kouki 2012, 84). The drop in settlements from all areas suggests a different cause than simply relocation of population.

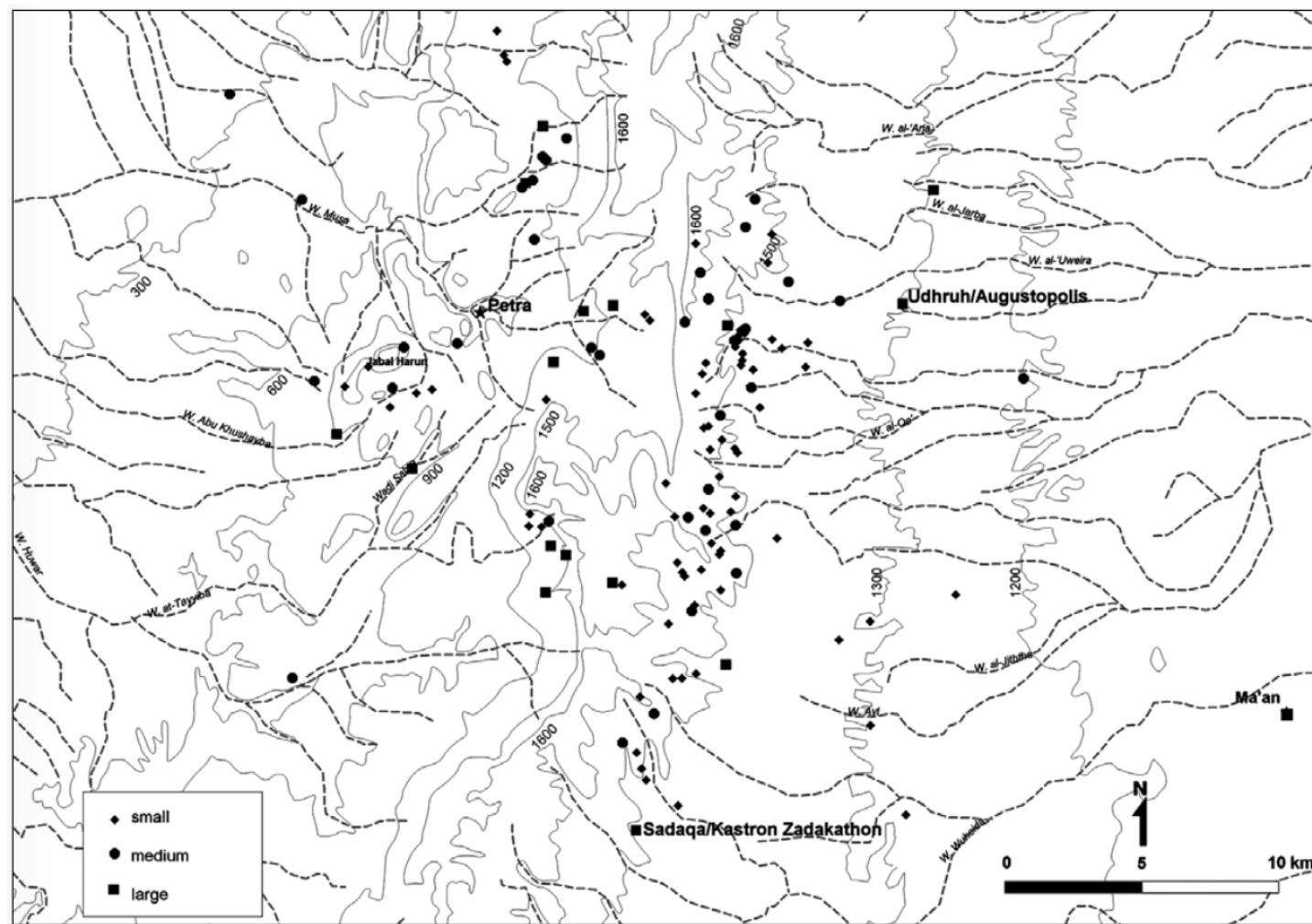


Figure 22: 2nd century sites (Kouki 2012, 88)

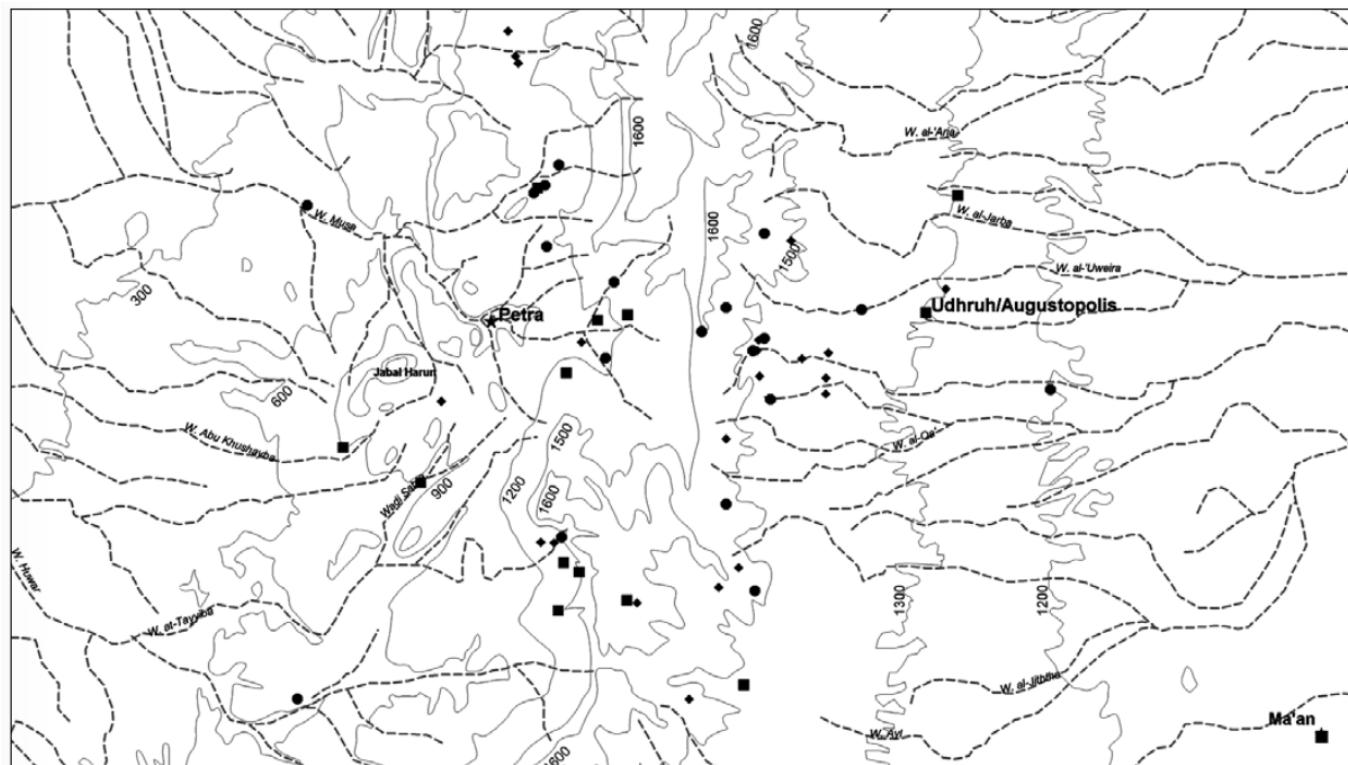


Figure 23: 3rd century sites (Kouki 2012, 89)



In the 4th-6th centuries, smaller sites in or west of Petra continued to disappear until only three of the original 21 remained (see figures 24-25).⁶⁹ Only two of nineteen medium sites survived the end of the 6th century. The number of large sites declined somewhat, from thirteen in or west of Petra at the 2nd century peak to nine at the end of the 6th century. Abudanh's material offered a different pattern during this period. The number of small sites decreased from their 2nd century peak—from 53 to 24; this decrease (almost 55%) is significant but not nearly as dramatic as in the west (over 85%). Medium sites decreased from fifteen to ten, a 33% reduction in comparison with over 85%. The number of large sites actually increased from three to seven between the 2nd and 6th centuries (Kouki 2012, 80, 89).

⁶⁹ Excluding those from Abudanh's survey.

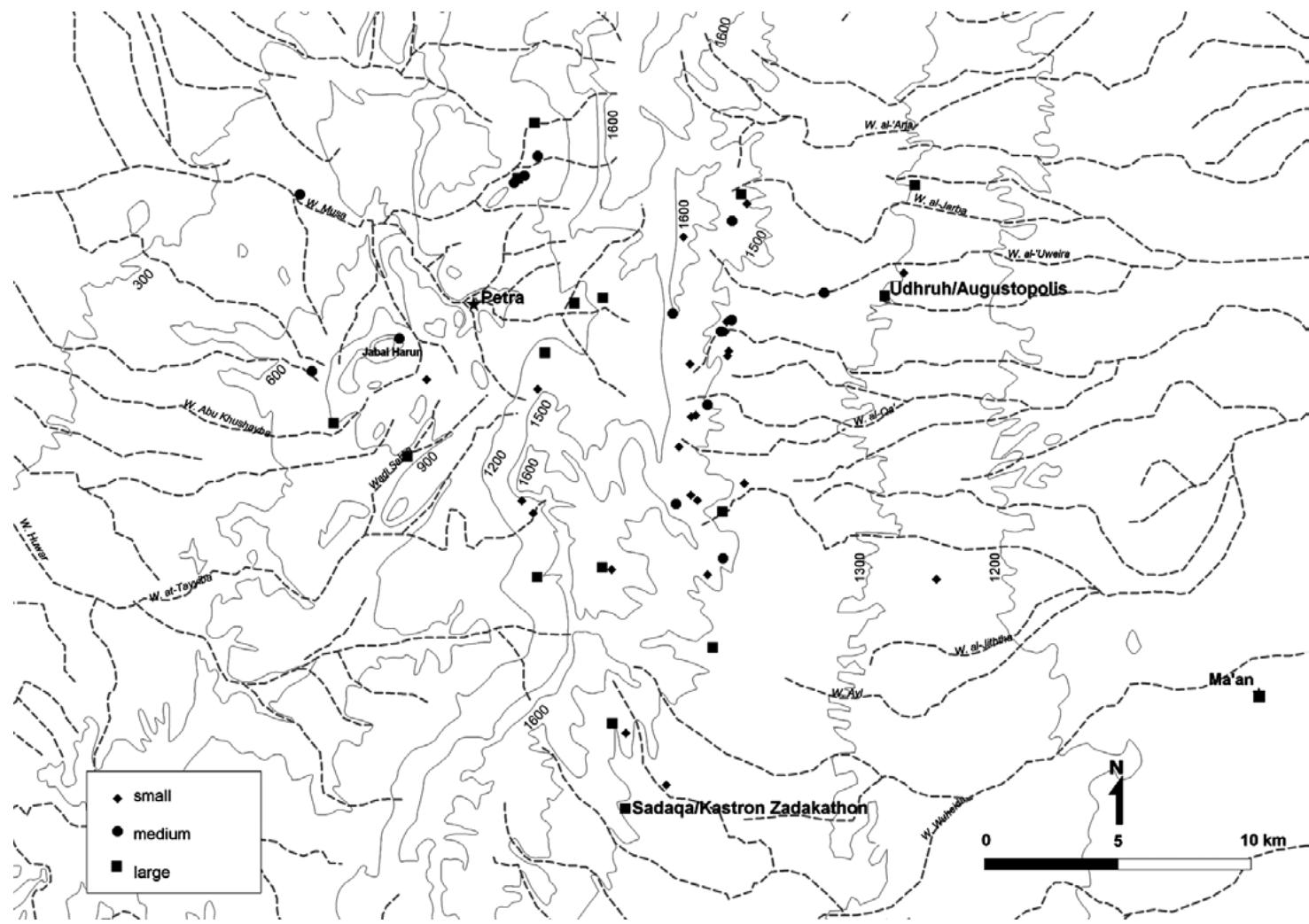


Figure 24: 4th century AD sites (Kouki 2012, 91)

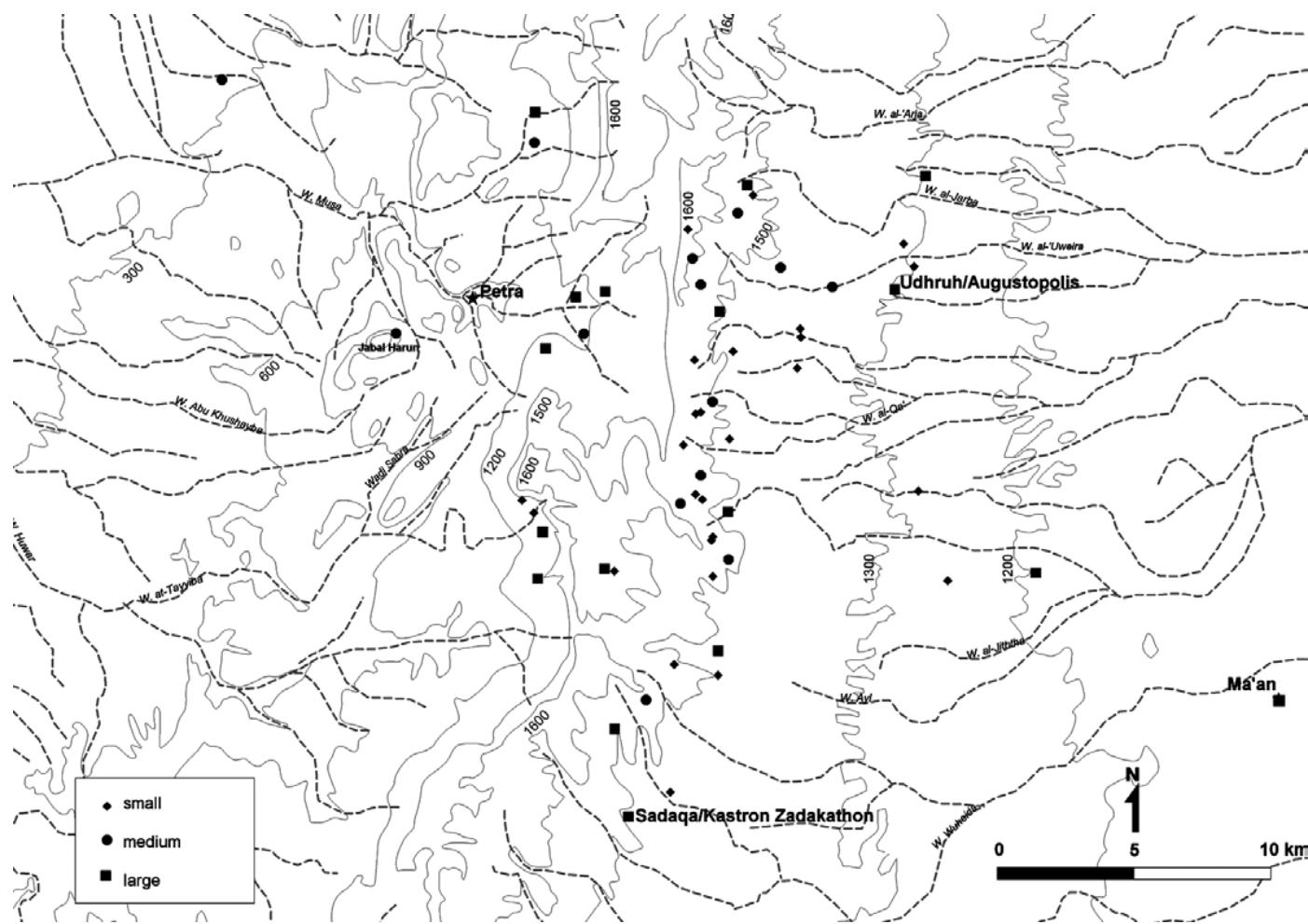


Figure 25: 6th century AD sites (Kouki 2012, 93)

In the 4th century, occupation resumed at a number of sites abandoned only a century prior, especially those medium or large in size. Medium sites also grew during this period, especially in the east closer to Udhruh. The number of small eastern sites remained fairly consistent from the 3rd to 5th centuries. Petra's western periphery was almost completely abandoned during the 5th century. In the 6th century, even the formerly stable medium-sized settlements in the Jabal ash-Shara region disappeared, although some of the larger ones increased in size (Kouki 2012, 98). Kouki offers no explanation for this change in settlement pattern but it perhaps suggests that the wealthier inhabitants of Petra were moving away from the former Nabataean capital to the new economic powerhouse in the east, especially after the Roman legion appeared in the early 4th century (Kennedy & Falahat 2008). Additionally, Kouki believes that Early Byzantine material simply may have not survived as well in the archaeological record as the Finnish Jabal Haroun team noted the material from that period was less durable than Nabataean era material (Kouki 2012, 27).⁷⁰

Kouki notes that most sites reflect multi-period occupation, suggesting much continuity in location after most sites were founded during the first century AD. Sites may have been temporarily abandoned but then reoccupied. Kouki interprets this pattern as a result of the limited availability of water and also concedes that the availability of "building material and preexisting agricultural installation may also have influenced the location when abandoned settlements were reoccupied" (Kouki 2012, 94). Additionally—based on the

⁷⁰ I agree with Kouki's assessment based on the material I worked with at the Udhruh Archaeological Project. Early Byzantine material was often much more worn and fragile than the harder material from the Nabataean period. That would also explain the lower amount of Early Byzantine surface material in a region with a well-documented Early Byzantine presence.

theory developed from Alcock's *Graecia Capta* (Alcock S. E., 1995)—Kouki argues that the small, single farmstead sites common in the first and 2nd centuries AD suggest both intensification of land use and private land ownership. When small and medium sites began to disappear in the 3rd century only to be eventually replaced by larger sites, settlement nucleation began as land ownership was concentrated in fewer hands. The landholding system had become unstable and some event, possibly the Roman annexation, facilitated a move to a more mobile land-use strategy (Kouki, 2012, p. 96). As Kouki argued for the continuity between the first and 2nd centuries, it is unclear why she credits the annexation, an event almost 100 years prior, for settlement changes in the 3rd century. If, however, this change began in the 2nd century as suspected, this explanation seems more plausible.

Bir Madkhur

Andrew Smith launched a new project at Bir Madhkur in 2003 with several goals in mind: to examine the civilian and military function of this Nabataean through Byzantine outpost; to analyze the relationship between modern indigenous and nonindigenous peoples currently residing in the Araba Valley; to understand local and long distance trade which passed through the site; and to explore Bir Madkhur's larger trading relationship with major regional urban centers at Petra, Aqaba, and Gaza. Smith seeks to achieve these goals through excavation of civilian and military structures, artifacts, and a regional survey (Smith 2014).

The project's survey extended 20 km north of Bir Madhkur to Wadi Hamdan and Jebel el Malaqa, 20 km south to Wadi Huwwar, west to the modern Araba highway, and east to the ash Shara mountain range. Walking at twenty meters apart on parallel tracts, the team documented all agricultural installations such as field walls, terraces, water channels, and

domestic structures. Additionally, they recorded migratory movements of past nomadic peoples (mainly through graffiti) and more formalized regional communications (ancient roads; Smith II & Kay 2010).

However, Smith has to-date only published a detailed summary of the 25 sites visited and documented in 2005. Two sites (4 and 5) likely date prior to the Hellenistic period as they only contained lithics and slag (Smith 2005, 64). Two sites (14 and 15) were ancient roads with no associated pottery (Smith 2005, 67). Smith simply failed to offer a date for one site (18) (Smith 2005, 68). An additional three sites (7, 8, and 11) yielded undiagnostic ceramic material (Smith 2005, 65-66). One of these sites (7) contained stone walls with a hydraulic purpose, while the others produced sherds simply too worn to identify. The remaining seventeen sites all yielded Nabataean or Early Roman pottery. Of these, four (3, 10, 19, and 23) contained a fair amount of definite Late Roman material,⁷¹ five sites (16, 20-22, and 25) yielded a few Late Roman sherds, and three (9, 13, and 24) produced possible Late Roman sherds (Smith 2005, 63-71).

Most of the seventeen Nabataean and possibly Roman sites were associated with agricultural production: field systems with intersecting walls, stone enclosures possibly for livestock, threshing installations, and basalt millstones (Smith 2005, 63-71). Nabataeans living close to the agriculturally viable land likely worked the landscape. The possible fort at site 24 (Khirbet es-Faysif), with Nabataean/Early Roman pottery with some Late Roman sherds, suggests a need for protection of precious resources. It lies along an ancient road,

⁷¹ Post Roman annexation and prior to AD 324 or the start of the Early Byzantine phase. As Andrew Smith was a student of S. Thomas Parker, it can be assumed he uses the same start and ends dates as he also uses Parker's chronology from the Roman Aqaba Project.

suggesting two possible functions: protecting local agriculture from intruders and providing a way station for shipping products to cities. Other sites identified as possible caravan stations (13 and 25) likely witnessed similar use (Smith 2005, 67, 70-71).

The decrease in number of sites from the Nabataean to the Roman periods supports the view that settlement declined after the annexation, certainly by the time the local pottery began to change markedly in the 3rd century. Additionally, the purpose of the sites changed. Most Nabataean sites were small and suggested both agricultural and domestic usage—asserting that residents lived close to their fields. The Roman period sites were generally much larger. Site 10 contained a building (farmhouse?) constructed of limestone blocks. The walls consisted of two faces with a rubble fill. Additionally, it held a boundary marker,⁷² wall alignments, and burials including a cairn (Smith 2005, 66). Site 19 was similarly impressive, with an apparent farmhouse, agricultural systems, wall alignments, and an ancient roadway (Smith 2005, 68). Site 3 consisted of four features, including stone enclosures, and two threshing floors (Smith 2005, 63-64). It seems that during the Roman period inhabitants only remained in larger sites either well-connected to the larger regional network or more strongly built.

The Petra Area and Wadi Silaysil Survey

The Petra Area and Wadi Silaysil Survey (PAWS) is part of a larger regional project conducted by Brown University focusing on the long-term changes in landscape north of the Petra city center (Knodell 2013). The project aims to elucidate the relationship between city and countryside and, perhaps most interesting, to better understand “what was happening in

⁷² Not further explained by Smith.

periods that have received relatively little scholarly attention (e.g., Late Prehistoric and Medieval periods)” (Knodell 2013). The team conducted three seasons of fieldwork, each with different archaeological approaches. The first season in 2010 utilized a pedestrian survey of three areas: Wadi Baqa’, Wadi Silaysil, and Medieval Bayda. The 2011 season aimed to fill gaps between the 2010 survey areas. In 2012 the team expanded north, east, and slightly south towards Umm Sayhun (see figure 26 for survey areas by field season). Covering over 600 hectares, the team collected all lithics and diagnostic ceramics⁷³ and documented over 1000 features. The following chronological summary is based on each season’s summaries on the project’s webpage.

⁷³Knodell never discusses what constitutes a “diagnostic sherd,” but likely it is a rim, base, or handle of local vessels. Any sort of imported fabrics were hopefully saved as well, even if they were body sherds.

The results claimed by this project are treated tentatively because the project’s ceramicist questions the standard ceramic chronological typology commonly used throughout Jordan.

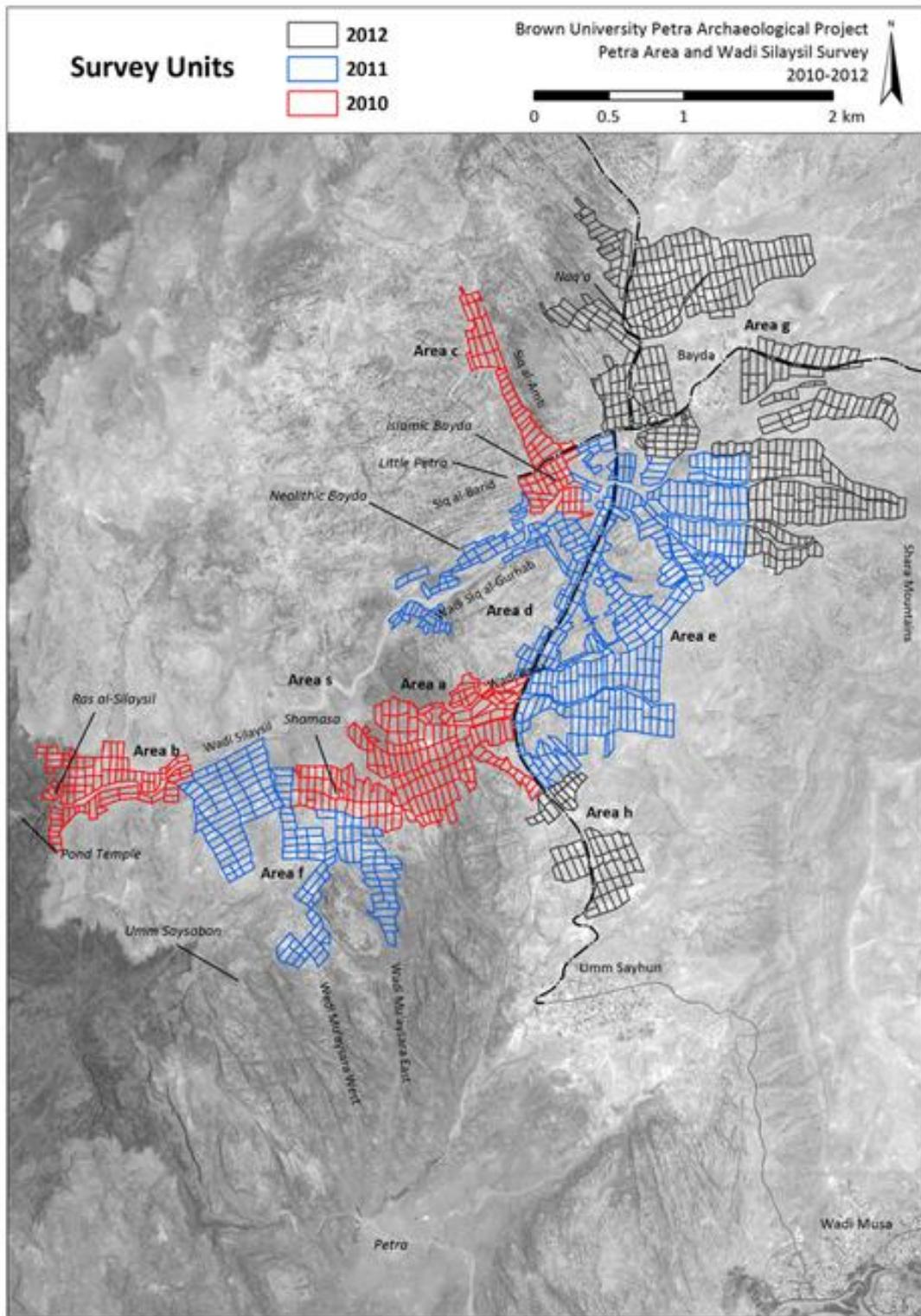


Figure 26: PAWS survey areas by season (Knodell 2013)

The first to employ this survey methodology in the Petra region, members of the 2010 intensive survey team covered 133 hectares by walking ten meters apart. The team was divided into three groups and ceramic evidence offered dates ranging from the Iron Age to the present, with concentrations in the Nabataean, Roman, and Medieval Islamic periods. However, it should be remembered that the project's ceramicist pushes forward in date numerous forms typically identified as late first century well into the 2nd or even early 3rd century, making it difficult to determine how the number of Nabataean and Roman finds from PAWS compares with the above surveys.

The team employed ceramic spatial patterning to explore both density and chronology (see figure 27). Wadi Slaysil contained the most Nabataean and Roman material (Alcock 2012). The reasons for the dense western clustering are not entirely clear but may be partially explained by the general settlement explosion during the period. Most identified features consisted of walls or “wall cut systems” relating to terraces or dams. Additionally, the team identified numerous agricultural installations, shrines, quarries, water-management systems, stairs, and even “game boards” found throughout the entire survey area (Alcock 2012). Lindner had previously documented two settlements in this region with a concentration of architectural remains. The team interpreted these two settlements—called Shammasa (in Area A) and Ras as-Slaysil (in Area B)—as dating from the 1st century BC until the 2nd century AD (Alcock 2012), although both earlier and later materials were present. Evidence from other surveys suggests that occupation of these western hinterland sites later contracted (Alcock 2012).

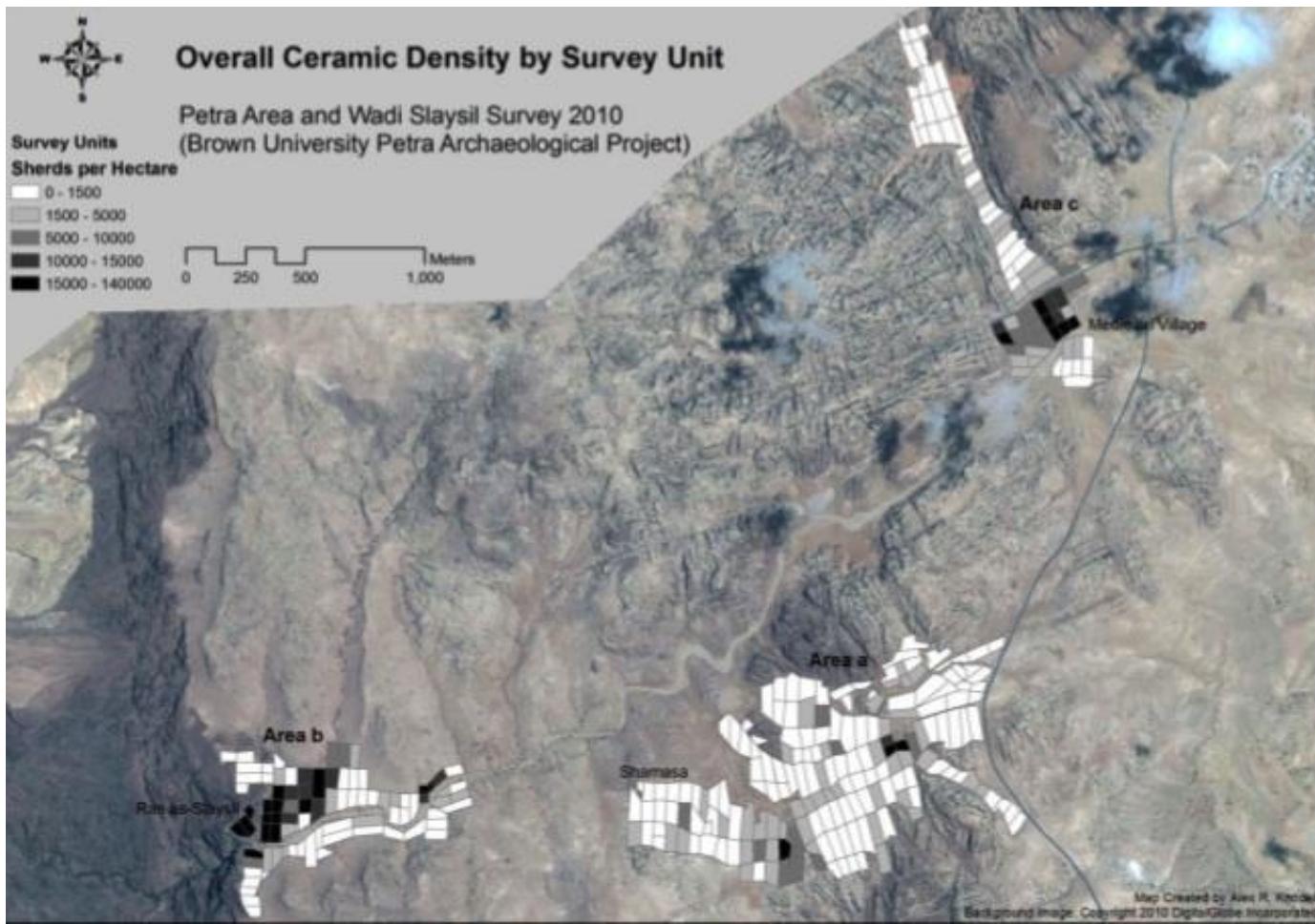


Figure 27: PAWS 2010 ceramic density (Alcock 2012)

The 2011 team surveyed three new sectors, Areas D, E, and F, directly linked to the 2010 survey areas. Additionally, the survey methodology remained the same as the previous year. Ceramic materials represented the same periods as the previous season with the addition of materials dating back to the Early Bonze Age. The best represented periods were again the Nabataean, Roman and Medieval Islamic, although the amount of Hellenistic evidence did increase. Ceramic density was highest in the far west reaches of the survey. The team added another 372 documented features to those identified the previous year, increasing the total to 599 and attesting to the massive modifications Petra's residents brought to the landscape since the Bronze Age (see figure 28; Alcock & Tuttle 2012).

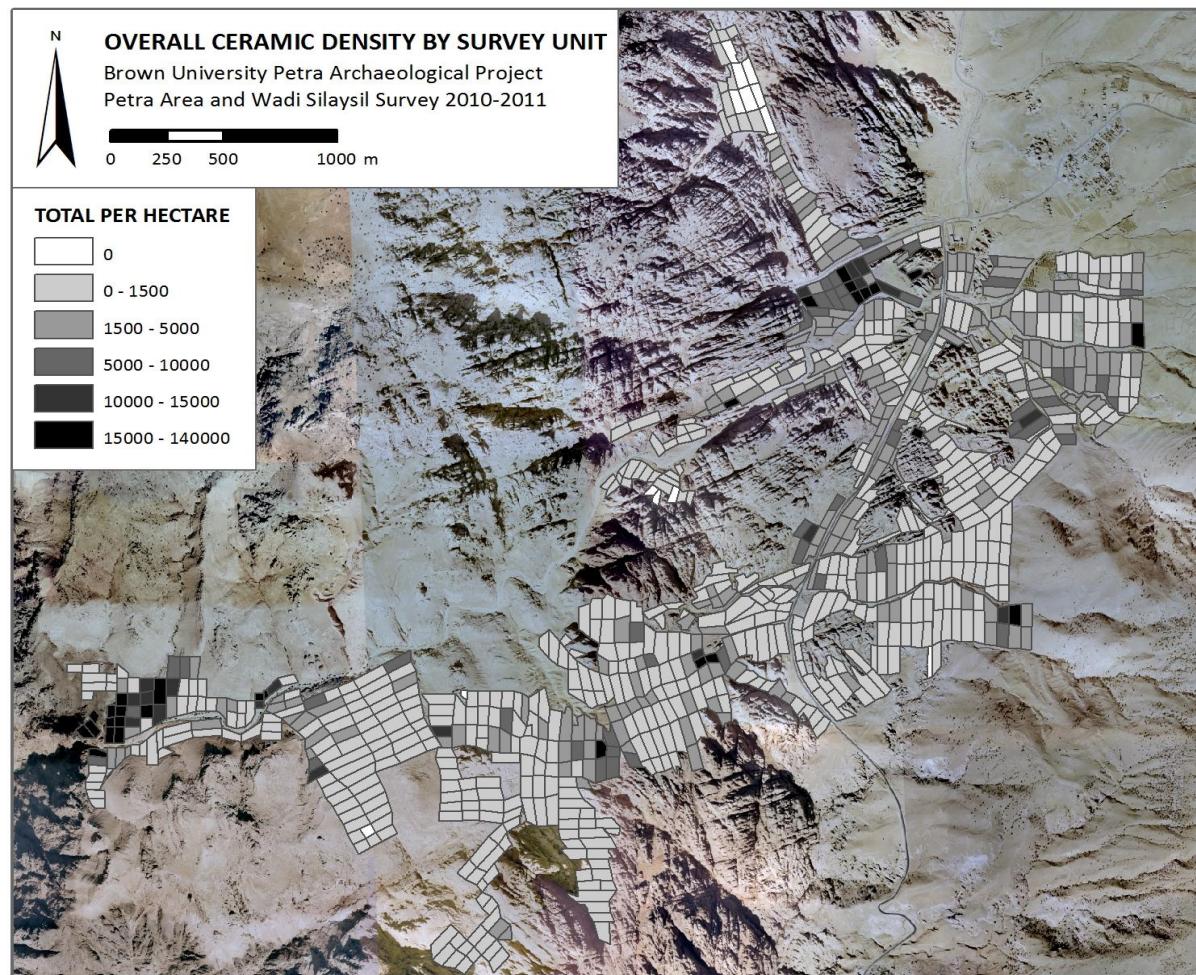


Figure 28: 2011 sherd density (Alcock and Tuttle 2012)

In 2012, two final survey areas were added, Areas G and H. Survey methodology appears to have remained the same, with a smaller, six person team. Ceramics ranged in date from the Early Bronze Age through the modern era. Anthropogenic features were similar to those previously identified, but also included baetyls, and the total identified number of features increased to 1012 after the team revisited previously surveyed areas. Additionally, test squares were excavated in ten locations previously noted by PAWS both to verify surface findings and to better understand the ceramic chronology of the region. Test squares included the shrine near Shamasa which revealed a paved limestone floor; structures in Ras al-Silaysil; a limestone platform near Bayda; a baetyl shrine near Bayda thought dedicated to Dushara (which yielded a dense concentration of sherds, see figure 29);⁷⁴ two stone structures atop hills revealing an “outlook post,” crushed ceramics, a flagstone floor, and a fireplace; a possible silo; a terrace/dam in Wadi Baqa’; and a Bronze Age hilltop settlement which contained a cooking surface overlaying a burnt structure. Optically stimulated luminescence (OSL) samples were collected from numerous test squares for OSL dating (Alcock & Tuttle 2013), but the results were not included in the 2012 summary.

⁷⁴ Date of sherds not mentioned but likely Nabataean.

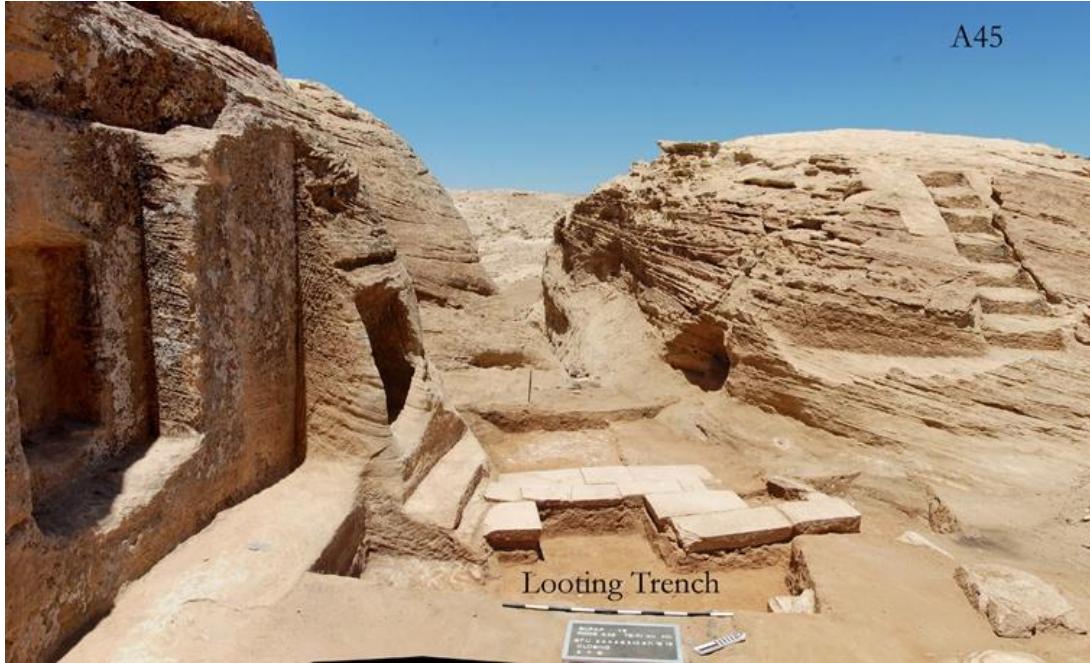


Figure 29: The Dushara Shrine near Shamasa (Alcock and Tuttle 2013)

While a breakdown of the dated ceramics by period has not yet been published, the season by season summaries confirm the pattern established by the other surveys discussed above: the Nabataean period was the most well-represented with indications of ever restricted occupation in the Roman and Byzantine periods. Alcock and Knodell offer a further clarification in their 2011 paper for the *Seminar for Arabian Studies*, which only included data from the 2010 and 2011 seasons. The Hellenistic period offers the first evidence of a population increase. However, this minimal increase is dwarfed by that witnessed during the Early and Middle Roman period (see figure 30) (Alcock & Knodell 2012, 10). Dating from the mid-1st century BC through the mid-3rd century AD, the lumping of two periods together blurs the distinction this study attempts to refine. The rest of the PAWS evidence follows as suspected: an almost complete lack of Later Roman and Early Byzantine ceramics. Just as

with the Jabal Haroun survey, this pattern directly contradicts the wealthy and prosperous image the Petra Papyri paint of 6th century Petra (Alcock & Knodell 2012, 10-11).

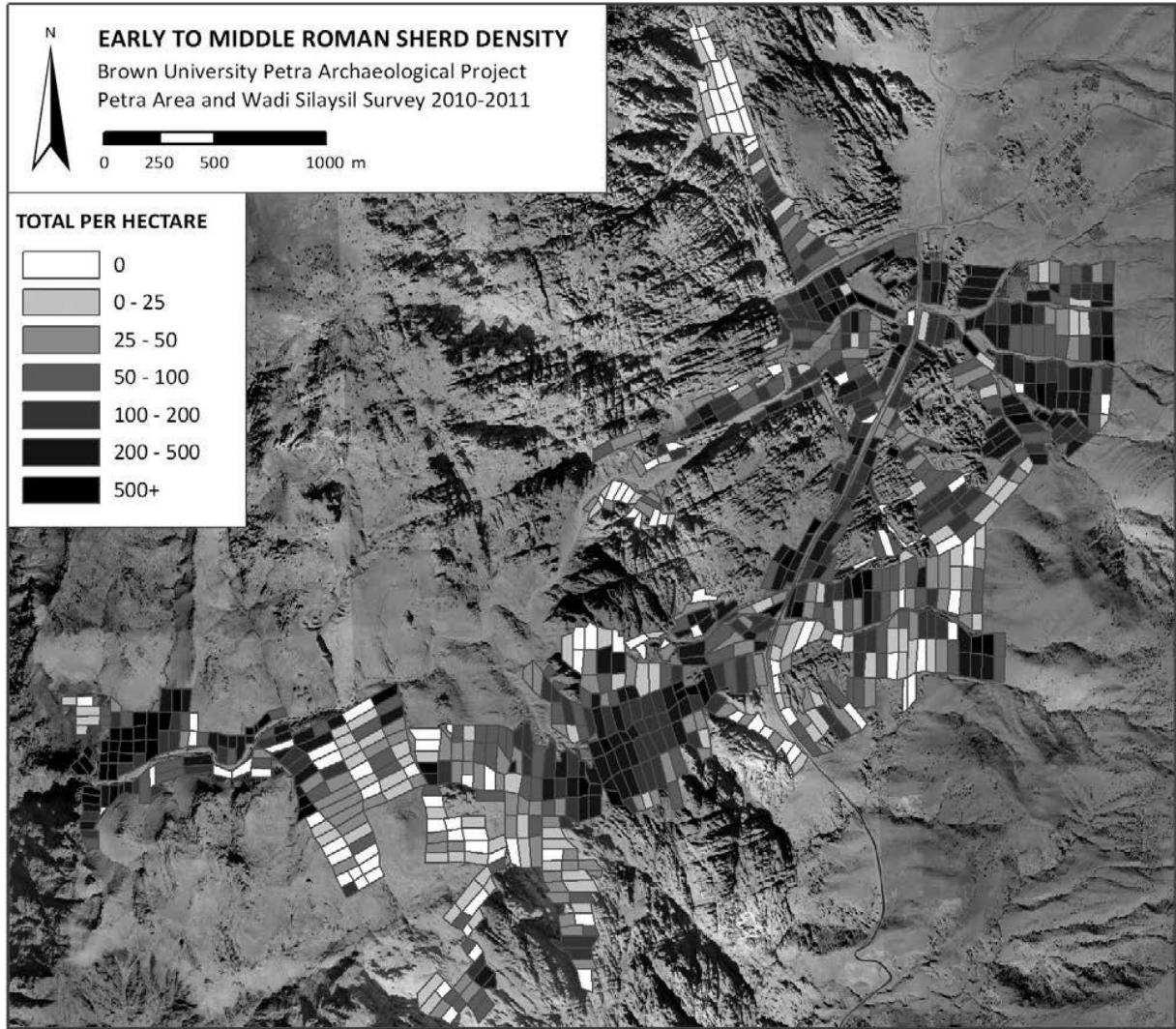


Figure 30: Roman sherds by area and density (Alcock and Knodell 2012, 10)

Conclusion

Based on the above analysis, the following provides a summary of the results offered by each survey. The Umm Rattam survey yielded material from all three periods of occupation, peaking in the Nabataean period in the 1st century AD. Roman pottery was

identified at several sites but was not necessarily associated with sites that yielded Nabataean material, suggesting that inhabitants utilized the Umm Rattam region differently during the later period. This is most readily evidenced by the fort's presence. While the qasr has not been definitely dated to this period, it seems likely that the Roman army constructed it soon after the annexation to secure the southwest entrance into Petra. Occupation in Umm Rattam continued into the Early Byzantine period on sites with both Nabataean and Roman material but did not continue long, likely terminating with the earthquake of 363.

East of the Umm Rattam survey area, the Jabal ash-Shara material suggested the transition between periods was more defined. Nabataean material, making up the majority of the ceramic corpus, illustrates an intensely settled region home to agriculture, trade, and industry, all of which provided the necessary materials to support the substantial capital city. After the Roman annexation, the mountains yielded much less Roman era materials, suggesting that the annexation adversely affected settlement. Most Roman era material was directly connected with the route of the *via nova Traiana*, suggesting that while trade was still vital to the region the agricultural zones had shifted elsewhere. But by the Early Byzantine period, even trade along the *via nova Traiana* was not sufficient to attract inhabitants as evidenced by a further reduction on the number of occupied sites.

Closer to Petra itself, the Wadi Musa Wastewater Survey yielded an almost overwhelming amount of Nabataean material coming from agricultural and domestic features, a villa, and a ceramic industry. Nabataean materials dominated in all six sectors, but at numerous sites it seems to end abruptly at the start of the 2nd century, especially evident at larger structures in the Wadi Musa survey section. Roman material is difficult to identify

definitely given that ‘Amr rightly views the Nabataean pottery tradition as continuing into the 2nd and 3rd centuries, blurring the transition at sites without marked destructive events. However, the end of the Roman period, which possessed a more distinctive ceramic tradition, seemingly witnessed a reduction continuing into the Early Byzantine period.

Using some of ‘Amr’s evidence from the Wadi Musa Wastewater Project in addition to Abudanh’s survey near Udhruh, Kouki argues that the buildup in settlement continued after the Roman annexation through the 2nd century. However, given her difficulty separating 1st and 2nd century material, it seems likely that settlement was restricted in the 2nd century as evidenced by the above interpretation of the Wadi Musa material, and continued to do so during the crisis of the mid-3rd century. As larger settlements replaced numerous smaller ones, settlement generally moved east towards the marginal lands near Udhruh and away from the more well-watered region of Petra.

In some ways, the Bir Madhkur survey reflects patterns established by the Finnish Jabal Haroun survey and the Umm Rattam survey. The survey yielded abundant Nabataean era material from sites of all sizes. However, as at Umm Rattam and Jabal Haroun, the amount of Roman material decreases significantly. The sites with Roman material are larger and better fortified, which parallels the change the Jabal Haroun region witnessed later in the Roman period. An almost complete lack of Early Byzantine material for the Bir Madhkur region west and north of Petra is expected given the shift to the east evidenced by the Jabal Haroun material.

At Wadi Silaysil, the Brown team identified most material as belonging to either the Nabataean or Roman periods. Initially this result might be surprising. However, as the

ceramicist lumped approximately two centuries of ceramic materials together (mid-1st through mid-3rd centuries), it is conceivable that a dip occurred at the start of the Roman period. A decline later in the Roman period, followed by an almost complete absence of Early Byzantine material, indicates that Petra's inhabitants turned less and less to Wadi Silaysil. As settlement concentrated more densely along the eastern frontier, the previously desirable land was abandoned.

The settlement patterns Parker identified in the northern regions of the former Nabataean kingdom—a peak in the Nabataean period followed by a decline in the Roman period (his “Late Roman” period) and resurgence in the Early Byzantine period ending in the 6th century—generally hold. Almost all of the surveys mark a decline in the Roman period. Additionally most also attest to an Early Byzantine decline, but the surge of activity in the Udhruh region indicates that settlement simply shifted. What does not hold is Parker’s partial explanation for the Roman era contraction due to a climate shift. As the region became drier, settlement should have concentrated in regions with the most water sources. Instead, the Jabal ash-Shara mountain range that received the most rainfall was virtually abandoned during this period. This change more likely is related to the change wrought by the annexation itself, drawing settlement into the newly walled city at Petra.

Graf disagreed with Parker’s argument that a decline occurred during the Roman period based on the evidence offered by the *via nova Traiana* which allowed the maximization of economic activities. In that specifically Graf was correct; sites along the road in the Roman period mostly remained occupied and new settlements even appeared along it to ensure the flow of goods in and out of the former capital. This phenomenon is

especially notable in the evidence from Bir Madhkur and Jabal ash-Shara surveys. In the Early Byzantine period, Graf believed settlement continued strongly through the 5th century, only declining at the beginning of the 6th century. He believed that numerous villas and rural markets existed in the hinterland that would have continued to support the area as Petra's provincial economic importance decreased. However, none of the surveys identified more than a minimal amount of Early Byzantine activity in Petra's immediate hinterland. The only significant Early Byzantine activity occurred further east near Udhruh.

Fiema's assessment is more difficult to categorize, as he argued that the new province's inhabitants looked to Petra as their economic leader through the Roman period. In the Early Byzantine period, Petra's economic power had mostly declined but Petra itself remained a typical provincial city. Based on the evidence from sites along the *via nova Traiana*, it seems that Petra's economic power remained high, certainly during the first half of the Roman period before the crisis of the mid-3rd century. The new road was well-maintained and protected, attesting to the city's regional economic importance. However, this economic importance did not lead to continued hinterland settlement. In the Early Byzantine period, there is little evidence outside Petra itself to indicate that the settlement thrived as a small provincial city. But if the city had lost most of its regional importance during this period, it seems likely that Petra's inhabitants would have chosen to reside in the city itself or move to the growing city to the east at Udhruh/Augustopolis.

Petra's history is long and varied, but these hinterland surveys have elucidated changes in settlement patterns from the Nabataean to the Byzantine periods. The area contained rich resources including multiple clay sources ('Amr 1997), fertile agricultural land

with ca. 200 mm of annual rainfall that the landscape immediately west and east could not match (Kouki 2012, 61), and presented a rugged topography which facilitated the protection of these resources. Together, these elements created an environment suitable for not just a stable but a thriving economy and culture, which finally emerged during the 1st century AD. As the Romans shaped the world around them, the Nabataeans constructed monuments carved into sandstone and presented an economic prize attractive enough to entice the Romans to react (Parker 2009a, 79-80). But in 106 the Romans annexed Nabataea⁷⁵ and triggered the slow decline of Petra's reign. Hinterland settlements contracted, certainly by the end of the 2nd century, but likely immediately after the Roman annexation. By the 3rd century and in conjunction with the empire-wide crisis of the mid-3rd century, Petra was rapidly losing power and prestige. Eventually the region stabilized but Petra's glamor was gone. Settlement virtually ceased immediately west of Petra, only to spring up in the east near Udhruh. There the Romans had erected the fortress of *legio VI Ferrata* (Kennedy & Falahat, 2008), attracting inhabitants to its *vicus* and creating a new regional powerhouse that would grow in significance through the Byzantine and into the Early Islamic periods (Killick 1983, 231).

Chapter IV: Udhruh

⁷⁵ Many scholars have offered different interpretations for the annexation. For a synthesis, see Philip Freeman's article "The Annexation of Arabia and Imperial Grand Strategy" (Freeman, 1996). The annexation will be discussed in further detail in the concluding chapter.

This chapter examines previous knowledge of Udhruh from historical and archaeological sources in order to document how knowledge of the site has changed over time, with a special emphasis paid to changes in settlement patterns from the Nabataean through the Early Byzantine period (ca. 63 BC-AD 500). More recent evidence offered by surveys in Petra's hinterland will not be discussed below (see chapter III).

The first mention of Udhruh in historical sources dates to the 2nd century AD. Ptolemy's *Geography* shows Adrou/Aδρου on his 6th map of Asia (see figure 31) (5.16.4). However, Udhruh is missing in the military lists of the *Notitia Dignitatum*, seemingly indicating that the legion had left the fortress by the start of the 5th century. Soon after was the appearance of a new name for the site: Augustopolis. Episcopal lists record the names of bishops from Augustopolis at the Council of Ephesus (431) and in 536 at Jerusalem (Le Quien 1740). A fragment of the 6th century Beersheba Edict lists the site as paying 65 *solidi* in taxes, the most of all sites in the area, and suggesting the importance of the site long after the legion moved away. Later sources suggest that the town continued to prosper into the Early Islamic era.



Figure 31: Copy of Ptolemy's *Geography* from 1578; housed at the Qatar National library

The first significant work at Udhruh was an architectural survey in the late 19th century by Brünnow and Domaszewski, who published the first plan of the fortress curtain wall and a number of photos, but their time there was short—only five days in 1897 and 1898 (Brünnow and Domaszewski 1904, 59-60). Nelson Glueck revisited the fortress and surrounding area in his 1934 survey and noted the presence of Nabataean, Roman, and Byzantine pottery (Glueck 1935, 76-77), suggesting that the site witnessed continual habitation throughout the Classical period. S. Thomas Parker then surveyed the site in 1976 as part of his study of the Arabian frontier. He collected 722 sherds, 167 of which were

closely dateable. The majority of these (n=55) dated to the Nabataean period while only a handful dated to the Roman period (n=7). The Early Byzantine period had the second greatest amount of sherds (n=41) (Parker 1986, 95). It was not until the 1980s that the site received significant attention, when Alistair Killick and his British team excavated parts of the fortress and surveyed the surrounding countryside (Killick 1982, 415).

Killick's Preliminary Reports

Killick's British team excavated Udhruh in the early 1980s for five field seasons and collected vast amounts of pottery and other materials vital for any analysis of the site (Killick 1987, 173). While most of the evidence remains unpublished, preliminary reports and a tourist booklet (Killick 1982, 1983a-b, 1986, 1987a-b) provide the project's basic structure, goals, and some results.

The project started in 1980 with a survey of Udhruh and its immediate hinterland with the goal to document more accurately the architectural features of the landscape (Killick 1982, 415). The team spent a month surveying, but he neither fully published his results nor explained his survey methodology in any preliminary reports. The only published results from the survey was a claim of evidence of Lower Paleolithic, Neolithic, Iron Age, Hellenistic, Nabataean, Late Roman, Byzantine, Early and Late Islamic, and Ottoman presence (Killick 1982, 415; Killick 1983a, 231). This is not surprising given the proximity to a major spring at the site, and the trade routes that likely traversed the region, which Killick suggested eventually became part of the *via nova Traiana* (Killick 1982, 415). Finally, Killick documented several major buildings outside the fortress, including a

Nabataean hilltop tower (Glueck's "Tell Udhruh" (Killick 1983b, 127)), several other watchtowers, and a limestone quarry (Killick 1982, 415).

Killick also claimed that the region possessed the largest limestone quarries in Jordan, located between Jerba⁷⁶ and Udhruh. He assumed that evidence of stone-cutting mentioned in the papyrus from Karanis, which might describe the construction of the *via nova Traiana* in AD 107 (Bowersock 1994, 81) can still be seen in the Udhruh region (Killick 1987b, 175). Although the exact path of the *via nova Traiana* is still a contentious issue,⁷⁷ well-built roads do cross the landscape and likely date to the Nabataean and/or Roman period.

Additionally, Killick identified several other structures of various purposes in the region. One (Tell Abara) is a site 2km from the fortress at the foot of a large hill. He calls this rectangular enclosure a marching/practice camp based on the similar gateways (*claviculae*), citing parallels to marching camps in Britain during the Flavian period. The construction was connected by a wall/road to Udhruh (Killick 1987b, 176). Killick also identified several large, unwalled settlements. In particular he names one at Jerba with extensive irrigation, which suggests "signs of ancient cultivation on the edge of the desert" (Killick 1987b, 176). If the settlements were both numerous and unwalled, it is likely that they date back to the Nabataean period as they fit the descriptions of Nabataean architecture established in the earlier examination of previous surveys.

Killick's real focus, however, was not on the changing landscape of Udhruh's hinterland but on its Roman fortress. With the northeast corner projecting over the Udhruh

⁷⁶ 2km north of Udhruh

⁷⁷ See "Via Nova Traiana between Petra and al-Qana in Arabia Petraea" (Abudanh Forthcoming)

spring, the trapezoidal building clearly announces that the Roman military was present after the annexation of Nabataea.⁷⁸ Following Brünnow and Domaszewski's plan and numbering of the towers, Killick discovered that “[i]nterval towers IX, X, and XXIII have been extensively altered and towers XI, XII, XIV, XV and XVI have been completely removed” (see figure 32; Killick 1983a, 234).

⁷⁸ The inscription, described below, clarifies that Roman military presence at Udhruh can be dated to ca. AD 300, almost two centuries after the annexation.

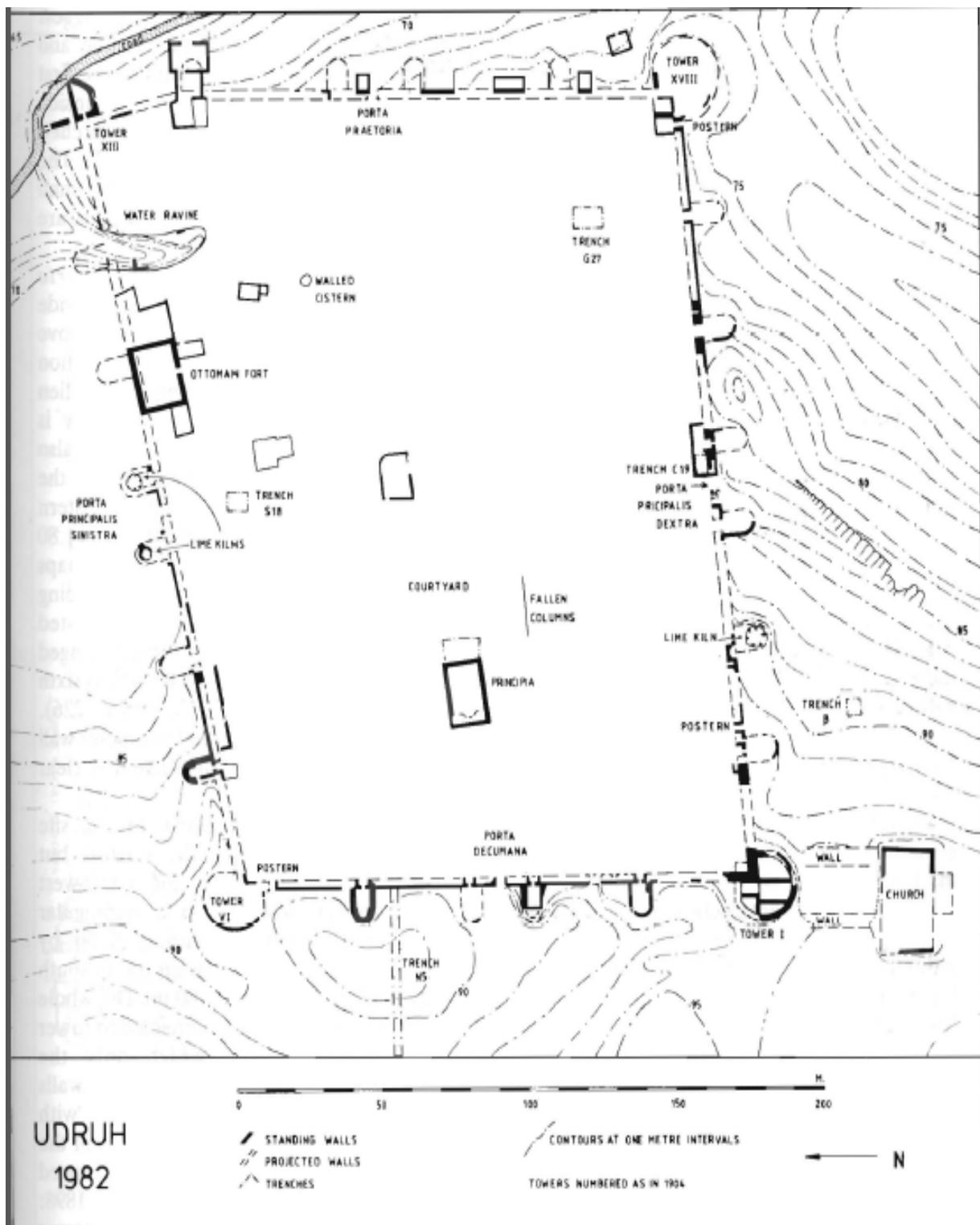


Figure 32: Killick's map of Udhruh in 1982 (Killick 1983a, 233)

The relationship between the interval towers and the curtain wall convinced Killick that the towers and the perimeter wall were contemporary.⁷⁹ The towers ranged from eight to nine meters high and 10.5 to 11.5 meters long. Tower III, although apparently deconstructed and rebuilt “recently,” was the best preserved and helped to clarify the sizes of the other remaining towers (Killick 1983a, 234). Threshold stones found in tower III and at other places across the site indicated that doors were approximately one meter wide and opened inwards. Stairs led up to another floor, and an arch covered the ground floor entrances (see figure 33; Killick 1983a, 234). Inside the fortress, Killick found several architectural features with one story still standing. Several had Christian motifs in the walls and a broken Greek inscription was found reading “θλθε” (Killick 1983a, 236), indicating that the fortress was re-appropriated by the nearby Christian community, perhaps associated with the so-called Byzantine Church, to the southeast. An Ottoman fort was built over the western fortress curtain wall and tower XI (Killick 1983a, 234), perhaps because of proximity to the spring.

⁷⁹ He admits the towers all abutted the curtain but claimed nonetheless that these were still contemporary as an earthquake resistant method of construction (Killick 1983a, 234).

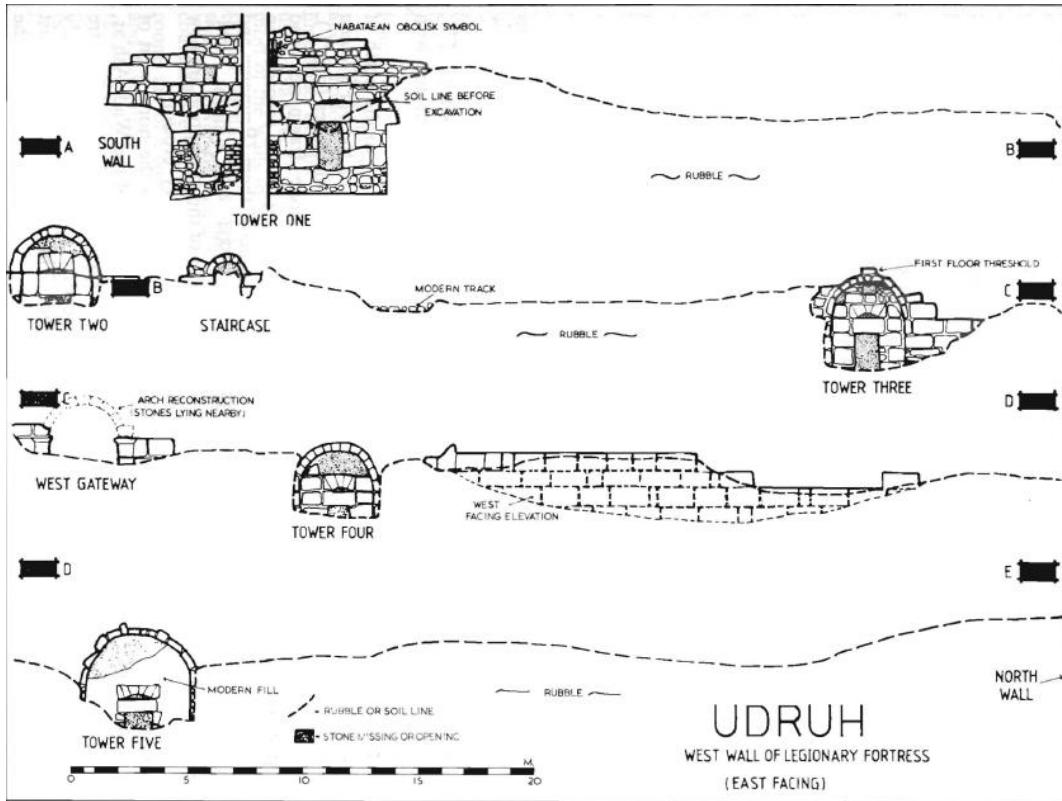


Figure 33: Udhruh's West Wall (Killick 1983, 235)

In 1981, Killick's team began excavation. They divided the fortress into 10 x 10 meter grids and focused first on the southeast corner tower. The results indicated that the tower originally contained four rooms on the ground floor with two doorways leading from the tower into the fortress (see figure 34). Construction materials mainly consisted of limestone ashlar but did include the occasional "re-used Nabataean dressed block" (Killick 1983a, 237).⁸⁰ Later occupants rebuilt parts of the tower with small-corbelled stones, likely during the Umayyad period. Killick's team also excavated four other areas, which he chose not to name, and he claimed the stratigraphy from the corner tower provided a pottery sequence from the Nabataean to the Ottoman periods (Killick 1982, 415). The *principia* was

⁸⁰ No description of the re-used blocks was provided.

another major excavation area, although only a small part of it was visible because of its later use as a church (Killick 1983a, 237). The floor was sealed by several different surfaces, but the ceramic material mostly dated to the Early Islamic period (Killick 1983a, 239), which agrees with the author's interpretation of material from Abudanh's 2008/2009 excavations (below).

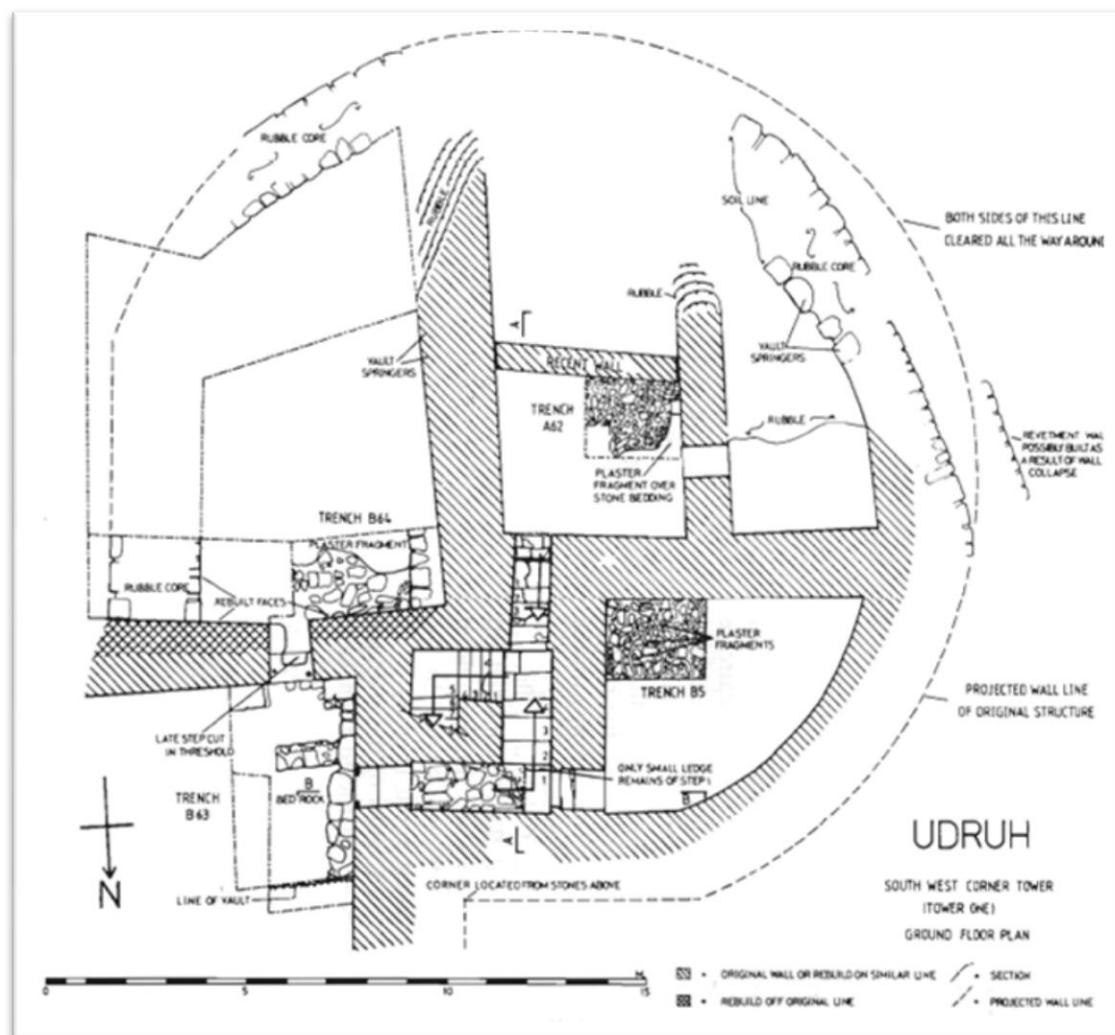


Figure 34: Udhruh's South West Corner Tower (Killick 1983, 238)

During the 1982 season, the team excavated tower XIII, which was threatened by the expansion of a modern road. They recovered material from the Early Roman (Nabataean) through the Mamluk period, but there was a major Early Byzantine/Early Islamic phase as with tower I (Killick 1983a, 239). The area required further excavation as the internal military style of the original buildings remained unclear due to the construction of Islamic buildings, whose inhabitants had cleared out the earlier occupation. Despite this, Killick did recover a significant amount of Nabataean Painted Fine Ware, lamps, and glass (presumably also Nabataean in date; Killick 1983a, 239). He later excavated tower XXII and offered a 6th century date for its rebuilding, although he failed to provide evidence of that date (Killick 1983b, 173).

Killick first reported a “Nabataean ceramic kiln” in his 1987 preliminary report. He says very little about it, except that it proved the site’s importance even before the fortress was built. His team excavated the kiln in the 1983 and 1985 seasons (Killick 1987b, 173) but, as he has never published excavation reports from those seasons, any evidence of the kiln is missing. In a picture (see figure 35), Killick simply states that the “town walls of Udruh are behind,” but fails to describe the location more specifically (Killick 1987b, 174). The trenches are shown more clearly in his 1987 tourist pamphlet (see figure 36; Killick 1987a, 4), but a site visit in 2014 revealed nothing more than a large hole.

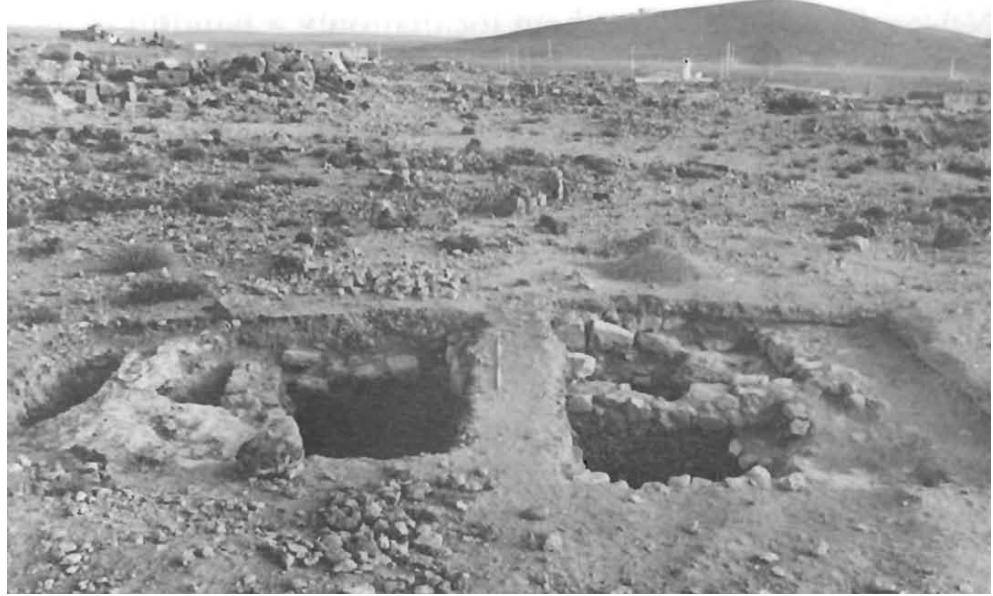


Figure 35: Picture of Killick's Nabataean Kiln at Udhruh (Killick 1987b, 174)

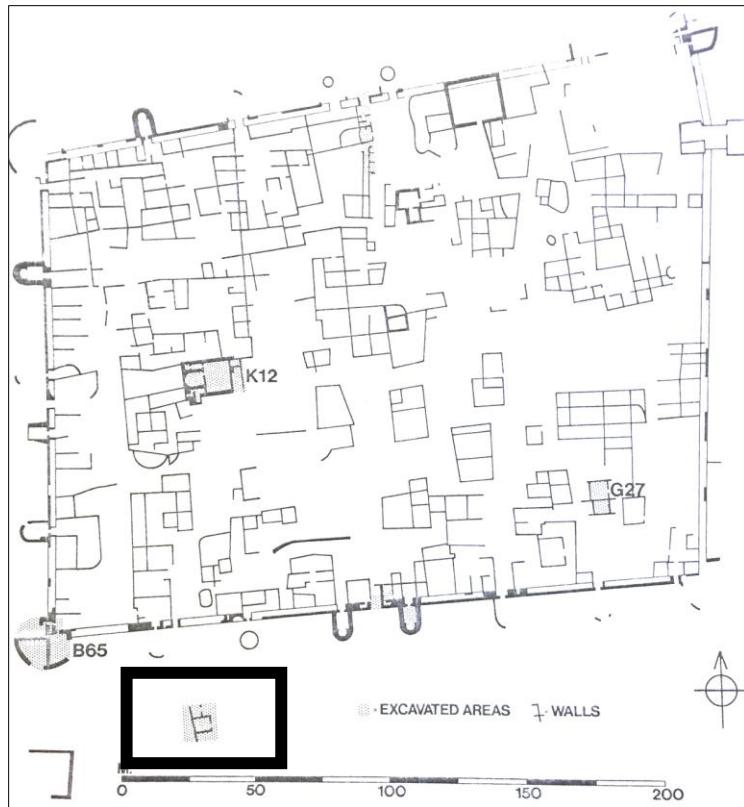


Figure 36: Killick's excavated areas with possible kiln location in black square (Killick 1987a, 4)

At this time, Killick also made clear his belief in a Trajanic date for construction of the fortress (Killick 1982, 415), and even with further analysis he strongly stated that “there is no archaeological evidence yet (May, 1986) to suggest a foundation date for the original walls after the Trajanic era” (Killick 1987b, 173). Killick disagreed with Parker’s argument that Udhruh was, instead, a “virtual twin of al-Lajjun” (Parker 1995, 258), where Parker had excavated from 1980-1989 (Parker 2006, 111). Udhruh and al-Lajjun are similar in size and number of gates, and both fortresses have U-shaped and semi-circular external towers, which suggested to Parker a 4th century date (Parker 1995, 258). Kennedy and Falahat have since confirmed Parker’s dating in their 2008 article on a building inscription, discussed below (Kennedy and Falahat 2008). It is possible that the site witnessed a major period of use during the Nabataean period (as suggested by Parker’s 1976 survey), providing the material that suggested to Killick a 2nd century date for the fortress. Killick himself notes that “Nabataean artefacts and masonry however indicate a substantial settlement which pre-dates the foundation of the perimeter wall” (Killick 1983a, 239). The periods of intense renovation noted in the towers suggests that the site itself had a long history but that the fortress was erected during the Tetrarchy, even if he did not recognize the trend himself.

The Limes Arabicus

In his 1986 book, *Romans and Saracens*, S. Thomas Parker notes that the fortress at Udhruh may “have been refortified [in the Early Byzantine period], since its massive projecting towers are identical to those of Lejjun” (Parker 1986, 137–142). But Parker’s analysis focused less on the Udhruh fortress itself and more on the state of the frontier during the Tetrarchic era, which was the best-documented period on the Arabian frontier. Parker

argues that after recovering from the shocks of the third century crisis, starting under the reign of Aurelian (270-275) but reaching fulfillment under Diocletian (284-305), the frontier was reorganized to provide a better defensive system against the Saracens (Parker 1986, 135).

After Diocletian's Caesar Galerius defeated the Persians at Mesopotamia in 298, the Romans controlled all the area west of the Tigris, and Diocletian began a defense-in-depth strategy south of the Euphrates in order to protect central and southern Syria from nomadic raiders. His defensive zone (*limes*) closely followed the 100mm rainfall line north to south, and was approximately 70 km deep east to west. Nomadic Arabs, now called *Saraceni*, continued to be a threat both in Syria and further south in Arabia, and this external pressure likely triggered Diocletian to continue his defensive zone further south to Arabia. During this time, he also reorganized the provinces, and the area around Udhruh was transferred from the province of Arabia to *Palaestina Salutaris/Palaestina Tertia*, with the capital at Petra (Parker 1986, 135-136).

The *Notitia Dignitatum* describes the deployment of the Roman army on the eastern frontier ca. AD 400, and likely reflects the policy of Diocletian himself (Jones 1986, 57). The eastern frontier was divided into military zones, each headed by a *dux*. Each *dux* commanded various auxiliary units as well as two legions, with the notable exception of the duchy of *Palaestina Tertia*, which only had one legion according to the *Notitia (Oriens 34, see below, Parker 1986, 136)*. The strength of the frontier's legions was a much-debated topic, but based on the size of Lejjun—an apparent twin of Udhruh—Udhruh likely held 1000-1500 men (Parker 1986, 136-137).

Abudanh's Dissertation Survey

Since Killick had not published the data from his 1980 survey, Fawzi Abudanh surveyed the Udhruh region for his 2006 Newcastle University dissertation, which specifically examined the Roman and Byzantine periods. His team—consisting mainly of himself, a driver, and occasionally a few volunteers—visited the field in October-December 2003 and again in May 2004 (Abudanh 2006, 39). The surveyed area was large, encompassing 700 square kilometers, and it was difficult to consider the entire region as one geographic unit. Therefore, Abudanh divided the region horizontally and vertically based on the modern road network, creating eight distinct areas (Abudanh 2006, 39-42). No area contained hills or other geographical obstacles too great to prevent the use of a vehicle and the team applied a consistent survey methodology in all areas. Sites were recorded during the surveying process and an occasional site was walked completely, depending on size. Often indigenous people assisted in locating sites, especially those who lived as nomads. These individuals often provided site names. Finally, Abudanh took GPS points of the roads, channels and walls, and collected pottery sherds. This data was incorporated into a GIS database (Abudanh 2006, 43-44).

There are several qualifications that must be noted before examining the results of Abudanh's survey. First, Abudanh acknowledged that in a normal field survey, pedestrians might investigate all transects, probably at a 10 meter interval. However, due to time constraints, funding, the topography of the area, and the size of his team, he was unable to conduct a pedestrian survey.

Additionally, Abudanh struggled with the ceramic material as Sauer's typology—supported by Parker in 1986⁸¹ and 1987 (Parker 1986; Parker 1987)—failed to reflect the cultural impact of the Nabataeans on the ceramic tradition and applied better in northern Jordan. Abudanh found the incorporation of the period when Nabataean culture was at its height (ca. 63 BC – AD 106) into the Roman period to be especially problematic, as he considered the Roman period as beginning after the annexation. In regards to research from southern Jordan, Abudanh argued that all prior focus centered on Petra and failed to trace the changes beginning in the 2nd century AD and onwards, so he offered his own analysis (Abudanh 2006, 48). In particular, Abudanh examined the notion that there was continuity of Nabataean ceramic ware from the 1st century BC until the 5th or 6th century, especially in response to Parr and 'Amr (Abudanh 2006, 49; Parr 1978; 'Amr 2004). He was convinced that "Roman control of the region did not significantly affect the local production of material culture including pottery," and asked 'Amr to examine his ceramic material (Abudanh 2006, 49).

Abudanh's 2003/04 survey sought to examine the notion that a different society existed on the marginal areas between the agricultural region to the west around Petra and the more arid region further east during the Roman and Byzantine periods; in addition, the survey studied the impact that the Roman legionary fortress at Udhruh had on the surrounding region. He found that the region reflected a long history of human activity from prehistory to the 19th century, with a period of intensity in the first two centuries AD. He

⁸¹ In his introductory chapter to *Romans and Saracens*, Parker examined the epigraphic, numismatic, and stratigraphic evidence available to test Sauer's chronology in order to date his survey material. He found that the typology held, although he suggests "that the dating of sites by surface pottery is [not] without limitations" (Parker 1986, 12).

argued that the Roman annexation of Nabataea in AD 106 did not significantly affect the intensity of settlement initially, but that settlement gradually decreased through the Roman period (ca. AD 106-324). Settlement resurged at the start of the Byzantine period (5th-7th centuries AD) although not in the same way as it had in the Nabataean period. New sites were settled but the total number was much smaller than the total number of Nabataean period sites. However, Abudanh found evidence that Byzantine human activity focused in specific, pre-desert zones at Udhruh, Khirbet al-Jerba, and Jebel al-Tahuna (Abudanh 2006, 244).

The Qanat System

Abudanh's dissertation eventually led to a closer examination of the region's *qanat* systems. Much of the ancient Mediterranean world revolved around water management in their agricultural societies. Only when water was properly controlled and channeled could it be used to create new, settled communities and larger populations. Sometime in the first millennium BC, complex societies developed a method to extract water from under the ground for daily use and populations slowly expanded into more and more arid regions (Abudanh and Twaissi 2010, 67). Udhruh and southern Jordan seem the perfect example of this trend and the region adopted the use of *qanat* systems, which carried underground water (highland aquifers, alluvial fans, stream valleys, etc.) to a lower level due to gravity. *Qanat* systems are usually found in regions with annual rainfall between 100 and 300 mm (Abudanh and Twaissi 2010, 67-68).

Abudanh and Twaissi identified three *qanat* systems near Udhruh: one south of Udhruh, one near Jebel al-Tahuna, and one near Al-Hussein Bin Talal University in Wadi

Musa. The first qanat system sits 1 km south of the fortress and consists of three vertical shafts dug into flat terrain. The shafts were not excavated at the time of the article's publication, but were easily recognizable to the team by the "earth circles" on the surface around them (Abudanh and Twaissi 2010, 69). Killick theorized that the system ended at the Nabataean reservoir, Birket Udhruh, in the east (Killick 1987, 28), and the authors support his hypothesis (Abudanh and Twaissi 2010, 69). David Kennedy alerted the team to the next *qanat* system at Jebel al-Tahuna, identified by aerial photographs. The system likely attracted settlement to Jebel al-Tahuna (Abudanh and Twaissi 2010, 70-71). The authors discovered the final system west of the Ma'an-Udhruh road running eastward, and the surrounding area was likely used for agricultural purposes (Abudanh and Twaissi 2010, 71).

The *qanat* systems have proven difficult to study and to date. Shafts are not equally spaced, ranging between 3 and 10 meters apart, but they were all associated with a ditch feature either at the end of the line of shafts or between the individual shafts. Additionally, all shafts followed a single path to the water source, usually some place with fields, stone enclosures, and a reservoir (Abudanh and Twaissi 2010, 74-75). But despite the apparent usefulness of the *qanat* system, none has ever been associated with the large urban centers of the Nabataean and Roman periods. Lightfoot's analysis of Arabian *qanat* systems led him to suggest that the Achaemenid Persians introduced the technique across Mesopotamia, Syria, and the Levant, and the technique's use was expanded by the Romans (Lightfoot 2000, 224). Abudanh and Twaissi disagree, arguing that the systems date to the Late Byzantine or even the Early Islamic period, and were introduced to the area from the Hijaz based on the other systems there and throughout the Arabian Peninsula (Abudanh and Twaissi 2010, 77-78).

The technology arrived during a period of population expansion and the increasing scarcity of water sources. Finally, the Late Byzantine/Early Islamic date coincides with the appearance of similar technology in the Negev and there is ceramic evidence of the same date from Udhruh itself (Abudanh and Twaissi 2010, 81-82).

Although knowledge of *qanat* systems appears necessary to facilitate settlement along the edge of the desert, Abudanh and Twaissi argue that the technology cannot date to the Nabataean period. Parts of northern Arabia, including Madain Saleh (Hegra) certainly belonged to the Nabataean kingdom during the 1st century AD (Bowersock 1994, 95-99) and the Nabataeans likely knew the area well before that due to their spice trade through the region. If the *qanat* system existed somewhere in north or west Arabia, the Nabataeans likely were familiar with it. But an examination of previously published Nabataean water systems fails to include *qanats*, making it difficult to argue that the technology developed during that period (Oleson 2001, 603-614; Abudanh and Twaissi 2010, 79-80). It is also unlikely that the Romans brought the technology to their fortress at Udhruh ca. 300 as a perennial spring offered water at the fortress's northeast corner. When the spring began to either move or dry up, the town's population likely became desperate to replace their dwindling water supply (Abudanh and Twaissi 2010, 82).⁸²

The Udhruh Inscription

⁸² No matter how convincing the evidence is to suggest that Udhruh's *qanats* date to the Late Byzantine/Early Islamic period, Abudanh and Twaissi fail to offer an explanation for the boom in settlement along the eastern frontier during the Nabataean period. Certainly perennial springs could provide some of the necessary water, but it is unlikely that they supplied all of it. More research is needed to better understand how the Nabataean population survived at the margins.

Kennedy and Falahat published a large Latin inscription (see figure 37), discovered under rubble close to the eastern gate in 2005 by the Jordanian Department of Antiquities. The inscribed stone is of the same limestone as the fortress, likely from the nearby quarry. Generally in good condition, it measures 165 cm long, 97 cm high, and 42 cm deep. There were even traces of red paint. The main damage occurred during antiquity in what Kennedy and Falahat have identified as “deliberate mutilation,” in the upper right and covering part of the third line of text (Kennedy and Falahat 2008, 157). The inscription names Diocletian and his co-Augustus Maximian (which was chiseled off sometime in antiquity), as well as their Caesars, the legion, its prefect, and the governor of the province, dating the inscription (and most likely the fortress) to ca. 300.⁸³

⁸³ “Restitutoribus [o]rbis terrarium, fundatoribus ubique / pacem, domatoribus universarum gentium barbarorum , / Imp(eratoribus) Caes(aribus) C(aio) Aur(elio) Val(erio) Diocletiano [[et M(arco) Aur(elio) Val(erio) Maximiano]] P(iis) F(elicibus) Invict(is) Aug(ustis) et / Fl(avio) Val(erio) Constantio et Gal(erio) Val(erio) Maximiano fortiss(imis) ac nobiliss(imis) Caes(aribus). / Kastr(a) (*sic*) Leg(ionis) VI Ferr(atae) f(idelis) c(onstantis) ex fundamentis / restituta insistentibus Aur(elio) Heraclida v(iro) p(erfectissimo) duci (*sic*) et / Ael(io) Flaviano v(iro) clarissimo praeside provinciae curante / Aur(elio) Muciano Praef[ecto] eiusdem legeonis (*sic*).
To the restorers of the world, the founders of peace everywhere, the vanquishers of all barbarians peoples, the emperors Caesar Gaius Aurelius Valerius Diocletianus [[and Marcus Aurelius Valerius Maximianus]], pious fortunate unconquerable Augusti, and Flavius Valerius Constantius and Galerius Valerius Maximianus, the most courageous and most noble Caesars. The camp of the legion Vi Ferrata Fidelis Constans rebuilt from its foundations through the efforts of the most accomplished *dux* Aurelius Heraclides and the most illustrious governor of the province, Aelius Flavianus, under the charge of Aurelius Mucianus, prefect of the same legion” (Kennedy and Falahat 2008, 159).



Figure 37: Building Inscription from Udhruh (Kennedy and Falahat 2008, 159)

The *Legio VI Ferrata* had been based in the Roman East since the start of the Empire. Originally the legion was deployed in Syria, perhaps at Raphanaea and later at Samosata, but it participated in the annexation of the Nabataean kingdom in 106. Sometime ca. 120 the legion was moved again to *Syria Palaestina* at Caparcotna in Galilee, where it remained until at least ca. 244-249, based on coins of Philip the Arab with the insignia of the legion. The new inscription now confirms that the legion moved from Caparcotna to Udhruh under Diocletian as part of his massive reorganization of the eastern frontier defenses. The legion reappears again in 324 in a papyrus from Oxyrhynchus and in a re-dated early 4th century military inscription from Alexandria. This suggests that the legion was either split into two parts (one in Egypt and one in Palaestina) or that the legion left Udhruh soon after its arrival to depart for Egypt (Kennedy and Falahat 2008, 160).

During the Tetrarchic period the eastern provinces were subdivided. Each of the new smaller subdivided provinces received a pair of smaller legions, as evidenced by the *Notitia Dignitatum*. The document lists Arabia's legions at Bostra and at Betthorus (almost certainly el-Lejjun, the modern Arabic site name being a corruption of the Latin “*legio*”); Syria's legions at Souriya/Sura and Tayibeh/Scythicae; Phoenicia's legions at Palmyra and Danaba;

and Palaestina's single legion at Aila (*Notitia Dignitatum, Orientis* 33. 28, 23; 32. 30-31; 34. 30). As the southern half of Arabia (including Petra and Udhruh) had been transferred to Palaestina, some scholars—including Speidel, Kennedy, and Sipila—had thought that the second legion missing from the *Notitia Dignitatum* was originally posted at Udhruh during the fourth century but had been transferred or disbanded by the time of the composition of the *Notitia* at the end of the fourth century (Kennedy and Falahat 2008, 161).

Kennedy and Falahat argue that the use of *restitute* indicates that the fortress at Udhruh was not constructed from the ground up, but rather reflects a restoration of an earlier structure (Kennedy and Falahat 2008, 161).⁸⁴ Killick had believed that the fortress was Trajanic based on coins and ceramic material, indicating that it was “perhaps constructed at a similar time to the *Via Traiana Nova* (sic) beside which it lies” (Killick 1983, 125). If the ceramic material from the foundation trenches does indeed date to the beginning of the 2nd century AD,⁸⁵ Kennedy and Falahat are likely correct in their assumption that some complex stood at Udhruh before the construction of the fortress, perhaps even a fort of some kind from the early 2nd century (Kennedy and Falahat 2008, 162–163). But Udhruh’s classification as a repurposed structure stands in direct opposition to the trend established by

⁸⁴ This is seemingly refuted by the inscription’s use of *ex fundamentis*.

⁸⁵ It is difficult to determine if Killick did find second century ceramic material. Schmid’s Nabataean Painted Fine ware chronology did not exist in the 1980’s and the ceramics were not as well understood before the excavation of Zantur. Additionally, a handful of forms identified as belonging to the period after the Roman Annexation—such as the cooking bowl—seem to appear at the end of the first century, based on excavations on Petra’s North Ridge.

It is more difficult to explain Killick’s claim that there was little Roman or Early Byzantine pottery based on the material I have seen at the fortress itself. Although there is certainly less Roman and Early Byzantine material than the Nabataean material, it is definitely present in more significant numbers than indicated by Killick (Killick 1983, 125).

other forts in the area, including the forts at Bostra, Humayma, and Umm el-Quttein. However, these were all constructed much earlier, in the 2nd century, and cannot be used for comparison. As both Parker and Kennedy noted earlier, the best parallel for Udhruh is Lejjun, although that too was built on a “virgin site” (Kennedy and Falahat 2008, 161–162).

Later Excavations at Udhruh

Fawzi Abudanh started a new excavation at Udhruh, triggered by the discovery of the Latin inscription in 2005. He launched a joint excavation between al-Hussein Bin Talal University and the Department of Antiquities in 2008, mainly to train students in archaeological fieldwork. They laid out five 4x4 meter trenches on the inside of the east curtain wall, between two interval towers (Abudanh, Shiqarat, & Falahat 2010, 39).

The team identified significant architectural, numismatic, ceramic, and metal finds in the 2008 season. Excavation revealed new walls associated with the fortress, and these included arches, niches, window-like features, and pillars complete with stone capitals. The stones offer a range of sizes, suggesting that they were removed from elsewhere, likely the fortress itself. The function of some of these newer walls, apparently constructed atop older Roman remains, is unclear as they run down the center of the room, leaving little space on either side of the newer arch (Abudanh, Shiqarat, & Falahat 2010a, 39-40). Three coins were found in the 2008 season, all of which can be clearly dated according to the authors. However, their dates are only explained as “Roman,” presumably from the 2nd through 4th centuries, and are not useful to date the architectural features as they were found out of context (Abudanh, Shiqarat, & Falahat 2010a, 41). A range of ceramic material was identified, dating from the “Classical to Late Islamic” periods (Abudanh, Shiqarat, &

Falahat 2010a, 42). Descriptions of the ceramic material seem to indicate it was primarily Islamic in date, and an examination of the material viewed during the 2014 field season for the Udhruh Archaeological Survey Project, with permission of Abudanh, seems to confirm this notion, as very little Classical period material was present. A small amount of glass and metal finds was also identified, but none proved useful in dating the architectural features (Abudanh, Shqiarat, and Falahat 2010a, 42).

In the 2009 field season, five 4x4 trenches were again laid out along the eastern curtain wall (Abudanh, Shqiarat, and Falahat 2010b, 45), ca. 3 meters wide. The exterior of the curtain wall is made of large, limestone blocks, obviously brought to Udhruh from a quarry, but the interior of the wall consists of smaller, irregular sized blocks that seem to have come from pre-Roman sites in the vicinity. Evidence of repairs suggests the site was continuously used for long periods of time (Abudanh, Shqiarat, and Falahat 2010b, 46). Pottery was found dating to the Roman, Byzantine, and Islamic periods, with the Late Islamic period dominating in most of the trenches. One coin was found, but could not be identified (Abudanh, Shqiarat, and Falahat 2010b, 48).

Conclusion

Because scholars have offered a variety of different dates and land use strategies in regards to Udhruh, the above, systematic review of previous scholarship was necessary to understand Udhruh's complicated relationship with Petra from the Nabataean through the Early Byzantine periods. Publications that supposedly review all knowledge of Udhruh often fail to include a review of the more minor sources, which do suggest the size and importance

of the site. Killick's own publications do not provide any more than the barest summary of his excavation and survey.

In a hope to better understand the ceramic evidence used for dating the fortress, the author visited the British Institute in Amman in February 2014 to examine a ceramic corpus from Udhruh. It could not be definitely established if the material came from Killick's project, but it seems likely. However, the material consisted of mostly un-diagnostic body sherds. When the material could be associated with a specific period, it was often mixed with a number of other periods. Unfortunately, a review of Abudanh's 2008/2009 excavation material proved no more enlightening other than suggesting significant reoccupation during the Islamic periods. Because excavations from the fortress itself proved so problematic, survey data is vital for understanding the complex, diachronic, regional trends suggested by both ancient sources and archaeological investigations.

Chapter V: Udhruh's Ceramics

In 2011, Fawzi Abudanh of Al-Hussein Bin Talal University and Mark Driessen of Leiden University formed a joint Dutch-Jordanian survey to reconstruct the evolution of the Udhruh region in antiquity, especially in relation to the major urban center at Petra. Emphasis was placed on agriculture, water management, caravan routes, and communication and security networks. The survey surrounding Udhruh covers 48 square km (figure 38). The landscape was subdivided into units, called tracts, distinguished by topographic and geomorphic features. Teams surveyed tracts through both intensive and extensive surveys. They collected ceramic and other material culture. Collection complemented non-destructive exploration methods—such as ground penetrating radar and magnetometry. Optically stimulated luminescence samples of mortar, plaster and soil date crucial structures, but the results are not yet available.

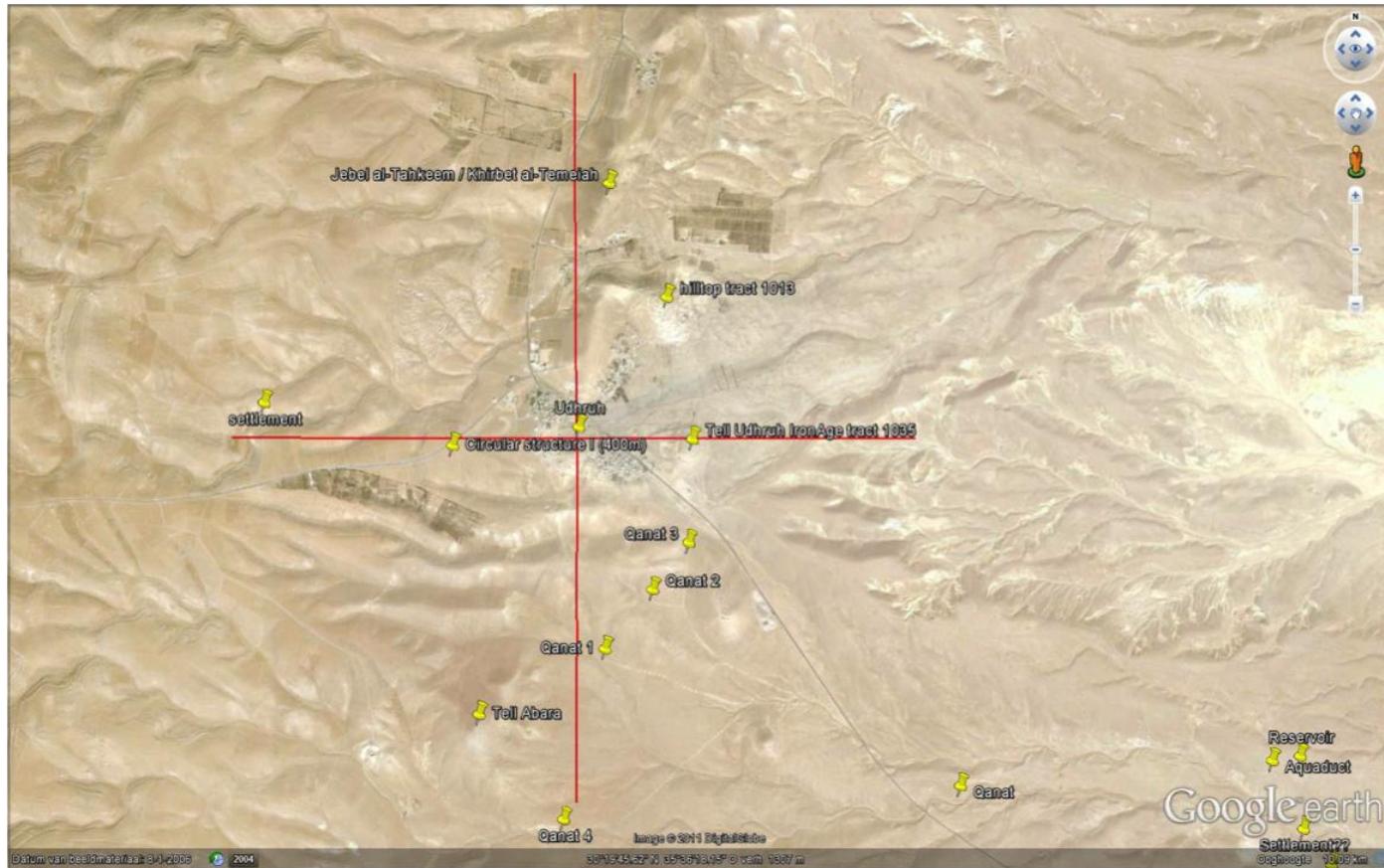


Figure 38: Map of Udhruh survey area

The material discussed in this chapter comes from the 2011, 2013, and 2014 field seasons. Until the 2014 season, the survey material was both purposefully and haphazardly collected, never randomly.⁸⁶ A track's team collected material when they recognized a site as a dense collection of sherds. The goal was to collect all material from the surface of recognized sites, but at some larger sites this was not possible and the team collected what they considered diagnostic sherds.

In 2014, the team surveyed four unique areas intensively with a goal of 100% collection. Two large circular structures, the purpose of which is still unclear, were intensively surveyed, but data from these sites is not currently available for analysis. An intensive survey occurred at a so-called “Extra-Leugam settlement”, named by its location one *leuga* or 2.2 km west of the fortress. Additionally, a long and narrow strip (a.k.a. ‘South Valley Survey’) directly south of the fortress was intensively surveyed as a control. This chapter discusses the general trends that emerged from the Udhruh survey diachronically, before examining the differences between the two intensive surveys.

Udhruh Ceramic Analysis – General

Nabataean period (ca. 63 BC-AD 106) material represents by far the largest corpus of ceramic evidence, with 1260 sherds out of over 3200 total identified by the author as dating primarily to the Nabataean period. In comparison, 407 sherds were identified as dated to the Roman (ca. AD 106-324) period while 457 were dated to the Early Byzantine phase (ca. 324-500). These numbers exclude those sherds that could not be closely dated to one period: 57

⁸⁶ See Chapter I for further definition of these terms. The exception to the described collection methodology was a 2013 field survey. This material is not discussed below.

sherds could only be identified as ‘Classical’ (Nabataean through Early Byzantine), 714 sherds as ‘Nabataean or Roman,’ and 94 sherds as ‘Roman or Byzantine’ (see figure 39).

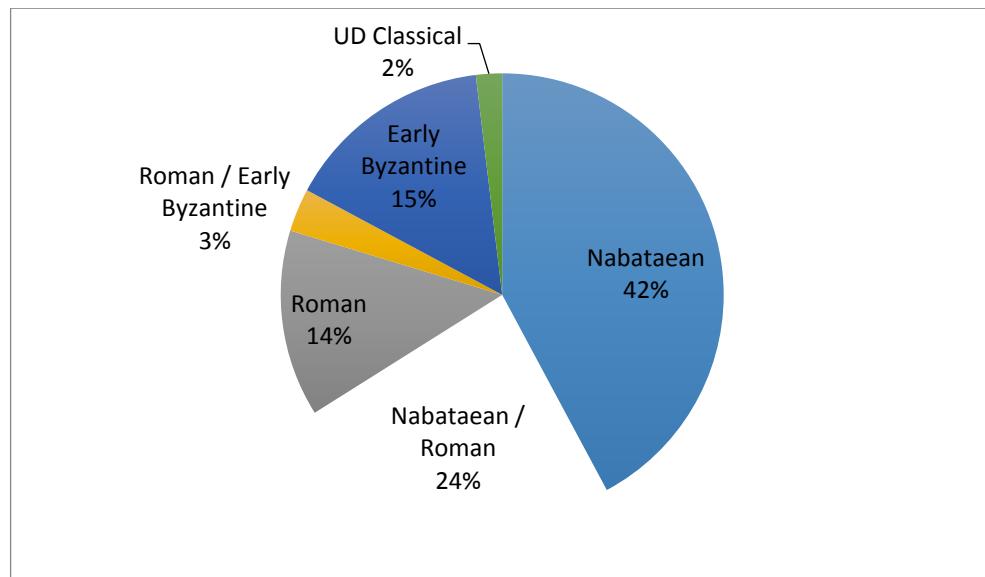


Figure 39: Udhruh Survey Sherds by Period

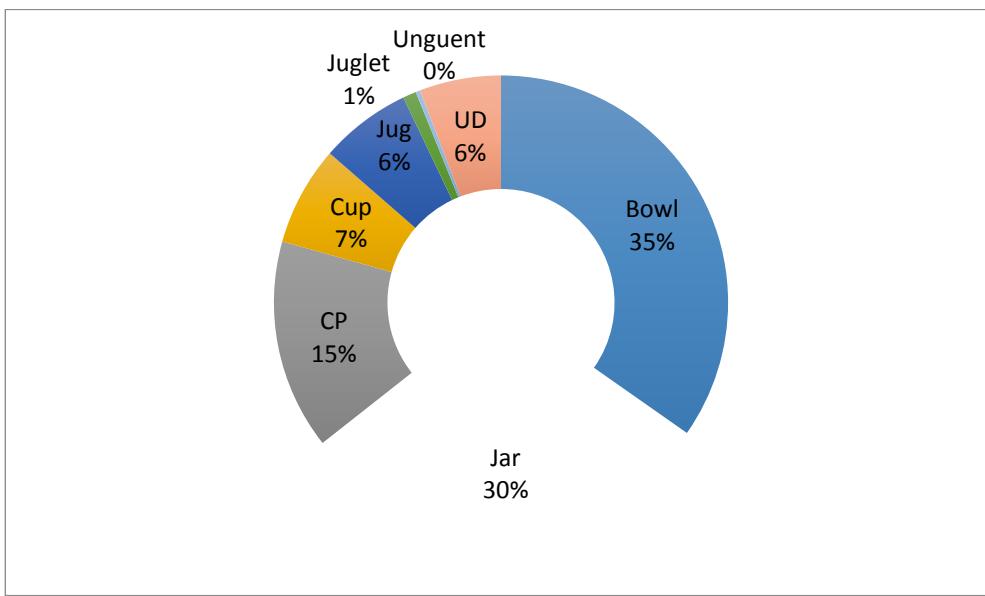


Figure 40: Nabataean Sherds by Vessel Type

Bowls were the most common Nabataean period vessel type, representing almost 37% of the identified forms (n=437). Of these, unpainted fine-ware vessels represented

almost 44% (n=193), Nabataean Painted Fine-Ware represented 36% (n=158), and local coarse ware represented almost 19% (n=84). The vessel types of many sherds could not be identified (including a single body sherd of western Terra Sigillata), but the most common forms included the carinated bowl and the hemispherical bowl—one in Kerak ware. Bowls in this period almost all had ring bases (see figures 40-41).

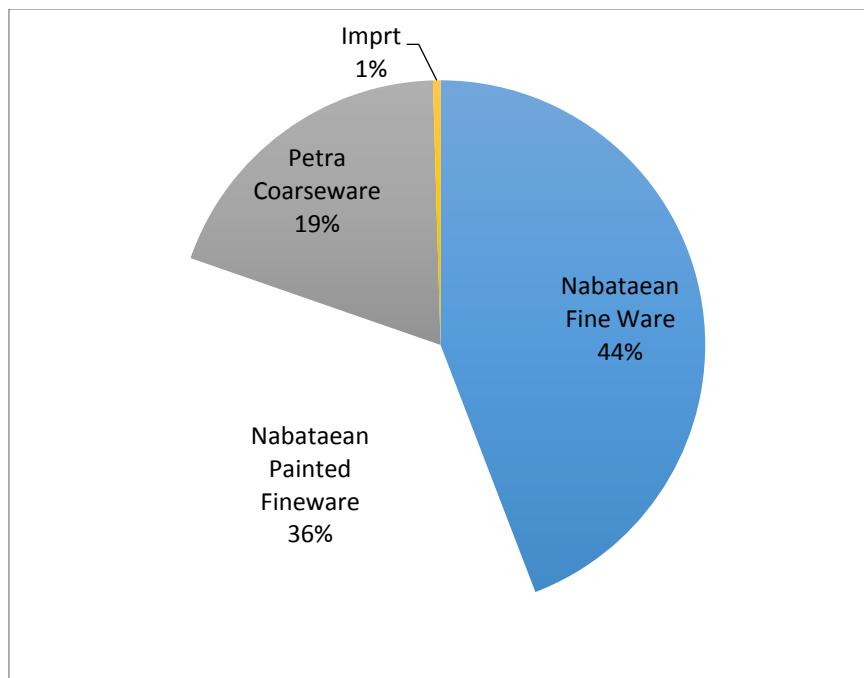


Figure 41: Nabataean Bowls by Fabric Type

Nabataean Painted Fine ware bowls were well-represented, likely due to the region's proximity to the source of production near the Nabataean capital. Eleven Dekorphase 2 sherds attest to a late 1st century BC and early 1st century AD occupation but suggest that the population was not substantial at this time. Of these eleven sherds, six originated from the Extra-Leugam survey and two from the South Valley Survey. Dekorphase 3 was much better represented. 20 subphase 3a (ca. AD 20-70/80) sherds were identified in comparison with 122 subphase 3b (ca. AD 70/80-100), suggesting that the region possibly witnessed a

population spike during the latter half of the 1st century. Additionally, the population might have become wealthier during this time and could simply afford more fine ware (see figure 42).

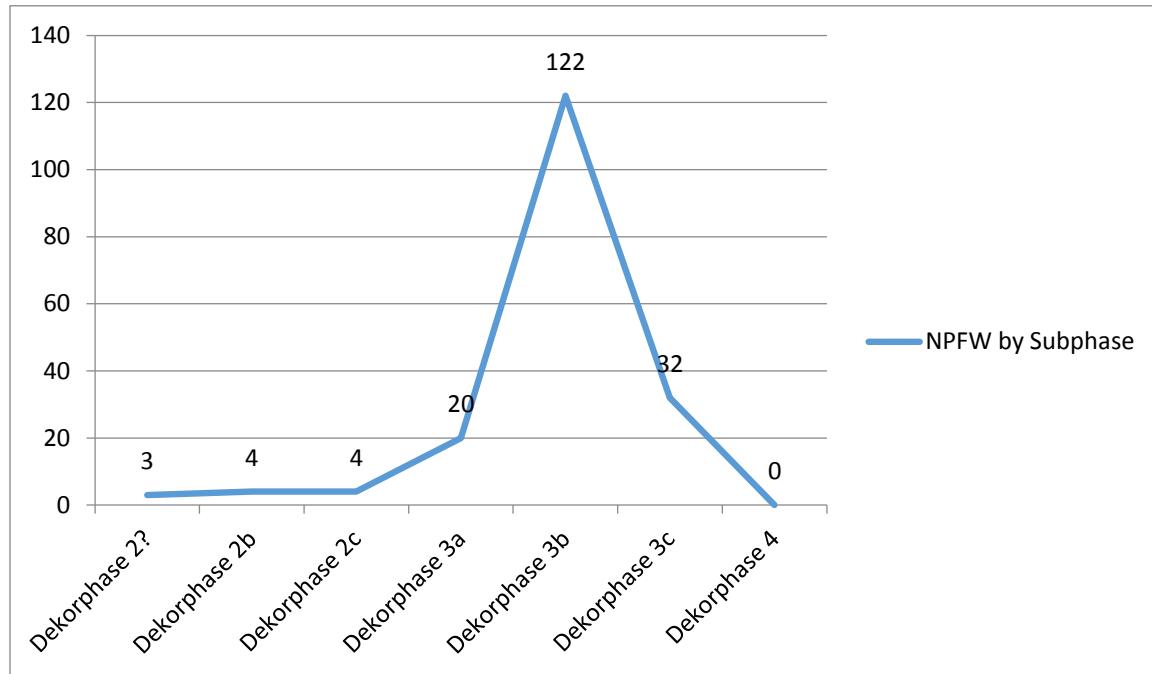


Figure 42: NPFW by Dekorphase

Coarse ware bowls were not nearly as common as fine-ware vessels. This is likely due to collection bias during the first three seasons, especially in 2011 when only special finds were collected by some teams. Common forms included plain rounded rim bowls with straight profiles extending outward at a 45-degree angle (Aila type 9), and a more upright version with a hooked interior (Aila forms 20 and 21).⁸⁷ Neither of these forms was especially popular at Petra during the Nabataean period, so it is noteworthy that they are so numerous in the survey area. Because of this, it is possible that they were not made at Petra

⁸⁷ Unpublished data from the forthcoming publication of the Roman Aqaba Project by S. Thomas Parker.

until later in the Roman or even Early Byzantine period, although they appear in late 1st century AD contexts at Aila. Other common forms include the carinated bowl and the hemispherical bowl in Petra coarse ware or Nabataean fine ware fabric.

Jars were the next most common vessel retrieved by the Udhruh survey, representing over 31% of the Nabataean vessels with identified forms (n=373). Most often these jars were made of Petra coarse-ware, but a handful of Nabataean fine and semi-fine ware vessels were included in the corpus along with two Kerak ware vessels and one of unknown origin. Ring bases and strap handles identified other Nabataean jars. Jars ranged in size and, with the exception of some rouletted fine-ware jars, seemed to have served utilitarian purposes.

Jar handles make up a good portion of the diagnostic sherds. The most common jar handle belongs to a large storage jar (see figure 43). It is large and wide, often about the size of a hand, with numerous ridges on the top perhaps made by fingers. These handles are common on large jars with four handles and possibly were used as amphorae, i.e. transporting goods. Yvonne Gerber published one from a storage room in a bronze foundry at ez Zantur, which she dated to the second half of the 1st century AD. These vessels mostly had rounded rims, some with wavy band decorations around the shoulder (Gerber 1997, 409-410). Caroline Durand also published vessels with similar handles from the Obodas Chapel at Petra, dated to the end of the 1st and beginning of the 2nd century AD, which she directly compared with Gerber's. However, the vessel at Obodas had a large triangular rim, shorter neck, and ribbed body (Tholbecq and Durand 2005, 308-309).

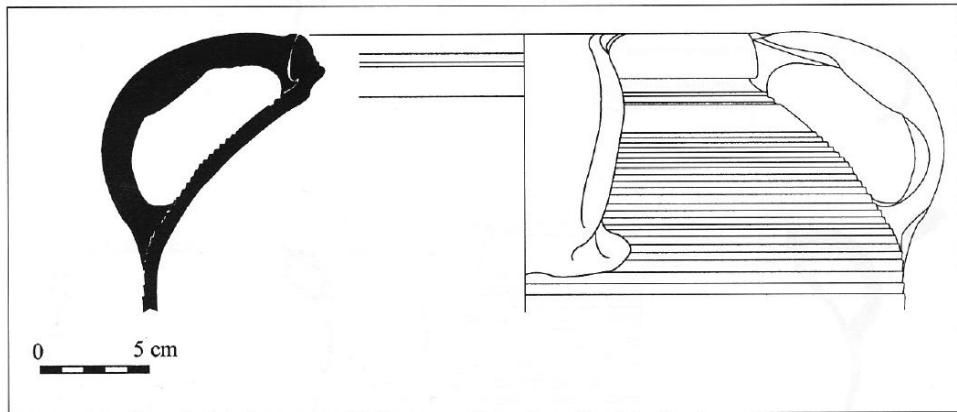


Figure 43: Large Storage Jar from the Obodas Chapel (Tholbecq and Durand 2005, 308)

Based on the sheer number of these vessels most commonly referred to as ‘large storage jars,’ it seems evident that large amounts of imported products were brought to the Udhruh region, perhaps from Petra. What these vessels carried is unclear, but likely they supplied a range of products including grain and perhaps wine and oil. No other jar is as prominent, perhaps because the fat and thick handles proved more difficult for the environment and time to destroy. However, these vessels likely did not carry luxury goods, and they appear to have been used most commonly in domestic settings. However, it is also possible that at least some of these jars may have been imported to Udhruh while empty simply to serve as storage vessels upon arrival, especially when considering the close proximity to the Wadi Musa kilns. At the Petra Garden and Pool Complex, the team only rarely found handles such as this.⁸⁸ At the Petra North Ridge project, the team found these vessels commonly in domestic settings but almost never in conjunction with the tombs.⁸⁹

⁸⁸ Personal communication with Pamela Koulianou, ceramicist for Petra Garden and Pool Complex excavation.

⁸⁹ Unpublished evidence from the Petra North Ridge Project database.

The rest of the forms make up the remaining 35% of the Nabataean ceramic corpus.

Cooking pots represent 15% of this amount and most forms are well attested at Petra and Aila. There were 12 cooking pots from the 1st century BC. Pamela Koulianou, the ceramicist for the Petra Garden and Pool Complex, dates these cooking pot sherds to the 1st century BC. Parker has argued that this form disappears by 30 BC based on its virtual absence from Aila, founded around that time. The cups retrieved from the survey often had a rolled or triangular rim. The fabric was usually of higher quality, often in Nabataean Fine ware or Nabataean Semi-Fine ware. Jugs and juglets were also often in Nabataean Fine ware, while only one of the unguents was Fine ware. The others were Nabataean Semi-Fine ware sherds. One had diagnostic features that allowed it to be classified as a Johnson Group II, Form V, dating from ca. AD 27 to the beginning of the second century (Johnson 1990, 237-238, 246).

It was not possible to date more than 20% of the sherds more closely than generically ‘Nabataean or Roman’. This corpus consisted of various forms that extend from the 1st into the 2nd century AD. Among these is a notched rim, rouletted bowl—dating from ca. AD 50-150. Additionally, the triangular rimmed cooking pots extend well into the Roman period and are not very diagnostic with the limited profiles the survey recovered. Some could be more tightly dated based on fabric quality, handles, or slight morphological differences, but most triangular rimmed cooking pots were simply identified as Nabataean or Roman.

A number of imported fine wares were also identified as belonging to this broad period, including 5 sherds of Eastern Sigillata A and 2 sherds of Eastern Sigillata C. All but one came from an intensive survey. Most sherds, with the exception of the one from the extensive survey, had little red slip left, apparently from weathering. Thus these imported

fine ware sherds were only identifiable upon a closer look. It is possible that there are more Eastern Sigillata sherds, but, as they appear non-descript without the bright and shiny red slip, they may have been missed due to the collection methodology.

Roman period vessels were much less numerous, only 14% of the sherds, compared to 42% of sherds identified as Nabataean (see figure 44). Jars, usually in local coarse ware fabric, were the most common Roman vessel type. Additionally, many of these jars were larger, either to transport bulk materials or for storage. None could be tightly dated, although a handful of folded rim jars, attested at ez-Zantur and the Petra North Ridge, suggest a late second century date. Unlike in the Nabataean period, most jars were identified as Roman by their rim, not their handle. Although a number of sherds were recognized as Roman era jars by their pinched handle, this feature does not appear to emerge until later in the Roman period, perhaps in the third century.

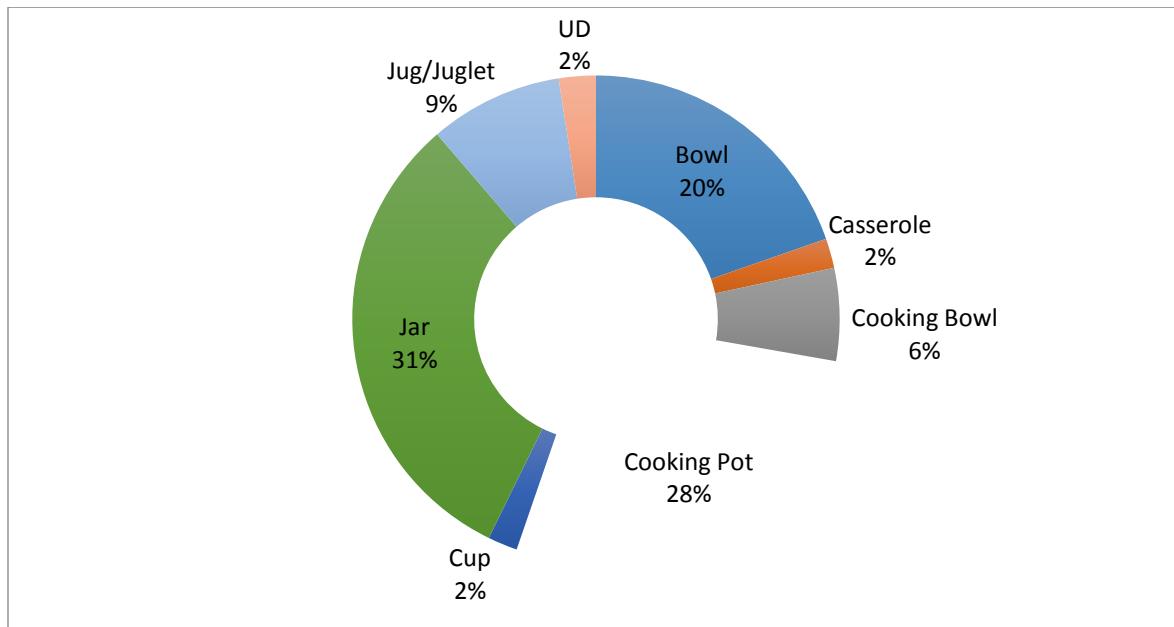


Figure 44: Roman Period Sherds by Vessel Type

Bowls consist of a much smaller percentage of the corpus than in the Nabataean period. Over a third of these were identified as Roman based on their Dekorphase in Schmid's typology. These 36 sherds are exclusively Dekorphase 3c (ca. 100-150). Some appear on the verge of transitioning to Dekorphase 4, but none could be recognized as a true late second century form. Two ARS sherds were also identified in the corpus; one a form 50A (ca. 230/240-360; Hayes 1972, 69-73), and the other a body sherd.

The Roman period not only marked the appearance of fine ware from Africa (ARS), but also coarse wares from different cities across the former Nabataean kingdom. Although not terribly common (representing only approximately 3% of all Roman period fabrics), non-Petra ware vessels increase as a percentage of the period's total in comparison with the Nabataean material. Most of these imported wares served utilitarian purposes and were found via the intensive surveys. The cooking pots almost all had charring marks, indicating they were used for this purpose. This is especially notable on the vessels made of the so-called 'Petra Cream Ware' ('Amr 1992). Scholars used to believe that this fabric originated from Petra but a kiln producing this material has never been found. Additionally, it is simply not nearly as common as other Petra wares. Instead, scholars now favor the idea that the 'Petra Cream Ware' vessels were imported from somewhere outside of but close to Petra, as it is quite common at excavations there (see figure 45).⁹⁰

⁹⁰ Private communication with Yvonne Gerber in Amman, Jordan February 2014.

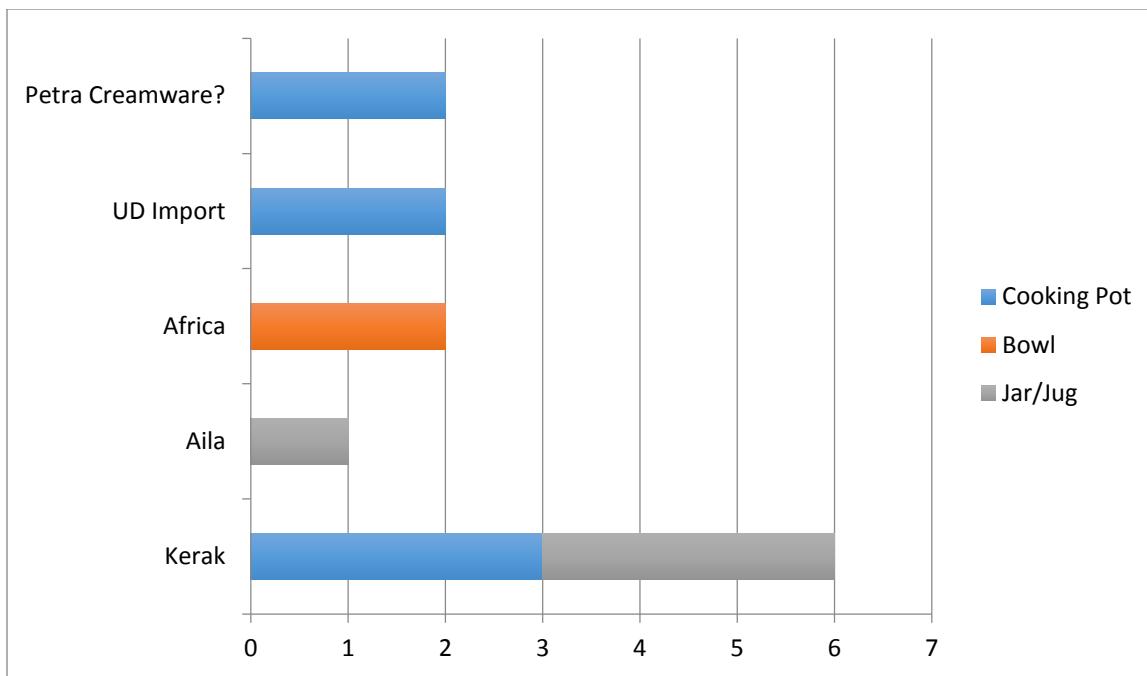


Figure 45: Imported fabrics by vessel type

The Roman period does mark a large increase in cooking ware. The percentage of cooking pots increased from just 15% in the Nabataean period to 28% in the Roman period. Casseroles, still not very common, are present in greater amounts, often as a complete vertical or horizontal loop with a pinched handle. Cooking bowls are also less common than cooking pots, but their presence is well established in Udhruh's hinterland. This suggests some continuity between the Nabataean and Roman periods as the cooking bowl does not seem to remain especially common in the 3rd century on Petra's North Ridge.

Surprisingly, not a single amphora sherd could be positively linked to the Roman period. Rather, all of the nine amphora sherds recovered on the survey were classified as either Byzantine or the ware could not be dated. One sherd, likely a Class 48 amphora based on the handle morphology but possibly a Class 49 (both from Gaza), could have been brought to Udhruh sometime in the Roman period. However, without a clear rim or other

diagnostic feature, it can date anywhere between the 1st and 6th centuries (Peacock and Williams 1986, 198-199). Gaza amphorae are common at Aqaba in the 1st century and Egyptian amphorae, already present at Aqaba in the same century, become by far the most common imported amphorae at the turn of the 4th century (Parker 2009b). However, they are rare at Petra, so their absence at Udhruh is not surprising. What is notable is the almost complete lack of Roman period amphorae. As the Roman soldiers began to construct the *via nova Traiana* in the early 2nd century, it seems likely that they were supplied in part by food in amphorae. Perhaps the amphorae were repurposed and taken away from the site, but it seems unlikely that there would be a complete lack of sherds if this was the case. Rather, the lack of amphorae can likely be explained by several factors, such as collection bias. Most amphorae sherds identified at Aila were body sherds, easily missed by the collection methods employed by the Udhruh survey. Fewer amphorae might in any case be expected at an inland site such as Udhruh. Finally, inhabitants in the period might have used a local coarse ware vessel—such as the ribbed-neck jar—to ship goods to the hinterland.

This dip in Roman period sherds will be discussed more in depth in the final chapter, but one possibility is offered here. The 2nd and 3rd century local coarse ware chronology is not as well known as the Nabataean period.⁹¹ As the ceramicist could not always distinguish Roman sherds from either Byzantine or Nabataean sherds, some Roman material was likely

⁹¹ This possibly reflects some of the issues experienced by the surveys previously reviewed in chapter II. Very few surveyors included drawings of their Roman period material with the exception of Yvonne Gerber. As she was part of the ez-Zantur team and has yet to publish the coarse ware typology from the excavation, she alone is privy to the chronology. But Zantur also had a long period of abandonment during the second and third centuries (Schmid 2000). Hopefully with the excavation and publication of the Petra North Ridge Project, this period can be better documented.

classified as either Nabataean-Roman, Roman-Early Byzantine, or even “undetermined” (UD). On the other hand, Nabataean material might have been identified as Roman as all cooking bowls were identified as Roman. However, at the North Ridge, it has become apparent that this form appears at the very end of the 1st century AD.

Some 94 sherds were placed into the broad Roman or Early Byzantine category (see figure 46). Cooking pots were by far the most common, offering triangular rims with a gentle groove on the exterior. As they dated to both the Roman and Byzantine periods, they are not terribly diagnostic. However, because cooking pots make up such a large portion of the corpus, the land was likely used for domestic purposes in the third and fourth centuries (Aila type 11 CP). The other cooking pot form that resisted tighter classification was thin-walled vessel with a deep groove on the rim (Aila type 8 CP). Often these cooking pots date to the Roman period at Aila, but they do appear in Early Byzantine contexts. A handful of cooking pot sherds fell between these forms, seemingly indicating that the former type might have transitioned into the latter type.

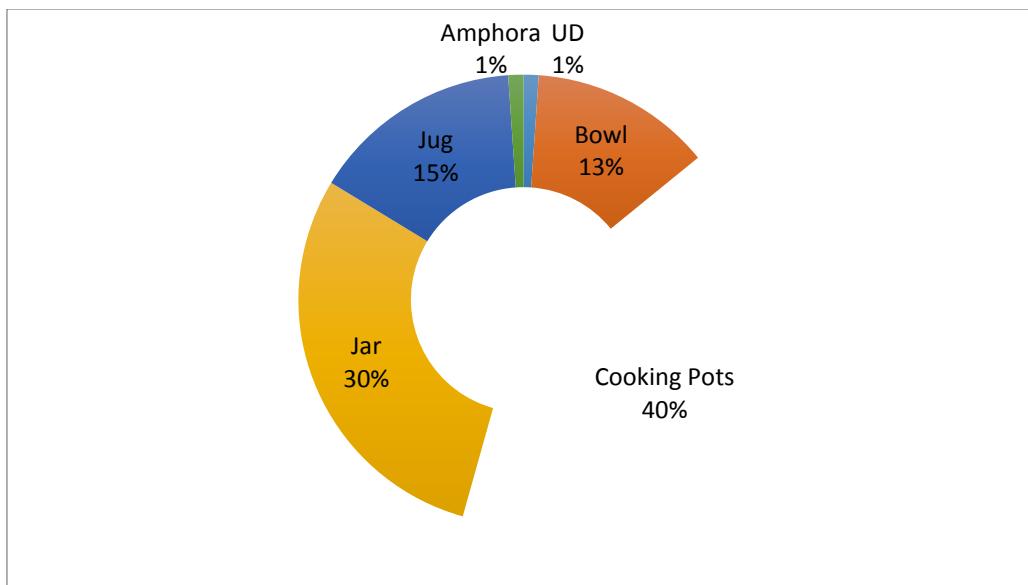


Figure 46: Roman / Early Byzantine Sherds by Vessel Type

Jars, jugs, and bowls placed in this category resisted classification. Some bowls seemed to imitate ARS bowls in local coarse ware, but often lacked enough preserved profile to determine which type. Both jars and bowls labeled as Roman or Early Byzantine were often thicker, of coarse ware, and less finely levigated. They overwhelmingly had string-cut bases.

The amount of sherds did increase in the Early Byzantine period, representing more than a 12% increase from the Roman period (see figure 47). Two vessel types dominate in this period: cooking pots and jars. These vessels also appear to have more, larger inclusions than previously. These often included large grains of quartz that protruded from the surface. The rest of the fabric was well-weathered, to the extent that the diagnostic features were often completely worn away.

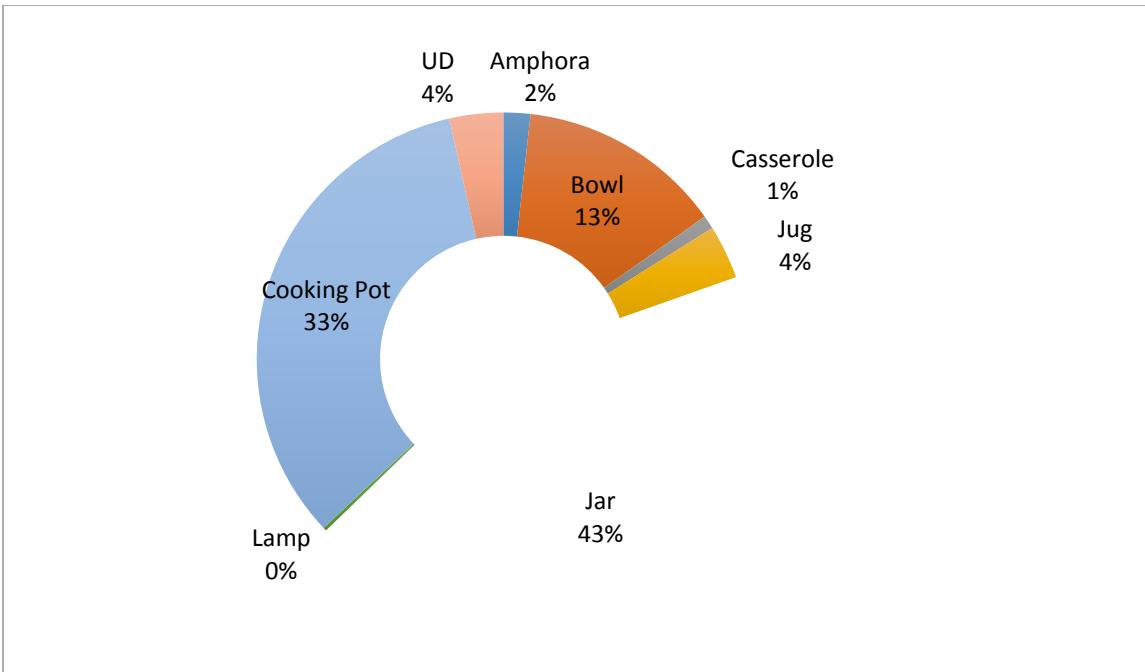


Figure 47: Early Byzantine Sherds by Vessel Type

Neither jars nor cooking pots offered much variety during this period. Jars almost always often had thick, wide handles with two grooves. Handles identified over 65% of the Early Byzantine period jars. Thick, bulbous rims—some with hints of wavy-band combing—identified almost all of the remaining 35%. But despite the perceived homogenous nature of the Early Byzantine jar corpus, the period also witnessed the importation of eight unidentified coarse ware sherds and four Kerak-ware sherds. They all survived in the form of handles, making it impossible to state for certain that they date to the Early Byzantine period if imported from another site with a different handle morphology in this period. However, the remarkable similarities between the imported and the local handles make it difficult to deny that they were of roughly the same date. Fabrics ranged from white, to cream, pink, and dark orange, and only two appear to originate from the same location. It is possible that they are amphora handles, but usually they were thinner than expected for an

amphora handle. Cooking pots, on the other hand, were almost all locally produced and had either slightly everted rims or rims with gently rounded or hooked rims.

The bowl was still a more common form, but generally the Early Byzantine corpus became more homogenous. Other locally made Early Byzantine vessels were often identified by their handles or bases, and therefore offer less evidence of their form's tradition at Udhruh. Bowls, which were often identified by their rims as opposed to their bases, often had simple profiles, with thick, triangularly shaped rims. The walls of the bowls often join a flat base at a roughly 45 degree angle. Three ARS or imitation ARS sherds were also identified as belonging to the Early Byzantine period: one is a Hayes Form 69 (from the second quarter of the 5th century; Hayes 1972, 117-119); one is a Hayes Form 59B (ca. 320-420; Hayes 1972, 96-100); and an imitation of Hayes Form 67 (ca. 360-470; Hayes 1972, 112-116).

As noted earlier, almost all amphorae from the survey dated to the Early Byzantine period.⁹² Often recognizable by either their morphology or fabric, they attest to trade ranging from Syria to Egypt in the 4th through 6th centuries. A Class 44 (Late Roman 1) handle indicates some trade relationship with the northeastern Mediterranean or Cyprus between the late 4th and 6th centuries (Peacock and Williams 1986, 185-187). A Class 46 amphora body sherd indicates trade with Palestine in the 5th and 6th centuries (Peacock and Williams 1986, 191-192). Two amphora sherds from Egypt likely arrived at Udhruh sometime between the late 4th and 6th/7th centuries (Peacock and Williams 1986, 204-207). Three Aila amphora sherds (5th-7th centuries) attest to the continued interaction between the port on the Red Sea and the former Nabataean heartland (Parker 2009c) It is interesting to note, however, that few

⁹² As the legion arrived at Udhruh during this period, the lack of earlier amphora is rather unremarkable.

Class 47/Hollow Foot amphorae were identified as these are found commonly at Leijun, Humayma, and Aila.

Intensive Surveys

The control group, henceforth referred to as the Udhruh Survey South Valley, surveyed an area running directly south of the fortress for 900 meters, with the grid set at 20x10 meters (see figures 48-49). Of the 540 diagnostic sherds collected in this area, just over 20% are positively attributed to the Nabataean period and the majority of these were Petra coarse ware, which is unsurprising given Udhruh's proximity to the kilns in Wadi Musa. 35% of these (n=40) were Nabataean painted fine ware, Nabataean fine ware, or Nabataean semi-fine ware. All except two of the 22 Nabataean painted fine ware sherds were Dekorphase 3b. The two other sherds are Dekorphase 2b. Given the Udhruh Survey South Valley's proximity to Udhruh and its perennial spring, it is no surprise that earlier settlement in the 1st century BC was attracted to the location. A single 1st century BC cooking pot sherd also confirms this notion. However, almost all of the remaining Nabataean period sherds date to from the mid to late 1st century AD.



Figure 48: Map of the Udhruh Survey South Valley (white line running NS)

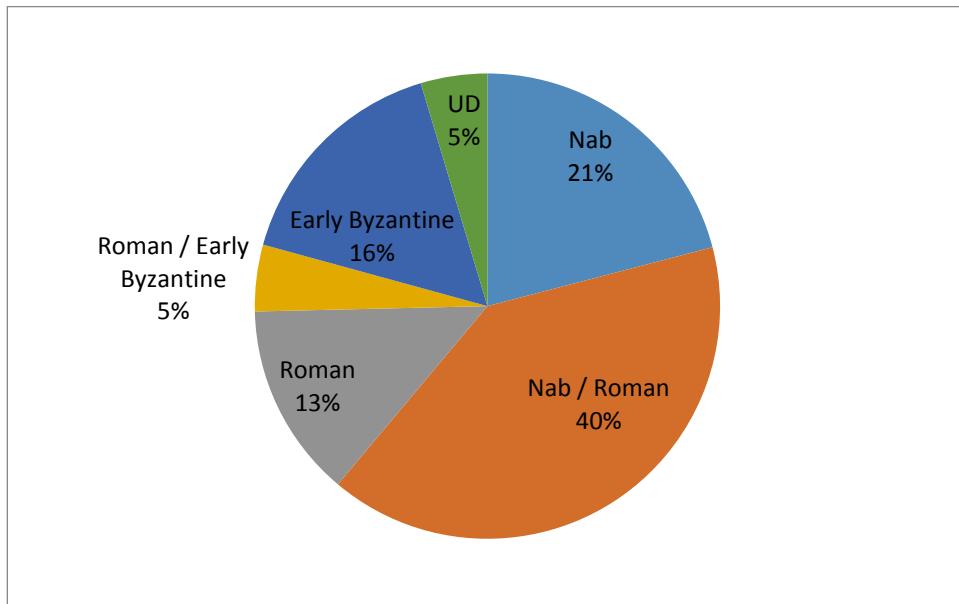


Figure 49: Udhruh Survey South Valley Sherds by Period

The Extra-Leugam settlement was divided into 138 (20 x 20 m) squares. Over 1100 Classical era diagnostic sherds were collected and identified. About 40% of these date to the Nabataean period. This is significantly more than the Nabataean material recovered from the Udhruh Survey South Valley. However, this result is not unexpected as the Extra-Leugam survey investigated a site that likely witnessed intensive Nabataean inhabitation. The majority of Nabataean era sherds from the Extra-Leugam survey were Petra coarse ware but this corpus did contain six sherds of Kerak ware, imported from the north. Almost 30% of the Nabataean period sherds were fine ware, semi-fine ware, or painted fine ware. This number is slightly less than the amount collected from the Udhruh Survey South Valley, but it nevertheless suggests that the region did not just witness agricultural use but also a significant amount of domestic use, as inhabitants likely lived near their fields. This

assessment agrees with the site's visible architecture, which includes several domestic structures, agricultural fields, and a threshing floor (see figures 50-52).

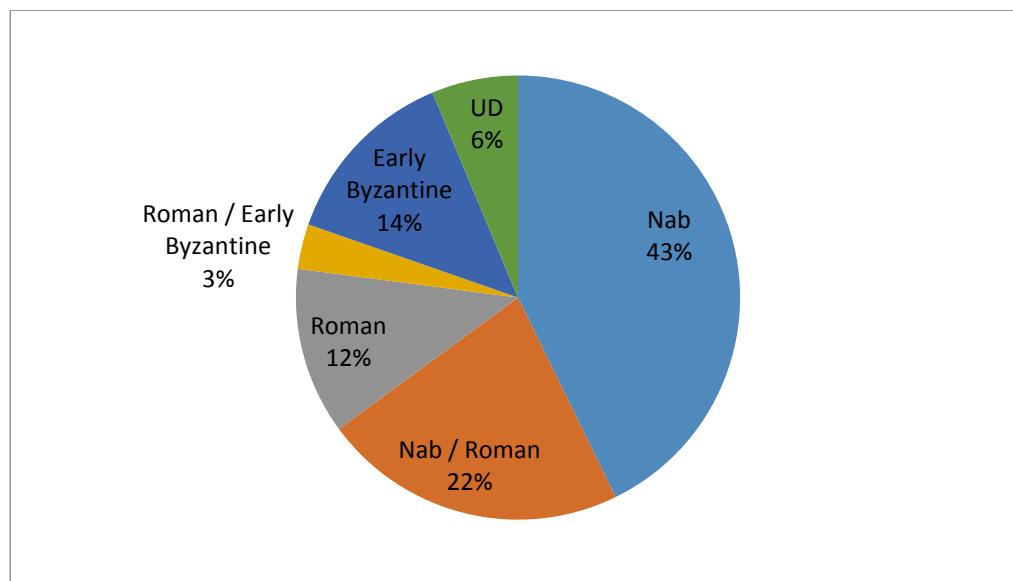


Figure 50: Extra-Leugam Settlement Sherds by Period

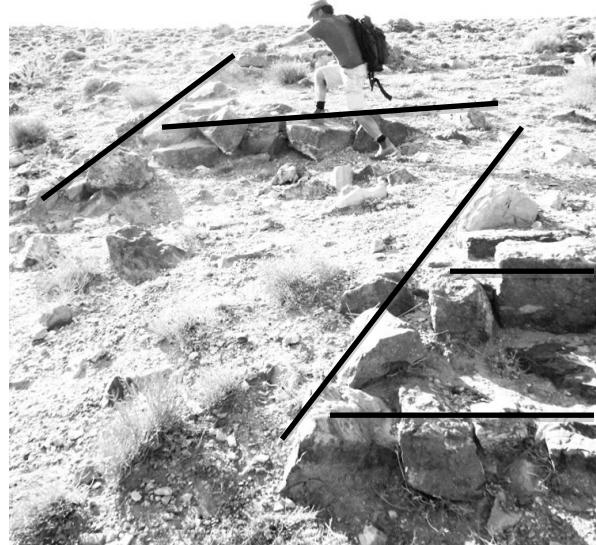


Figure 51: The remaining walls of a Nabataean settlement at the Extra-Leugam site; walls marked by lines

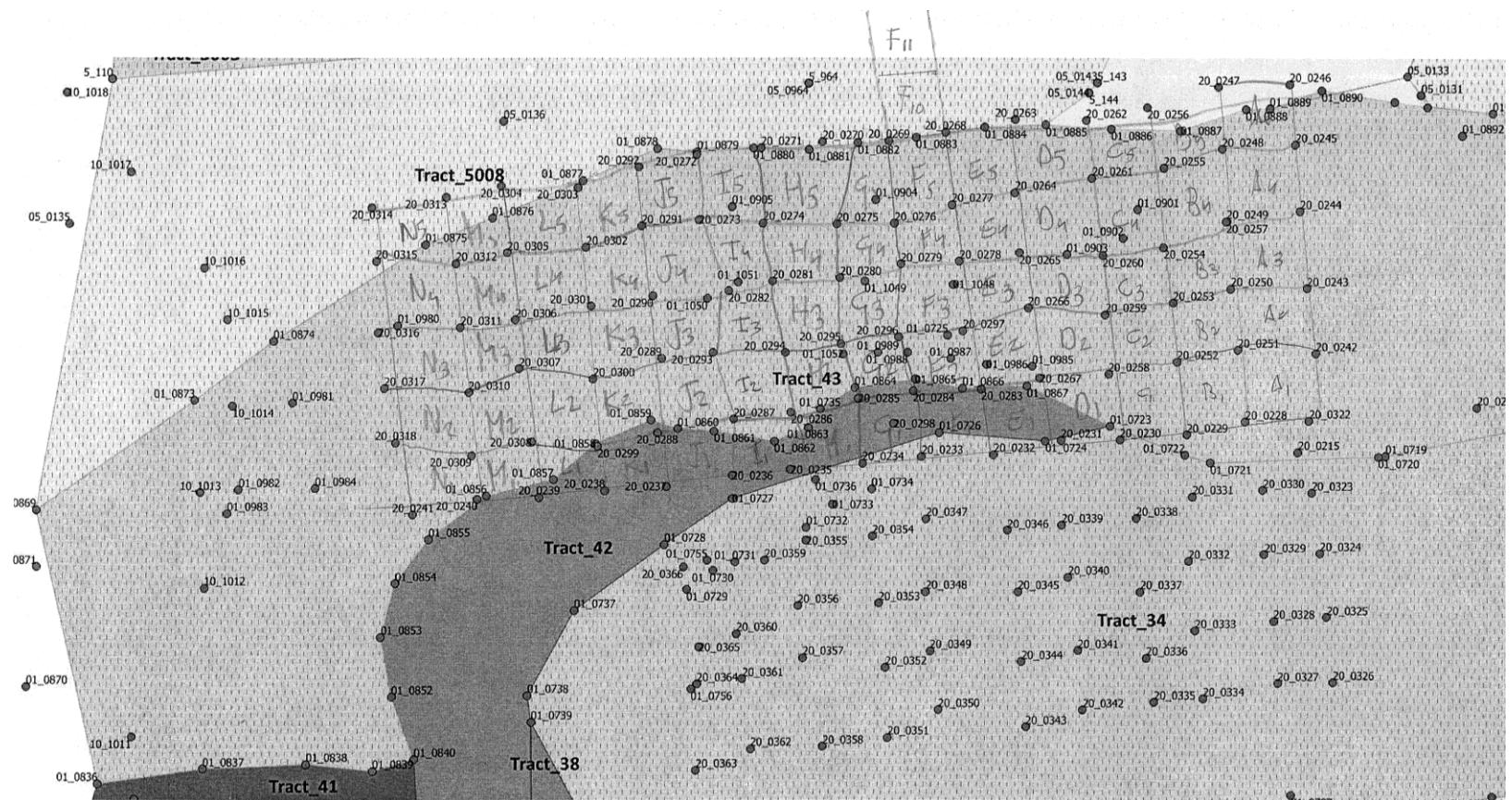


Figure 52: Extra Leagum Settlement Survey Tracts

On the Extra-Leugam settlement, most Nabataean pottery dates to the mid to late 1st century AD. This finding is consistent with the intensification of settlement witnessed at Jabal ash-Shara, Bir Madhkur, Wadi Musa, Wadi Silaysil, and Umm Rattam in this period. However, nine sherds from the Udhruh survey, including 1st century BC cooking pot sherds and Dekorphase 2 Nabataean Painted Fine ware, suggest earlier settlement sometime between the second half of the 1st century BC and the early 1st century AD.

The Extra-Leugam survey also yielded a Western Sigillata bowl rim of the 1st century AD. This is significant as Western Sigillata is rare even in Petra itself. The Roman port at Aila, which recovered over 2,000 Eastern Sigillata sherds, yielded no Western Sigillata. Eastern Sigillata A and Candalri Ware were identified from the Udhruh survey, but could not be dated more precisely than 1st and 2nd centuries AD. These are rare at hinterland sites but are more common elsewhere in the Nabataean kingdom.⁹³ Their presence around Udhruh suggests a vibrant, thriving community with far-flung trade connections to the wider Roman Empire.

Nabataean period vessels from Udhruh Survey South Valley represent a range of different vessel types in relatively equal amounts. Bowls and jars were the most common forms, followed closely by cooking pots. As seen generally, handles make up large portions

⁹³ Imported fine wares are not terribly common at 1st century AD Nabataean sites in and around Petra, and some have suggested that the Nabataeans might have favored their own fine ware over the imported wares. However, later imported fine wares such as African Red Slip, a imported fineware from Roman North Africa popular found across the eastern Roman Empire, do not surge in popularity after the Nabataean Painted Fineware begins to become less common in the 2nd century AD. Nothing seems to fill the vast amount of local fineware that disappears at this time. This could indicate that Petra's population was less economically stable in this period (likely due to the Roman annexation) or that the local fineware tradition had never been related to the amount of imported finewares.

of the diagnostic material and therefore prevent the vessels from being placed into recognized classifications. The Nabataean handles were very diagnostic, however, as they were often much more carefully manufactured, more finely levigated, and were variations of the strap handle. Almost all cooking pots with the discernable triangular rim were classified as Nabataean or Roman.

At the Extra-Leugam settlement, jars were the best represented 1st century AD form, in particular large storage jars with large and wide handles, often with numerous ridges perhaps made by fingers. Other common finds during this period included carinated bowls with ring bases (often in Petra coarse ware), triangular rim cooking pots, and rolled rim cups. Together, this collection of storage, utilitarian and serving wares suggest a region that witnessed primarily domestic and agricultural use. Supplies may have been shipped from Petra in the previously mentioned storage jars, commonly found on Petra excavations including ez-Zantur and the Obodas Chapel. These might have then carried grain back to Petra or been reused on a hinterland site. Although the Udhruh region receives less rain than the hinterland immediately surrounding Petra, it is still sufficient to grow grain and the soil is rich. Nabataean era inhabitants likely cultivated grain and other products to support Petra, suggesting less of a parasitic relationship but one that mutually benefited both regions.

At the Udhruh Survey South Valley, 40% of the sherds were identified as either Nabataean or Roman. The Extra-Leugam survey did not yield as many vessels (ca. 22%) dating from the 1st century into the 2nd century AD, but a significant amount nevertheless blurs the transition between Nabataean and Roman eras. However, Nabataean Painted Fine ware helps to clarify this transition. As mentioned previously, 22 Dekorphase 3c sherds for

the Udhruh Survey South Valley, dating to ca. AD 70/80-100, indicate intensive occupation in the decades just before the Roman annexation. In comparison, 46 sherds of Dekorphase 3b were identified at the Extra-Leugam settlement. In comparison, the Udhruh Survey South Valley and the Extra-Leugam settlement had 15 and 8 sherds respectively of Dekorphase 3c (20% and 18% of all Nabataean Painted Fine ware), dating ca. AD 100-150.

It is not only notable that Dekorphase 3c represents a larger portion of the NPFW corpus at the Udhruh Survey South Valley than at the Extra-Leugam settlement, but also that in both groups the Dekorphase indicates such a dramatic decline after the annexation. At the Petra North Ridge Project, Dekorphase 3b almost immediately disappears when Dekorphase 3c emerges, during or after the annexation, and the amount of 3c is roughly comparable with 3b. While the exact year of Dekorphase 3c's emergence remains obscure based on tests of the typology, it is certainly the phase associated with the 1st half century of the Roman era in Petra and its hinterland. No Dekorphase 4 sherds (ca. AD 150-250?) were identified. This phase is not exceptionally common at Petra but does begin by the mid-or late second century.

The decline marked by Dekorphase 3c continues at both sites in the Roman period. At the Udhruh Survey South Valley, Roman era sherds represent ca. 13.5% of the total corpus (n=73). At the Extra-Leugam settlement, Roman era sherds represent ca. 14% of the total corpus (n=145). With the exception of a handful of Kerak ware cooking pot sherds at both sites, the Roman era vessels were all made of local material. Jars and cooking pots dominate the forms while bowls are much less common. No imported wares, either amphorae or fine ware, indicate much interaction between Udhruh and neighbors to the north, west, or south (Egypt, Gaza, North Africa, or Turkey).

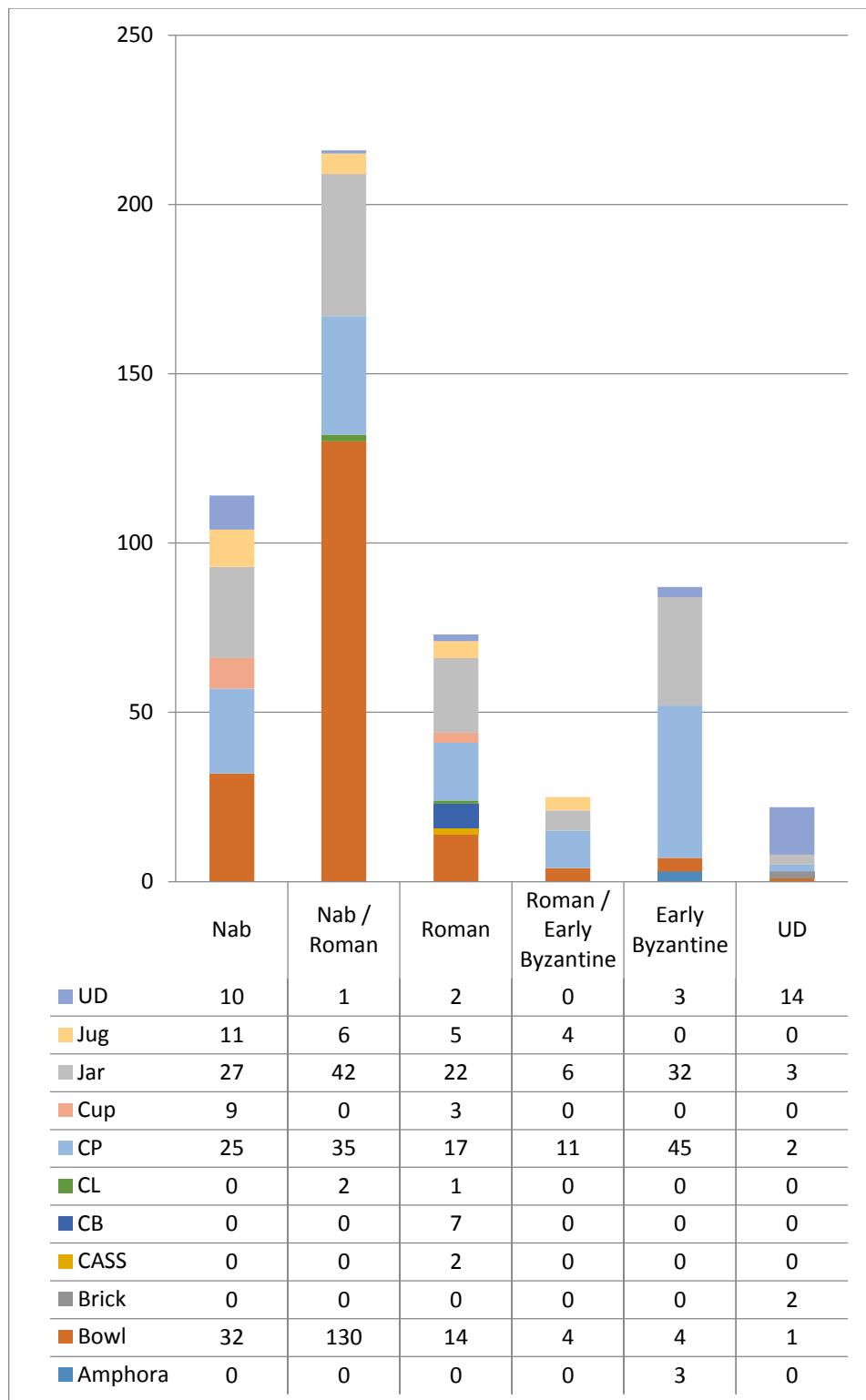


Figure 53: Udhruh Survey South Valley Sherds by Vessel Type and Period

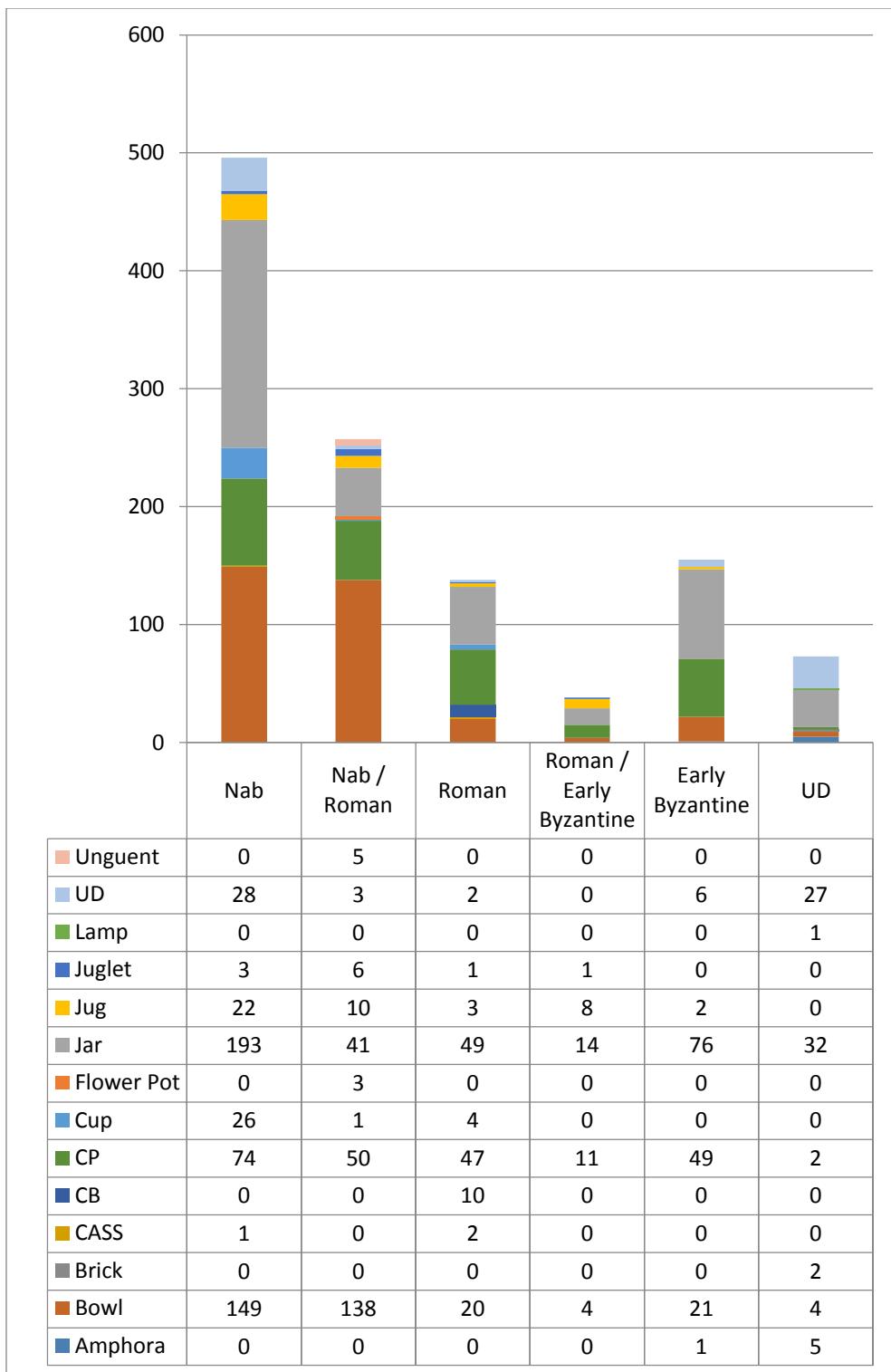


Figure 54: Extra-Leugam Settlement Sherds by Vessel Type and Period

A comparison of data from Petra's North Ridge with that from the Udhruh intensive survey sites suggests a marked decrease in settlement after the Roman annexation. The most common forms include jars, which comprise the majority of Roman era forms. Interestingly, there is a much greater proportion of cooking vessels. They comprise 40% of all Roman period forms compared to only 17% in the Nabataean era. In comparison, cooking vessels comprise 37% of the Roman period sherds versus 35% in the Nabataean period at the Udhruh Survey South Valley.

Both the Udhruh Survey South Valley and the Extra-Leugam survey area witnessed some resurgence in the Early Byzantine period. This resurgence was much larger in the control group, which witnessed a nearly 20% increase in sherds from the Roman period. At the Extra-Leugam settlement, only a 9% increase was observed.⁹⁴ But despite an increase from the Roman to the Early Byzantine period, neither site yielded many imported vessels. The Udhruh Survey South Valley produced 3 amphorae (2 Aila, 1 Egypt), a Kerak ware cooking pot, and a coarse ware jar likely imported from Khirbet edh-Dharih.⁹⁵ At the Extra-Leugam settlement, imports included two Kerak ware jars and a Class 46 amphora sherd. Amphora sherds are rare at Udhruh overall as only fifteen have been identified from four survey seasons. With these exceptions, all other Early Byzantine sherds are local to the region, possibly even produced at Udhruh itself.

⁹⁴ When calculated as a percentage of each site's entire corpus, the increase between the Roman and Early Byzantine period is much less significant (approximately 3% increase for both).

⁹⁵ This is the author's own hypothesis and it has not been confirmed by the Khirbet edh-Dharih ceramicists. However, upon a visit to the site, I noticed that the fabric was a much brighter red, with less orange tints, than typical Petra fabric. Additionally, sherds seemed to have a great amount of large, black inclusions visible to the naked eye.

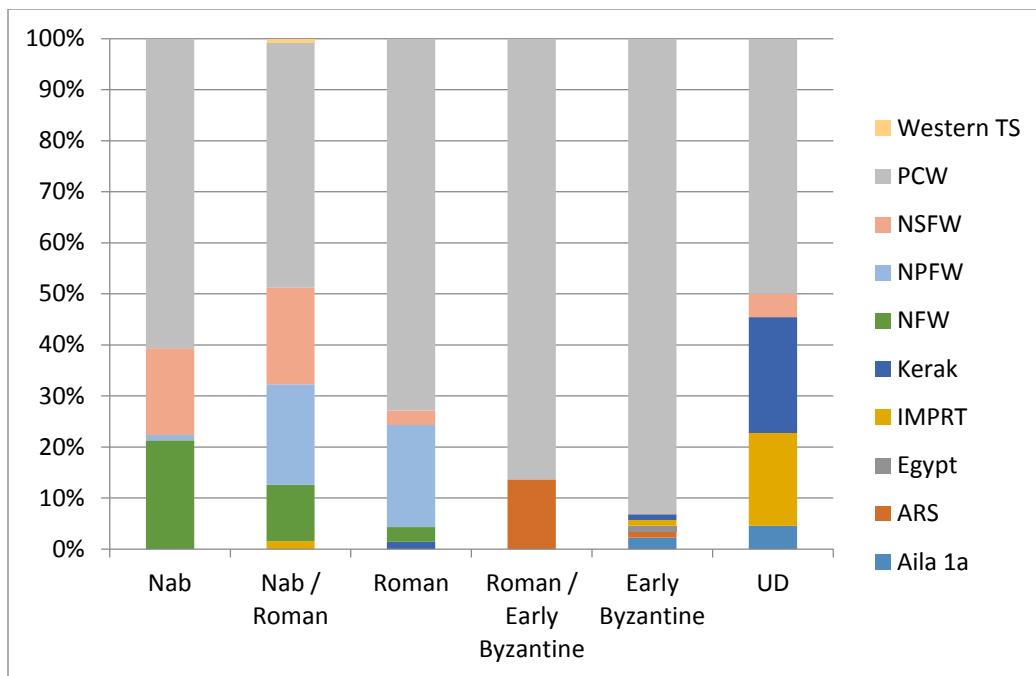


Figure 55: Udhruh Survey South Valley Sherds by Fabric

As noted above, Killick claimed to have excavated a ceramic kiln at Udhruh, apparently just outside the fortress's southern wall. As he neither published the kiln nor its contents, this is impossible to confirm. However, the Udhruh survey has identified several kiln wasters. Many of these were found near the possible kiln site and another group of eleven wasters was identified in a 2013 field system survey. All of these dated to the Early Byzantine period. The Udhruh Survey South Valley and the Extra-Leugam settlement each produced an Early Byzantine cooking pot kiln waster. Additional evidence for local production in Udhruh itself is suggested by a slight change in fabric. Udhruh's ceramics from this period have many more inclusions than in previous periods. Early Byzantine material from Petra does not have nearly the same amount of inclusions. Ceramic samples from Udhruh are now undergoing analysis in Leiden. As the kiln wasters date exclusively to

the Early Byzantine period, the evidence seemingly refutes Killick's claim of a Nabataean period kiln and likely dates to the legion's appearance at Udhruh ca. 300.

At the Extra Leugam settlement, the percentage of cooking, storage, transport, and serving vessels remained fairly stable in the Roman to Early Byzantine transition. Jars were the most common find, usually thicker, debased, and often with a folded or triangular rim. Most cooking pots evolved directly from their triangular rim predecessors but a number had rounded and everted rims, typical of Petra's Early Byzantine cooking wares. Bowls were the third most dominate form, having remained particularly steady from the Nabataean through the Byzantine period. Bowls were not nearly as common from the Udhruh Survey South Valley and represent less than 5% of the period's total corpus. Cooking pots and jars overwhelmingly comprise the rest of the site's Early Byzantine material.

Although there was a slight recovery after the Roman period, the paucity of Early Byzantine material, both at Udhruh and the intensive survey sites, is rather surprising given the construction of the fortress near the beginning of this period. This pattern parallels Abudanh's earlier survey. The Brown survey, the Finnish Jabal Haroun Survey, and the Jabal ash-Shara survey have reported little evidence of the Early Byzantine period (Alcock and Knodell 2012; Kouki 2012b; Tholbecq 2013). On the other hand, the Umm Rattam survey yielded evidence of an increase in Early Byzantine period occupation, but settlement likely terminated after the 363 earthquake (Lindner et al. 2007).

But the Udhruh survey produced no such evidence of abandonment after 363 and based on historical sources it seems that the region continued to prosper. However, the Petra Papyri do reference an "uninhabited hamlet" within the *territorium* of Augustopolis/Udhruh

(as well as another near Petra). Coupled with the papyri's general implication that land was concentrated in fewer hands, one expects larger land-owners employed tenants to work the land, perhaps living near their fields.⁹⁶ This should lead to an increase in Early Byzantine sherds, more than those recovered in the Udhruh survey. Kouki explained this phenomenon by arguing that Early Byzantine pottery simply may have not survived as well in the archaeological record as it seemed less durable than Nabataean era sherds (Kouki 2012, 27).⁹⁷ While it certainly appeared that Early Byzantine ceramics were more likely to crumble and often appeared more worn than the Nabataean sherds, this does not explain the unexpected dearth of Early Byzantine material. Instead, during the Early Byzantine period, settlement concentrated in certain areas, especially near the fortress, and it remained so until the beginning of the Islamic period in the 7th century. Both the Petra Papyri and numerous surveys of Petra's hinterland support this explanation.

⁹⁶ The notion that tenant farmers must live near their land is discussed more in depth in chapter VII.

⁹⁷ Specifically she states "it has been noted in the Finnish Jabal Harun Project survey that the Byzantine ware is less durable than the Nabataean ware, which is likely to cause the under representation of the former in a surface collection, and especially in the number of diagnostic sherds" (Kouki 2012, 27).

Chapter VI: Placing Udhruh in the Roman Empire

The Udhruh survey pottery produced two unexpected results. First, the Roman material was quite insignificant in comparison with the material from the preceding and following periods, representing 14% of the total Classical era diagnostic sherds examined and only 12% of those at the Extra-Leugam settlement. Second, although there was a definite increase (ca. 12%) in the amount of Early Byzantine period material, it did not increase nearly as much as expected given the fortress's construction ca. AD 300. However, analysis of other Classical era surveys and related research, especially Susan Alcock's 1993 examination of Roman Greece, makes it seem likely that both results are linked to the concept of nucleation.

A number of Nabataeans had an urbanized lifestyle in the 1st century AD, and this pattern was only exacerbated by the AD 106 Roman annexation. As Rome sought to secure the new territory and its external frontier, the rural population was significantly reduced, perhaps by some combination of warfare and migration from the hinterland to the city. Although there is no direct evidence, perhaps the Roman authorities gifted viable agricultural land to large, Romanized landowners. Those who used to own land now possibly worked for an absentee landowner and commuted from the city, which provided a sense of economic stability with its additional employment opportunities and easier access to trade. Petra's prosperity eventually decreased in the 3rd century, partially from the empire-wide crisis of the mid-3rd century and partially from its exclusion from the incense trade, whose main routes now shifted north and south of Petra (Fiema 2003; Fiema 2002). At the start of the Byzantine period, as Rome tied *coloni* to land and taxes increased across the empire, Udhruh became

the region's new economic powerhouse. Originally attracting residents because of the legion's arrival, its fortress seemingly evolved into a small city (especially after the withdrawal of its legion by the end of the 4th century). Now styled Augustopolis, it must have grown and expanded into its hinterland in order to feed the growing population, even as residents continued to prefer city life over that on rural sites. Some of the population did return to the hinterland, although not in the previously densely occupied locations in Wadi Slaysil and Jabal ash-Shara. Rather, they returned to select locations in Umm Rattam, Wadi Musa, at-Tayyiba, and 'Qa, almost all of which had substantial Nabataean architecture and sat near major roads.

Graecia Capta

Susan Alcock addressed a lack of Roman era evidence over the rural landscape of Greece, which at least superficially may be compared to the Udhruh survey results, in her now classic monograph, *Graecia Capta*. Ancient historians and archaeologists had long believed that Greece, Rome's cultural conqueror (Horace *Epistles* 2.I.156), fell into obscurity under the Roman Empire. As Bowersock said in 1965, Greece was "a country learning how to be a museum; cultivated Romans admired Greece romantically for what she had been" (Bowersock 1982, 90-91; Alcock 1993a, 2). This almost overwhelming perception, which had existed since the Roman period, remained unchallenged until Alcock analyzed the settlement patterns revealed by several surveys. And while the initial interpretations of the surveys' results seemingly corroborated the literary evidence, she dismissed both as false. Instead, Alcock argued that Roman tourists, who wrote of their experiences in the Greek landscape, did not notice actual civic decline but rather an urban landscape that did not meet

their expectations, especially when compared to the city of Rome (Alcock 1993a, 29). Their biased interpretation did not reveal anything of actual settlement under the Romans.

Alcock examined the Hellenistic and Early Roman material from 21 regional surveys from across ancient Greece, especially taking into consideration the surveys' coverage intensity and general reliability. In this analysis, she found that surveys of the highest reliability were usually recent and intensive, and met the qualities established in chapter II; they systematically recorded the density and distribution of artifacts across a defined landscape; they documented all periods of human activity, regardless of the specialties of the researchers; they utilized field walkers, often spaced between 10 and 20 meters apart; in exceptional cases, surveyors considered post-depositional factors (usually geomorphic) that may have altered the find pattern. In contrast, surveys of lesser value often only identified sites from the upper strata of a region's hierarchy (Alcock 1993a, 34–37).

In Alcock's analysis of surveys, a general pattern emerged which seemed to agree with the preconceived notions of settlement in Roman Greece; the landscape appears particularly active during the Classical period (ca. 5th-late 4th BC), but there was often a severe drop during the Hellenistic and Early Roman periods (ca. 4th century BC - 4th century AD). Many sites started to decline in the 3rd and 2nd centuries BC, but almost all declined during the 1st century AD. A handful started to recover during the 2nd and 3rd centuries (Alcock 1993a, 48).

Alcock identifies several issues that strongly affect this interpretation of the Greek landscape during the Roman period, especially relating to surveyors' understandings of ceramic chronologies. Similar to the issues of Nabataean/Roman Jordan, the ceramic

chronology for these centuries is difficult to determine and often the period identifiers that past surveys utilized—such as “Hellenistic”—are unnecessarily vague. This issue leads to the next: coarse ware ceramics of the Hellenistic and Early Roman periods (ca. 4th BC century – 4th century AD) are overlooked in favor of well-understood finds—including Late Roman Red Wares and amphorae. Sherds of these vessels are rare in surveys but they are primarily used to date sites (Alcock 1993a, 50). This dating method blatantly disregards the life period or heirloom status of ceramic vessels, especially from rural and lower-class sites.

Alcock’s first critique of survey interpretations based on unusual, if not rare, finds is especially relevant for the Udhruh survey. The local coarse ware chronological typology is in desperate need of further refinement for surveyors to better recognize the transitions in chronological markers, not necessarily associated with major historic events. This can only improve with more publication, beginning with Killick’s excavations at Udhruh. Without this, however, surveyors are forced to look at other local coarse ware ceramic typologies in the hopes that they share similar chronological markers. In this study, the coarse ware typology referenced was that established at ez-Zantur and the Roman Aqaba Project. As the Udhruh survey’s ceramicist was familiar with that typology, to be published within the next year, it was a logical comparison as it does seem to closely parallel Petra’s material as evidenced by the ez-Zantur and Petra North Ridge excavations.

But even with a reliable chronological comparison, the historical transitions are often not marked by shifts in the ceramic tradition. Rather, the forms most common to one historical period often extend well into the next. At Petra, common forms such as the carinated bowl and the triangular rim cooking pot are common from the 1st through 3rd

centuries. Unless there was evidence to suggest otherwise (usually based on the handle or the fabric), the sherd had to be classified as “Nabataean” or “Nabataean / Roman.” This is also an issue at the Early Byzantine transition, but to a lesser degree. Therefore, it is entirely possible that the Roman period is under-represented in a way that would challenge the results offered here. However, with the available knowledge on Petra’s coarse ware, this problem was mitigated by placing most of the problematic sherds in a Nabataean / Roman period, so that the Nabataean and Roman periods could be compared with less bias. However, it was obviously impossible to remove it completely.

Wedded to an unclear coarse ware chronology is a general ignorance of ceramic alternatives—such as metal, glass, or animal hides. At the same time, none of these offer a great substitute to ceramic material; glass or metal might be used for serving ware but not for cooking or transport; animal hides could serve for storage and transportation but not for cooking (Alcock 1993a, 52). The use of any of these alternative materials is not well documented in Roman Arabia because they simply do not survive in the archaeological record and thus they cannot be considered to any great extent. However, given both the strength of the ceramic industry at Petra during the Roman period (attested in Area C at the Petra North Ridge Project) and the unsuitable nature of these alternative materials for cooking, it seems unlikely that anything could effectively replace the all-purpose ceramic.

Nucleated Settlement

Petra’s hinterland seemingly witnessed widespread abandonment at the start of the Roman period. If nothing else, this abandonment could indicate a change in land ownership as it seems especially unlikely that Petra witnessed rapid soil exhaustion at the same moment

of the Roman annexation. Alcock supports this interpretation for Roman Greece, arguing that while the issue cannot be pressed too far, there is a correlation between discontinuity of occupation and the disruption of land ownership (Alcock 1993a, 56). She witnessed a great amount of shifts in site occupation between the Hellenistic and Early Roman period there. While this change did not occur at the historical, 31 BC marker, it suggests settlement instability in the last centuries BC.

The greatest change between the Classical and Hellenistic/Early Roman periods in Greece was the disappearance of smaller sites. During the Classical period (ca. 475-325 BC), scholars believe that these smaller sites were rural farms, occupied year-round. Alcock believes this explanation is too often taken for granted and instead argues that “many of them could well be find-shelters, sheds and outbuildings for use on a seasonal or occasional basis” (Alcock 1993a, 60). If the land was more intensively farmed, more labor was required. This labor would have seasonally invested a significant amount of time in the crops and small, seasonal buildings provide the logical, economic response. But in the off-season, rural inhabitants could have lived in a more urban setting or in a nucleated settlement, closer to the economic and other benefits a city provided (opportunities to sell labor, barter, etc.) (Alcock 1993a, 60-61). The sites that remained occupied throughout Greece’s Roman period tended to be larger and could often be classified as “villas.” These sites had more monumental architecture, sometimes with visible mosaics and baths (Alcock 1993a, 63-64).

The settlement pattern described above is best classified as ‘nucleated,’ defined by Alcock as “a preference for residence in larger, more populous settlements; this entails the rejection of isolated rural occupation” (Alcock 1993a, 95). It was not new in the Classical

world and evidence from Greece indicates it might date back as far as ca. 450 BC;⁹⁸ on Keos, archaeological and epigraphic evidence indicates that only around 25% of the population lived in the rural hinterland while a survey from Boeotia of the town of Hyettos suggested that almost 70% of the population lived within the city (Alcock 1993a, 96). But while this pattern was not unique in Classical and Hellenistic Greece, the desire to live in an urban center during the Roman period seems almost irresistible.

Nucleation is difficult to document or measure as most urban excavations work from the center outward, only rarely reaching the city's boundaries where diachronic change in settlement size can be examined.⁹⁹ Even large site surveys, which take into account both the urban and rural components of a given landscape, provide only rough data as population change does not necessarily reflect site size or vice versa (Alcock 1993a, 96-97). But even if they did, surveys do not all support the same conclusion. In Boeotia, several sites appeared to contract in the Late Hellenistic/Early Roman periods, supporting a theory of demographic collapse;¹⁰⁰ conversely, surveyors at the Methana survey believe the site expanded in the Hellenistic/Roman periods in order to account for declining villages nearby (Alcock 1993a, 97-98). Other analyses that include both surveys and historical/epigraphical evidence suggest that a number of urban centers continued to prosper or even grow in the Roman period—including Hermione, Karystos, Melos, Athens, Tanagra, Messina, and Phokis (Alcock 1993a,

⁹⁸ Alcock does not provide as precise a date, but notes it was common in the Classical era which she dates from the 2nd quarter of the fifth century to the later 4th century BC (Alcock 1993a, 96, 36).

⁹⁹ Alcock argues that city walls are misleading and do not portray how a population conceived of their city and space (Alcock 1993a, 97)

¹⁰⁰ Alcock sees Boeotia's result as definitive evidence of population decline. However, in cities that did not seem to undergo size changes, the demographics did not change significantly; such change would have devastated the city (Alcock 1993a, 105).

99-101).¹⁰¹

The rural sites that had been abandoned from Greece's landscape in the Hellenistic and Roman periods did not disappear entirely or randomly. Rural sites that did survive were regularly near urban centers and their proximity suggests that the rural population utilized the city (Alcock 1993a, 102). Cities offered specialized craftsmen, processing facilities, and markets for both goods and labor, while kilns, cemeteries, and shops were rarely offered in the hinterlands. Therefore, the rural population relied on cities for a number of their social and economic needs. As more of the hinterland's population moved inward, rural residents were forced to enter the city for more and more (Alcock 1993a, 102-105). When the process of nucleation began, it was difficult to counteract.

But what was the initial trigger that drew the rural population from the hinterland to the city? It is difficult to understand the motivation based on the available evidence and, as this was an ongoing process, the motivation for relocation likely changed. Despite the impossibility of the task, several motivations working in concert or individually offer some indication. The most obvious explanation is that the city provided some sense of personal safety against an external threat. Warfare, raiding, and fighting were common in antiquity and it is hard to conceive of any singular event that could have so dramatically changed settlement patterns, but there were a handful of historical events that triggered population

¹⁰¹ Not all of these cities/towns have been surveyed intensively. Rather Alcock comes to the conclusion that they experienced nucleation in the Hellenistic and Roman periods based on numerous examples of building activity in the later periods. Even if they do not necessarily indicate changes in the general population, they almost certainly indicate elite interest (Alcock 1993a, 101-102).

mobility (Alcock 1993a, 106).¹⁰²

If the desire for defense spurred residents to move to the city, what made them stay? Perhaps larger landholders began to take over some or all of the smaller plots, forcing the previous residents to remain in the city for survival. There, the former hinterland residents found economic stability. Or perhaps the imperial taxes proved too much for smaller, agricultural plots where production was difficult to intensify—only the wealthy could stay ahead in the taxation game. Instead of farming their own land, the non-elite could move to the city so they might be available for seasonal wage labor (Alcock 1993a, 107-107).

Alcock draws her data from multiple surveys across Roman Greece and ultimately argues for a unified, homogeneous pattern of land use with a handful of exceptions. In the last decade, scholars have pushed back at this idea of a monolithic Roman Greece, especially Daniel Stewart, who interprets the Peloponnese as a region composed of many, smaller regions (Achaia, Corinthia, Argolis, Laconia, Messenia, Eleia, and Arcadia), instead of a sub-region of Roman Greece (Stewart 2010, 217). He argues—like Alcock and other sections of this work—that changes in settlement patterns do not necessarily correlate with historical, social, or economic periods. Second, change is too often explained as a negative experience, i.e. population loss. Finally, it is not yet possible to use most archaeological evidence for dating closer than a century or half century and, while change might happen rapidly, archaeological data “cannot be tied consistently to that same short-term time-frame” (Stewart

¹⁰² Usually these events were triggered by war, other military conflicts, or brigandage. Alcock notes that this was especially common in Boeotia during the 2nd and 1st centuries BC, when a number of hinterland sites “rapidly disappeared” (Alcock 1993a, 106). This pattern is seemingly confirmed by inscriptions from Hyettos attesting to outbreaks of brigandage (Alcock 1993a, 106).

2010, 219).

For example, in some regions of the Hellenistic Peloponnese, there is evidence of increased elite land ownership, perhaps brought about by mono-cropping, meaning “the world of the Hellenistic Peloponnese is one of change, though not necessarily decline” (Stewart 2010, 221).¹⁰³ The effects experienced by the Roman Peloponnese, which witnessed a decrease in small rural sites and an increase in the number of larger sites, are actually symptoms of some underlying stimulus. Stewart believes that this is the unique geomorphology of the Peloponnese, varying throughout the peninsula. Although the ancient inhabitants might not have recognized the causes of these differences, they certainly experienced them; short-term sites were often clustered on marginal lands, which were utilized more heavily in the Roman period (Stewart 2010, 221-222).

Stewart also challenges Alcock’s interpretation of changing land ownership during the Roman period. While he generally agrees that low levels of site continuity suggest a variable pattern of landholding, he contests the idea that only about 51% of Roman sites had evidence of continuity from the Hellenistic period. While 51% holds as an average, different regions offered evidence ranging from 38% to 91%. Regions with evidence of greater continuity seemingly indicate, contra Alcock, that the land’s inhabitants adhered to the traditional methods of land ownership (Stewart 2010, 223). While a number of Hellenistic sites disappear in the Roman period, a handful of new Roman-specific sites also appear, although it is not understood if they were full-time or seasonal residences. Stewart does not believe

¹⁰³ Stewart seems to view this conclusion as a revision to Alcock’s thesis, but rather it seems to fit well with her original argument. In fact she mostly argues against a population decline and instead points to a shifting method of land ownership and land usage.

that Greece's inhabitants commuted to agricultural land and, even if they did, this does not necessarily represent changing land ownership but a family's changing economic situation. Finally, Stewart notes that a "significant minority of new sites are on soils that are better suited for either trees or vines, that is, mainly olives or grapes" (Stewart 2010, 224), suggesting that it was not a change in land ownership but instead a change in economic strategy.¹⁰⁴

Despite the issues associated with Alcock's nucleation, it still offers the best parallel to understand Roman Arabia. Stewart himself noted that his nuanced interpretation was possible only because there is "a rich body of evidence for the Peloponnese, with text, epigraphy and archaeology each contributing indispensable material" (Stewart 2010, 217). A fair amount of work has been done with the available textual and epigraphic evidence, but these are severely limited resources. Additionally, much is still left to be excavated—or published—in Petra itself, let alone its hinterland. Without this additional evidence to create a more complicated illustration of Petra's hinterland, the concept of nucleation may explain general population trends.

Arabia Adquisita

The threat of violence offered by Rome's annexation of Nabataea is the most likely action to draw such a dense web of agriculturalists into Petra. Very little is known about the event itself—and the extent to which it was violent or peaceful. Roman motivations for such action might offer some clarification, but even less is known regarding Trajan's motivation or plans in the historical sources. Writing in the early 3rd century AD, Cassius Dio was

¹⁰⁴ Roman Greece is not the only province that witnessed different changes in agricultural strategy. See section (g).

remarkably brief in his remarks on the annexation of Nabataea, stating that “around this same time Palma—the governor of Syria—both subdued Arabia around Petra and made it subject to the Romans” (Cassius Dio *Historiae Romanae* 68.14.5). Ammianus Marcellinus offered even less by way of an explanation in the late 4th century AD, stating that “this [the Nabataean kingdom] was given the name of a province, assigned a governor, [and] driven to comply to our laws by the emperor Trajan, repeatedly crushing the uprising of the inhabitants when he was waging glorious war with Media and the Parthians” (Ammianus Marcellinus 14.8.13). Eutropius, another late 4th century historian, included the Nabataeans in a list of peoples welcomed into an alliance with Trajan, whom he later reduced to a province (Eutropius 8.3). In short, we sorely lack a detailed account of Trajan’s reign.¹⁰⁵

Whatever Rome’s reasons for annexing Nabataea, it is apparent that the Nabataeans themselves did not share this desire to be brought under direct Roman control. This conclusion differs from the traditional historical explanation for the event; these scholars note such evidence as the lack of *Arabicus* in Trajan’s nomenclature and coins, which read *Arabia Adquisita* (as opposed to *Arabia Capta*), and interpret the annexation as a relatively peaceful event (Parker 2009a, 1585). Stephan Schmid began to challenge this interpretation based on the destruction layers at ez-Zantur and similar evidence from a wide range of other sites across Southern Jordan and the Negev, dated by ceramic and numismatic evidence to the beginning of the 2nd century AD (Schmid 1997, 415). He attributed the destructive event to the Roman annexation of Nabataea in 106, rather than an earthquake, usually assumed but actually unmentioned in documentary sources (Schmid 1997, 419-420).

¹⁰⁵ For a discussion of the literary evidence available, see introduction.

Rome had built up a substantial military force surrounding Nabataea for this operation. Palma, who was the governor of Syria, likely brought the *legio VI Ferrata* from Syria as epigraphic evidence confirms the legion's presence in the new province by AD 118/119 (Kennedy 1980, 297-299). Two auxiliary units (*cohortes I Hispanorum* and *I Thebaeorum*) were prepositioned in Judea by late 105. The *legio III Cyrenaica* was brought from Egypt, later to become part of the new province's permanent garrison. These are substantial forces drawn from three provinces. Even if the build-up of Roman forces on Nabataea's borders does not necessarily signify a violent event, it certainly indicates that Rome expected serious resistance (Parker 2009a, 1586-1587). The admittedly meager literary evidence, reviewed above, seemingly suggests a violent annexation.

Archaeological evidence adds credence to the argument for resistance suggested by the Roman build-up of forces just outside the province. In Petra itself, the Temple of the Winged Lions has destruction layers dating to the beginning of the 2nd century.¹⁰⁶ Across the Colonnaded Street, the so-called Great Temple also produced evidence of an early 2nd century destruction in addition to 423 ballista balls and 162 arrowheads. Outside of Petra, numerous other sites offer destruction layers or abandonment events dating to around the time of the Roman annexation—including Khirbet edh-Dharih, Dhibon, Oboda, Mamphsis, En Rahel, En Ziq, Horvat Hazaza, Mezad Mahmal, Moyat Awad, Sha'ar Ramon, Dafit, and

¹⁰⁶ The site was never adequately published. The American Center of Oriental Research (ACOR) has started to stabilize the site and reinterpret the evidence, gifted to ACOR by Philip Hammond's widow. Tali Erickson-Gini is reviewing the ceramic material. It is unclear how Erickson-Gini's reinterpretation of NPFW chronologies will affect the dating of the destruction layer.

Aila (Parker 2009a, 1587-1588).¹⁰⁷ It is likely that an earthquake occurring soon after the Roman annexation might have caused destruction at several sites, but it cannot explain the ballista balls or arrowheads at the Great Temple.

Although it seems apparent that the Roman annexation of Nabataea was at least partially violent, the motivation for annexing the eastern client kingdom remains a much-debated topic. Most scholars cite economic and/or military reasons. Starcky argued that both economic interests and Trajan's intolerance of an independent state on the eastern frontier motivated the Romans (Starcky 1955, 101-103 cited in Al-Otaibi 2011, 48), even though Nabataea was clearly a client state of Rome. Parker similarly argued that Trajan, who was a "skilled general intent on pursuing a major policy of expansion," annexed Nabataea as part of such a policy (Parker 1986, 123). This does not differ greatly from Bowersock's argument that Trajan had a long-range plan to annex Nabataea as the missing link in his Mediterranean Empire (Bowersock 1983, 82). Finally, Ball argued both economic and personal motivations drove Trajan to annex the client kingdom (Ball 2000, 15-16, 63).

Economics present an obvious motivation for the annexation. The Nabataeans possessed lucrative caravan routes for such items as frankincense, myrrh, various spices, and bitumen, produced in their own territory from the Dead Sea. As consumers of these products, Roman Egypt aggressively pursued trade on the Red Sea, avoiding the Arabian kingdoms (Gibson 2003, 37) and attempting to divert caravan trade to their Egyptian ports of Berenike and Myos Hormos. Revitalization and intensification of these Roman Egypt ports forced the Nabataeans to seek additional avenues for their own trade, and as a response the Nabataeans

¹⁰⁷ For a more detailed analysis of destruction events at these sites, see Parker 2009 and Schmid 1997.

built the Red Sea port of Aila (Parker 2008, 79-80), which some have suggested was the true object of Trajan's action (Kirkbride 1990, 256 cited in Freeman 1996, 94). But Aila was not the only Nabataean response to an economic threat. Under Rabbel II (AD 70-106), the capital was moved from Petra to Bostra, in modern Syria, which some scholars suggest may coincide with a shift in Nabataean trade routes from the Red Sea to the Wadi Sirhan¹⁰⁸ (Ball 2000, 63). However, the continued flourishing of Petra and Aila—evidenced by building activities in the 2nd-4th centuries—suggests this is untrue.

Fiema further explains the complicated economic desires of the Roman Empire, suggesting that the Romans, upon their encounters with Indian embassies in the time of Augustus, learned that long-distance diplomatic relations outside their control were difficult to establish and maintain (Fiema 1987, 30). While Nabataea was under indirect Roman control from 63 BC onwards, Roman avoidance of Aila in favor of their Egyptian ports provides weight for Fiema's argument. The Romans found that the only way to ensure a continuous flow of goods from the East to the Empire—to maintain the security of their eastern provinces and to potentially weaken the Parthian empire by diverting their economic trade—was to control Nabataean territory directly (Fiema 1987, 30). After the annexation, Nabataean trade with Egypt increased dramatically and the Red Sea ports (both in Nabataea and Egypt, although Myos Hormos was abandoned in the 3rd century and not reoccupied) were used more equally (Fiema 1987, 34). Wherever the trade routes lay, the kingdom was

¹⁰⁸ Most scholars interpret Rabbel II's action as economic, but Fiema suggests that his policies, early in his reign, might have “activated a kind of political and economic antagonism between the North and the South of the Nabataean kingdom,” forcing him to move the capital (Fiema 1987: 29). Other scholars, such as Eadie, have suggested that because Rabbel II moved his capital from Petra, the Romans may have viewed him as “unpredictable and perhaps unreliable” (Freeman 1996: 93).

stable throughout these supposed shifts and did not experience frequent uprisings like its neighbor Judaea. Its annexation could have provided some money and glory for the Romans, Trajan himself, and Palma, the governor of Syria who actually directed the operation to annex Nabataea (Ball 2000, 63).

Other scenarios offer both political and military motivations. Many scholars cite Trajan's desire to 'tidy up' a region outside of direct Roman control, especially in light of possible regional security issues and before the Parthian campaign (Freeman 1996, 93).¹⁰⁹ This argument holds little weight when considering that the Romans considered client states as part of the empire, and would, therefore, not need to intervene in order to 'tidy up' the imperial map (Freeman 1996, 94). Romans typically waited for trouble to appear before reacting, and there is no reason to suggest they would do otherwise in respect to Nabataea (Fiema 1987, 28). The Nabataeans themselves certainly knew that their semi-independent existence on the eastern frontier could end at any moment, and in order to mitigate this threat, they made every attempt to secure imperial favor by expressing a well-faced submission while meeting with Roman officials (Tacitus, *Annals* 2.56.3 & 2.57.3) or on the battlefield by faithfully providing auxiliary troops (Josephus, *Jewish War* 3.68; Fiema 1987, 26).

But despite their supposed deference to the Romans, Ball argues that the Nabataeans did challenge Roman authority in the East. He believes that the eastern people moved further north into a Hellenized region of Syria and became poised to seize a position of power there (Ball 2000, 63). While he acknowledges that the Nabataeans were not successful in this (Palmyra ultimately took advantage of a shift in trade routes), Ball believes that their attempt

¹⁰⁹ This includes Parker and Bowersock, previously discussed, in addition to Isaac.

to reposition themselves as a Near Eastern power, in addition to their possession of the lucrative trade routes, may have motivated Trajan to annex Nabataea (Ball 2000, 63). However, this idea that Nabataea was a threat is not represented in any of the ancient sources, who believed that if Nabataea was not *de iure*, it was *de facto* subject to Roman authority (Fiema 1987, 26).

Additionally, many scholars point to the subsequent war in Parthia as an obvious concern for Trajan. Foreseeing further conflicts with the kingdom, the emperor might have annexed Nabataea in order to safeguard his rear in the future campaign against the eastern threat in ca. AD 115 (Ball 2000, 63). But there is no indication Trajan used Nabataea for this purpose and there are no clear indications Trajan was preparing for war at this stage.¹¹⁰ Any connection between the fortification works—which began to appear along the new *via nova Traiana* trunk road and which supposedly represented a scientific border—and the Parthian campaign is difficult to prove (Fiema 1987, 28). Additionally, for two centuries after the Roman annexation of Nabataea, the new Province of Arabia only had one legion, suggesting Arabia was not fully utilized for military defense purposes, if indeed that had been the initial reason for annexation. After all, the Nabataean Kingdom did not extend far enough east to Parthian territory in Mesopotamia to provide a direct defense against the eastern threat (Ball 2000, 63).¹¹¹

¹¹⁰ By moving from Egypt to Bostra, the *Legio III Cyrenaica* sat significantly closer to the Parthian frontier. Trajan certainly found this move helpful in his campaign, but it remains doubtful that he annexed Nabataea for this reason.

¹¹¹ However, the additional troops that Nabataea contributed would have offered significant support for Trajan's invasion.

It does appear that Trajan planned the annexation of Nabataea, but it is possible that it was not Trajan himself who initiated action but his governor in Syria, Cornelius Palma. There is evidence that Trajan issued general instructions to Palma when he took office as governor in Syria, and perhaps Palma was forced to react to a situation within Nabataea, such as a conflict over succession (Fiema 1987, 29). A diploma from a soldier stationed in Egypt shows that Palma was able to garner strength from troops in the East, which suggests substantial forces stationed there. *Legio III Cyrenaica* was positioned in Egypt while *cohortes I Hispanorum*, and *cohortes I Thebaeorum* were pre-positioned in Judaea ca. September 105, suggesting that Trajan and Palma prepared to face serious Nabataean resistance (Pflaum 1967 cited in Parker 2009a, 1586-1587). Palma above all would have drawn from the substantial army in his own province, including *legio VI Ferrata*.

The question then becomes, what was Palma's role in the Nabataean annexation? Only Palma was likely present in the region at the time on March 22, 106.¹¹² Trajan was completing the conquest of Dacia from June 105 until autumn 106 (Freeman 1996, 94). Eadie suggests Palma might have initiated actions for which "Trajan may have been ignorant or unprepared" (Eadie 1985 cited in Freeman 1996, 94). Further, Eadie suggests that because of Palma's unwarranted actions, he seems to have disappeared from public life, perhaps having fallen into disfavor because of them (Eadie 1985 cited in Freeman 1996, 94). But it seems unlikely that Palma, the governor of Syria, could have commanded troops based in Egypt and Palestine without explicit authority of the emperor. And if his action so displeased Trajan, why was he awarded the highest honor that could then be given to an individual outside the

¹¹² This date was henceforth the first day of each year of the new provincial era.

imperial family, the *Ornamenta Triumphalia*, in AD 107 (*Corpus Inscriptionum Latinarum* VI. 1386)? Eadie's interpretation must be rejected on the basis of the available evidence.

The wealth, stability, and growing urbanization of the Nabataean kingdom may also have attracted Trajan. Generally, the Nabataean kingdom was prosperous from the late 2nd century BC until the Roman annexation. Kings ruled for long periods (Aretas IV for 48 years, Malichus II for 30 years, and Rabbel II for 36 years) and the transitions between reigns in the 1st century AD seems to have been relatively peaceful, “without the endless rounds of fratricides, civil strife and general bloodletting that characterized so many Near Eastern monarchies (or Rome itself for that matter)” (Ball 2000, 64). Furthermore, between 58 BC and AD 106, Rome was only given five opportunities to decide if it wished to uphold the succession of the monarch’s son (Goodman 2012, 283). Even Strabo himself said that the Nabataeans “had excellent laws for the administration of public affairs. . . [and that] the natives never had any dispute amongst themselves, and lived together in perfect harmony” (Strabo 16.4.21, translation Jones 1924). Favoring minimal bureaucracy in their empire, a wealthy, peaceful, and well-ordered society needing little Roman intervention would have proven difficult for the Romans to resist. The fact that Nabataea maintained some nominal independence for nearly 170 years, longer than almost any other eastern client, is notable in itself.

This might have changed because of an eastern or even internal threat. The Safaitic and Thamudic tribes in Jordan, the Negev, and Sinai could have been hostile to Roman rule and possibly to the by now more settled, agricultural, and urban Nabataeans as well. The Nabataeans might have become less adept at controlling their own borders and the external

tribes who crossed through them to the east (Parker 1986, 124). However, Nabataea was only bordered by the Arabian Desert, stretching from the Red Sea to the Roman provinces of Syria, Palestine, and Egypt. The relationship between the Nabataeans and the people of the eastern steppe was complex, but no known surviving evidence suggests a large-scale military threat (Millar 1993, 93). Even if a small-scale military threat existed, the Nabataeans had been able to maintain economic prosperity throughout the 1st century AD (Parker 1986, 124), suggesting that an eastern threat had little effect on the Nabataean kingdom as a whole. Some scholars even suggest that the annexation was a result of internal brigandage (Freeman 1996, 93), but this seems less likely.

Rome's Post-Annexation Momentum

Even assuming that Rome annexed Nabataea for a number of motivations, its actions after the event still remain unclear. However, the changes enacted on the former Nabataeans might be evidenced by Rome's actions on other frontiers. Rome had established a conscious policy of extracting resources from the Hellenistic Kingdoms, Spain, and Africa beginning in the 2nd century BC. It even interfered with kingdoms beyond its frontiers and beyond what could reasonably be labeled its sphere of influence (Crawford 1977, 42-43).¹¹³ As Edouard Will stated in 1967, “finally, one comes to think that the causes of war . . . they are to be sought in Rome itself, and that the true reason must, when all is said and done, be called by its proper name: Roman imperialism” (Will 2003, 123).¹¹⁴ Rome expanded continuously

¹¹³ See Philip V of Macedon-Walbank 1940, 240-252 (Macedon); *Roman Politics*-Schullard 1973, 229-230 (Syria); Polybius XXX, 1-3 (Pergamum).

¹¹⁴ “on en arrive finalement à penser que les causes de la guerre ... sont à chercher à Rome même, et que la vrai raison doit, en définitive, être appelée par son nom: l' impérialisme romain.”

until the 2nd century AD, and client kingdoms seemed helpless to stop the process.

But while Rome might have sought out war, it ultimately blamed the cause of wars on their conquests and sought reparations for its expenditure. For instance, they levied indemnities on Hiero of Syracuse (Polybius i, 16, 9) and Carthage after the First Punic War ca. 241 (Polybius i, 62, 9; 63, 3); Illyria after both wars ca. 228 and 168 BC (Polybius ii, 12,3; Livy xxii, 33, 5); Carthage after the Second Punic War ca. 201 BC (Polybius xv, 18, 7); Boeotia, Sparta, and Macedonia after the Second Macedonian War ca. 197 BC (Polybius xviii, 44, 7; Livy xxxiii, 30, 7; xxxiv, 35, 11). The list continues (Crawford 1977, 43). But the east underwent a major change when Rome insisted Macedonia and Illyria pay their monetary tribute in perpetuity, with the suspension of tribute. This move allowed the senate to close Macedonia's silver mines and to control the iron and copper mines. With this punishment for their military expenditure, they both suppressed the province's inhabitants and gained better control of their coinage as they had suspended silver coinage in favor of bronze wherever possible. This paved the way for Tiberius Gracchus to finance his ca. 133 BC agrarian program—which sought to limit the amount of public land an individual could control—and for Gaius Gracchus to hand over the contract for tax collection in Asia to the *publican* in 122 BC (Crawford 1977, 44-45). Thus Rome had begun the pattern of manipulating war and aggression as a conscious maneuver to control precious resources, even outside their borders.

Unsurprisingly, Romans of every class—ranging from soldiers to financial magnates—began to acquire land in their new provinces (Crawford 1977, 48). In the Late Republic soldiers discharged in the eastern provinces likely acquired property there (Brunt 1987, 219;

Crawford 1977, 48).¹¹⁵ This ignores the largest landholder of all—the Roman Emperor.

There is little written that discusses the official imperial holdings, but it is undeniable that the Empire certainly held a considerable amount of land, although the extent of this is unknown (Lewis and Reinholt 1990, 95-96).¹¹⁶

Roman Arabia

However, long before Nabataea's annexation, the emperors had generally ceased providing land; instead, they provided a sizeable discharge bonus to their legionary veterans from the *aerarium militare*. From *legio III Cyrenaica* (ca. 5000 men, each serving 20 years) and the provincial auxiliary units (totaling ca. 5000 troops serving 25 years) (Kennedy 2004, 46-47), one might estimate a maximum of 450 individuals per year would be discharged as civilians from the provincial army. In actuality, nowhere near this number was likely added to the province's population; some almost certainly died in service and others likely retired elsewhere.

An estimated 4,500 troops from the former Nabataean army were incorporated into the Roman *auxilia*. Forming six units of *cohortes Ulpiae Petraeorum* (Kennedy 2004, 46; Parker 2009a, 1591), this number does not take into account the number of individuals who followed the departing troops, nor does it account for the number of Nabataean lives lost in

¹¹⁵ A number of veteran colonies were established in Asia Minor but rarely in the Levant. The legionary colony at Berytus long maintained something of its Latin character.

¹¹⁶ This is certainly true of Roman Africa and Egypt, arguably the most important sources of Rome's food supplies. It seems that the empire leased parcels of the land to *coloni*, who might either deliver a certain percentage of their crops and provide a certain amount of labor for the land's use, or who effectively paid rent (Lewis and Reinholt 1990, 95-96). For further historical examples, see Lewis and Reinholt 96-101.

the Roman annexation. Although the troops that made up the *cohortes Ulpiae Petraeorum* were probably gathered from all over the former Nabataean kingdom, it is likely that a large chunk of them originated from the Petra region as the former capital remained a large economic powerhouse. Bostra was the administrative center of the province but Petra seems to have retained considerable importance as the former Nabataean capital.¹¹⁷

But the Roman army's presence continued to be felt in Petra after the annexation itself. Nabataeans who had remained outside the city (not having fled there during the annexation itself for fear of their safety) were likely forced into the city itself for safety reasons, or perhaps even forcibly moved by the Romans themselves, who were worried about an uprising. An AD 107 letter from a soldier, stationed somewhere in Arabia, wrote that he would visit his father in Egypt when his commander started to grant leave (P.Mich.8.466).¹¹⁸ If soldiers were not granted leave, they were still needed, implying either insecurity or instability. The fact that milestones of the *via nova Traiana* do not appear until 111, five years after the annexation, seemingly offers support for this view.

But after Rome re-established stability, why did Petra's population not spread back to

¹¹⁷ Bostra was the headquarters of both the governor and the province's only legion, but Petra received a great number of honors, which only came to Bostra later. Petra housed Trajan's triumphal arch and was honored by him as 'metropolis' of the province. The Babatha archives indicate that the city continued to remain administratively vital as well; the guardians of Babatha's sons were appointed by Petra's *boule* and in 125 the governor of Arabia summoned Babatha's guardian to Petra to be judged (Bowersock 1994, 84-86). While the governor likely traveled throughout the province and his presence in Petra does not indicate that the city became the province's next center, Bowersock argued that "the assizes to which Babatha had recourse at Petra do indicate that the city was considered among the most important in the province" (Bowersock 1994, 86).

¹¹⁸ He writes "I shall take pains, as soon as the prefect (of the province?) begins to grant furloughs, to come to you immediately... You will tell the firm of Aphrodas, the son of the condiment dealer, that they enrolled me in the cohort at Bostra. It lies 8 days' journey from Petra" (P.Mich.8.466).

the hinterland? The Roman army was likely deployed in far-flung garrisons and detachments across this new sprawling province, which extended from southern Syria to Sinai and to Hijaz in the northwestern Arabian peninsula. There was likely at least a detachment posted at Petra itself and, as suggested above, Udhruh may well have had a garrison in the 2nd century. The AD 107 papyrus indicates that at least part of *III Cyrenaica* was in Bostra, not Petra (P.Mich.8.466).¹¹⁹ A detachment (*vexillatio*) of *VI Ferrata* was likely stationed at Humayma, evidenced by an inscribed statue base which references C. Bruttius Praesens—the legion's commander in 114/115 (Kennedy 2004, 48, 197). Graffiti at Meda`in Saleh in the Hejaz indicates that *Ala Dromedariorum* likely protected the road station there in the early 2nd century, along with the *Ala Veterana Gaetulorum* (Kennedy 2004, 48-49). The *Cohors V Afrorum Severiana*, *Cohors I Thracum*, and *Cohors VI Hispanorum* were engaged in building a *castellum* at Qasr el-Hallabat in northern Jordan by 212. *Cohors III (?) Augusta Thracum Equitata* could have been based at either Umm el-Quttein or at Mampsis in the Negev. *Cohors I Hispanorum* and *Cohors I Thebaeorum* were located somewhere in the new province, but that location is not yet known (Kennedy 2004, 49).

Although the Roman army certainly had been in Petra, as seemingly evidenced by the numerous destruction events, it did not remain there long. Instead, the *vexillatio* of *VI Ferrata* moved to Humayma for almost two decades and *auxilia* moved both north and south, likely to guard the trade routes. Humayma, although relatively close to Petra, is 45 km south of the city. This effectively meant that the Nabataeans shipped out of the province post-annexation were not replaced. Additionally, the Romans could have killed or removed large

¹¹⁹ Kennedy has a different interpretation, arguing instead that the writer was in Petra. While the base was stationed at Bostra, he argues that it was often fragmented (Kennedy 2004, 48).

groups of Petra's population or sold them into slavery in order to decrease the likelihood of rebellion. Petra's population probably had to have experienced an initial decline because of the events of 106.

Even if Rome initially removed some of Petra's population and the Roman army did not take up residence nearby, Petra did recover in the 2nd and 3rd centuries (Fiema 2003) and its inhabitants would have required supplies. The *via nova Traiana* could have brought these into the city, but it is unlikely that Petra imported everything while living so close to fields with irrigation systems. The former royal estates of the Nabataean kings would have now become imperial property or sold to others, but it would be pointless to allow potential productive lands to lie idle. Instead, it is more likely that Petra's residents continued to utilize the fields, either formally leased to them by the emperor or unofficially exploited. Based on the dearth of Roman era ceramic material in the hinterland, those who utilized the land apparently lived in Petra itself, choosing to commute to the fields.

Alternatively, some portion of the indigenous population might have changed from agriculturalists to pastoralists as this, too, would explain what appears to be a deserted hinterland. Like pre-Roman Greeks, Nabataean pastoralists were likely constrained by the size of their property and animals were a part of a family's overall subsistence strategy (Alcock 1993a, 87). Several small enclosures—thought to have held livestock—date to the Nabataean period in Petra's hinterland (see chapter III), but almost none date to the Roman period. In a period when families had to carefully define their property, small permanent corrals were necessary. But when land was less carefully protected—perhaps because absentee landowners relied on the very individuals who needed to put their animals to pasture

to also cultivate their land, or perhaps because the land now belonged to the emperor and no one worked it—individuals could graze larger herds on larger swaths of land. These larger herds also presented a means to avoid some of the increased taxes imposed by Rome; tax-collectors likely found it difficult to accurately access larger herds, parts of which the owners might have hidden in the early rendering of a “tax dodge” (Alcock 1993a, 88).

Visible Movements & Possible Nucleation in the Former Nabataean Kingdom

With an understanding of the demographic shifts Petra experienced post annexation, it can only be expected that Petra’s hinterland in the Roman period appears almost entirely deserted. Very few small architectural sites seemingly date to the 2nd and 3rd centuries, in contrast with the walls, gates, field systems, and other small sites that littered Petra’s countryside in the 1st century AD (see Chapter III).

But the Nabataeans’ overwhelming presence in Petra’s hinterland, especially in comparison to that of other periods, might be exaggerated, blurring the indication that nucleation already occurred in the 1st century AD. While there is not quantifiable evidence to support this, it is plausible that 70-75% of Petra’s Nabataean era population could have lived within the city itself, paralleled with Classical Keos and Boeotia discussed above. The surface of Petra and Wadi Musa is certainly flush with 1st century AD ceramics, in numbers that overwhelm those found at almost any Nabataean hinterland site. The Nabataeans could have certainly commuted to their fields at the edge of the marginal zone, approximately 15km away, just as easily as those did in pre-Roman Greece. Modern ethnographic studies have revealed that farmers are willing to travel up to five hours to visit their furthest fields (Renfrew and Wagstaff 2009). Assuming a relatively mild pace of 5 km per hour walking,

Petra's residents could have made it to the furthest fields well within the 5-hour timeframe, taking into account the region's rough terrain. In this way, Classical and Roman Greece presents an excellent parallel to understand Petra's hinterland.

Even if the idea of Nabataean preference for nucleated settlement is rejected, Petra's Roman period sites did witness different use patterns. As noted earlier, Roman period sites noted by the Umm Rattam survey often lacked earlier material (Lindner, *et al.* 2007, 251-254). Roman sites at Bir Madhkur were almost always larger, close to a road system, and built of large limestone blocks, filled with rubble (Smith 2005, 64-68). The Jabal Haroun survey noted that medium and large sites decreased during this period, but at a much slower rate than the small sites (Kouki 2012, 80 and 85). In the Jabal ash-Shara range, surveyors failed to identify any sites definitively constructed during the Roman period, and a decrease in the period's pottery also suggests a decreasing population in the region (Kouki 2012, 84; Tholbecq 2001, 404).

Almost all of the surveys suggest that land-use strategies changed in the 2nd/3rd centuries. Occupants rejected the previous system of land management and clustered at the larger, more developed sites. If the land was exploited as it had been, the smaller sites, having either existed from the Nabataean period or been built new, would have remained as numerous. Some of the larger sites disappeared as well, but to a significantly lesser degree. It seems that the hinterland's population did decrease somewhat but also that it moved away from the smaller sites to the larger, nucleated hinterland settlements or back to Petra itself. The latter was most certainly true at the sites closest to Petra (Jabal ash-Shara and Wadi Silaysil).

If Petra itself was just as densely populated in the Roman period as it had been in the Nabataean period, the occupants must have depended just as heavily on their agricultural hinterland in the later period. While some have argued that “the more numerous the traces of human activity in the landscape, the more intensively the land was exploited” (Osborne 1987, 69-70), Alcock asserts that a lack of permanent or even semi-permanent shelters in a particular landscape do not necessarily indicate a lack of agricultural activity in that particular space (Alcock 1993a, 82). Although living primarily in the city itself, Petra’s population certainly still turned to the hinterlands for sustenance. Unless the soil was completely exhausted—and it seems entirely too easy to assume that Petra experienced soil exhaustion at the exact same moment as annexation—it is unlikely that Petra’s inhabitants deserted the marginal land entirely.

As foreign landowners collected land in the newly Roman Greece, native small-scale landowners were pushed from the hinterland back to the city, where they now had to seek alternative methods of supporting their families (Alcock 1993a, 79). Some of the new landlords might have resided on their new land on a full-time basis, but it is certain that some of these new owners were absentee part of the time (Alcock 1993a, 65). Perhaps the previous owners worked the land for them, or perhaps those on the lower rungs of society provided cheaper labor.

Crops and the Early Byzantine Expansion

It is now believed that in much the same way that land ownership changed, so too did the land’s use. This stands in contrast with Moses Finley’s *The Ancient Economy* that argued that agriculture in the Greek and Roman periods was rather unproductive. He insisted that

most instead lived at a near subsistence level (Finley 1999), “reinforcing the persistent representation of the Greco-Roman periods as a curiously unproductive intermission between the great advances of later prehistory and of the middle ages” (Greene 2000, 30). Looking at both historical and archaeological evidence, Greene argues that the Romans brought great swaths of hinterland territory into a single political unit, allowing it to be improved with infrastructural, organizational, and mechanical processes (Greene 2000, 30).

Finley had argued that agricultural technology had mostly remained unchanged and limited throughout the Classical Era. Rather, it is now apparent that the Greeks and Romans continually improved upon the technologies available for the processing of the Mediterranean Triad—grapes, olives, and cereals. Roman estates often had grain mills driven by muscle or waterpower, and presses for olives and grapes became more sophisticated throughout the Roman period. Evidence from Gaul indicates the practice of selective breeding (Greene 2000, 35-36). And, while Finley acknowledged Roman Egypt as an exception to the pattern, new textual evidence from Vindolanda by Hadrian’s Wall indicates the fort’s occupants were economically rational like Roman citizens in Egypt (Rathbone 1991; Greene 2000, 37).

With the improvement of agricultural technology came the appearance of cash crops and an increase in pastoralism. Small-scale landowners could diversify their crops and live on their land as they had less profit per square unit of property. It is no surprise then that after the Romans conquered a new territory, they employed more intensive policies with crop specialization. This technique allowed further “exploitative” strategies as the landowner

could absorb smaller returns.¹²⁰ Absentee landowners would find single crops easy to manage and new markets in the form of newly annexed provinces increased demand. Additionally, owners likely had other forms of income, perhaps from larger flocks. Previously, flock owners were restricted to grazing their herds on their limited lands, or at most those of the city to which they paid taxes/tribute, etc. The animals would provide manure for their fields but little additional income. But under the Roman Empire, larger landholders were no longer restricted by property or city boundaries, facilitating greater transhumant movements (Alcock 1993a, 87-88).

If Petra's inhabitants switched from multiple to single cash crops under the Roman Empire, the microbotanical remains should indicate a change. This data is not currently available for Petra itself, but evidence from other regions in the Near East—specifically North Africa, Israel, and the Negev Desert—corroborates Alcock's changing land-use theory under the Empire,¹²¹ most notably as this moment marks North Africa's introduction to olive oil. Numerous oil presses dating to Rome's annexation and later "strongly imply that the introduction of the olive tree in the area was a significant part of its Romanization" (Rubin 1991, 201). Serialized olive presses there further suggest "an intent to produce large volumes of surplus olive oil on a regular basis (Hitchner 2002, 76)," which the local population would presumably sell, not consume. Art illustrating wine production also suggests an intense

¹²⁰ Documentary evidence testifies to this occurrence at other places in the Roman Empire; Philostratus mentioned Thessalian grain shipments sent to Rome; Hadrianic legislation regulated the exportation of olive oil from Athens; Pliny and Pausanias both indicate that unguents were manufactured for export (Alcock 1993a, 80).

¹²¹ A well-known theory matches historic episodes to changes in climate. Rosen rejects this idea as false, instead arguing that although rainfall amounts certainly fluctuated during the Roman and Byzantine periods, these fluctuations were numerous and do not correspond with whole time periods (Rosen 2007, 153-154).

focus on wine production, while archaeological evidence indicates that horses, sheep, and camels were raised as live-stock (Rubin 1991, 201).

Farming on marginal land was both high risk and time-intensive, meaning that the reward had to be equally high. When the Romans conquered North Africa, they gave land to veterans, colonists, and native elite rulers who had been successfully Romanized. This often meant that land was repurposed from the original owners and incorporated into the Roman economy in order to collect taxes (Rosen 2007, 155). Then the imperial government could move resources from the southern frontier to meet their needs (which were often driven by newly urbanized populations, effectively connecting new territories to the Roman market) (Fulford 1992, 300-301; Rosen 2007, 156). As part of the larger, unified Mediterranean basin under a tightly monitored grain supply, North Africa suffered fewer food shortages as goods could be moved more easily from one place to another (Rosen 2007, 156-157).

But Rome's attraction to the Negev Desert differed from their attraction to North Africa and thus their actions differed there as well. The Nabataeans had slowly inhabited the area, initially only establishing small settlements and way stations along the spice route. There was then little farming in the Negev and its population did not meet the qualifications Rome sought in its new territories. Compared to inhabitants in other parts of Palestine and the Levant, the Negev's inhabitants were not settled agriculturalists who utilized traditional farming techniques.¹²² Rome had little desire to turn marginal land into agricultural zones

¹²² Archaeologists increasingly challenge this notion of a bare Negev. Recent research has revealed that the Nabataeans began building permanent structures in the Negev, beginning in the 1st century BC. A number of these were way stations, caravanserais, and cisterns along the Incense Route, but by the 1st century AD the long distance trade between Petra and the rest of the Mediterranean caused a substantial building explosion. Although there is little

when their needs were supplied by other regions (Rosen 2007, 161).

After ca. AD 200, the western empire suffered an agricultural recession (Rosen 2007, 158). North Africa, Greece,¹²³ and the Levant, however, continued to thrive and expand during this time as settlement and agriculture extended further into the hinterlands. Population seemingly boomed from Syria to the Negev as land was worked both by individuals and new institutions, such as *limitanei* (Roman frontier troops) and monasteries. These areas remained relatively stable throughout the 5th century and drew former residents of the Western Empire, who brought their wealth with them, further boosting local economies. Demand soared for wine, olive oil, and luxury goods. Cities witnessed construction of new churches and monasteries, which in turn increased the demand for skilled craftsmen (Rosen 2007, 158-159).

The Negev prospered as the region witnessed the most notable shifts from nomadism to sedentary agriculture. This major agricultural shift from the 4th to 7th centuries coexisted with increasing imperial administration and law, which in turn led to the increasing size of towns with new monumental architecture in the Negev (Rosen 2007, 161; Rubin 1991, 197) (see figure 56). The former Nabataeans mixed with people from elsewhere in the Mediterranean and the mixing of the many cultures and technologies is evidenced in their

research about the agricultural systems of the Negev during this period, a number of temples, quarried caves, and villas (which parallel Petra's level of development during this period) indicate that it was unlikely that the Nabataeans imported all their food-stuffs (Erickson-Gini 2006, 160-162). But despite this 1st century AD prosperity, it cannot be denied that the Negev's Early Byzantine systems were much more sophisticated than those from any other period.

¹²³ In Roman Greece, there were “patterns of rural activity once again resembling the ‘full’ landscape of the Classical epoch” (Alcock 1993a, 48).

settlements, specifically in regard to water conservation (Rubin 1991, 203).¹²⁴ The economic system—closely tied to the agricultural system—also changed at this point as Negev's inhabitants relied on runoff agriculture,¹²⁵ and the crops that it yielded,¹²⁶ as opposed to a dependence on the spice trade and caravan routes under the Nabataeans (Rubin 1991, 203).

¹²⁴ It is unclear what peoples Rubin believes came to the Negev at this point. Perhaps he simply refers to the *limitanei*, who might have become part-time farmers as well as soldiers.

¹²⁵ The change in the Byzantine period was so momentous that Rubin claimed that “[d]uring no other period was the Negev so densely occupied and populated” (Rubin 1991, 197), in part facilitated by the field systems. Some systems utilized the land between two blocked wadis, flooding a horizontal plot and making the land arable. This system is well paralleled in Roman North Africa. Another, rarer system controlled larger wadis with dams, forcing water into a water conduit system which carried it to a field system above the wadi on a plain (Rubin 1991, 200). For a more recent analysis of the Negev’s agricultural regime, see *The archaeology of the early Islamic settlement in Palestine* (Magness 2003).

¹²⁶ During this Byzantine period, the Negev’s inhabitants relied on three types of “crops”: field crops (wheat, barley, legumes), tree crops (grapes, olives), and livestock (sheep, goats, maybe camels and horses).

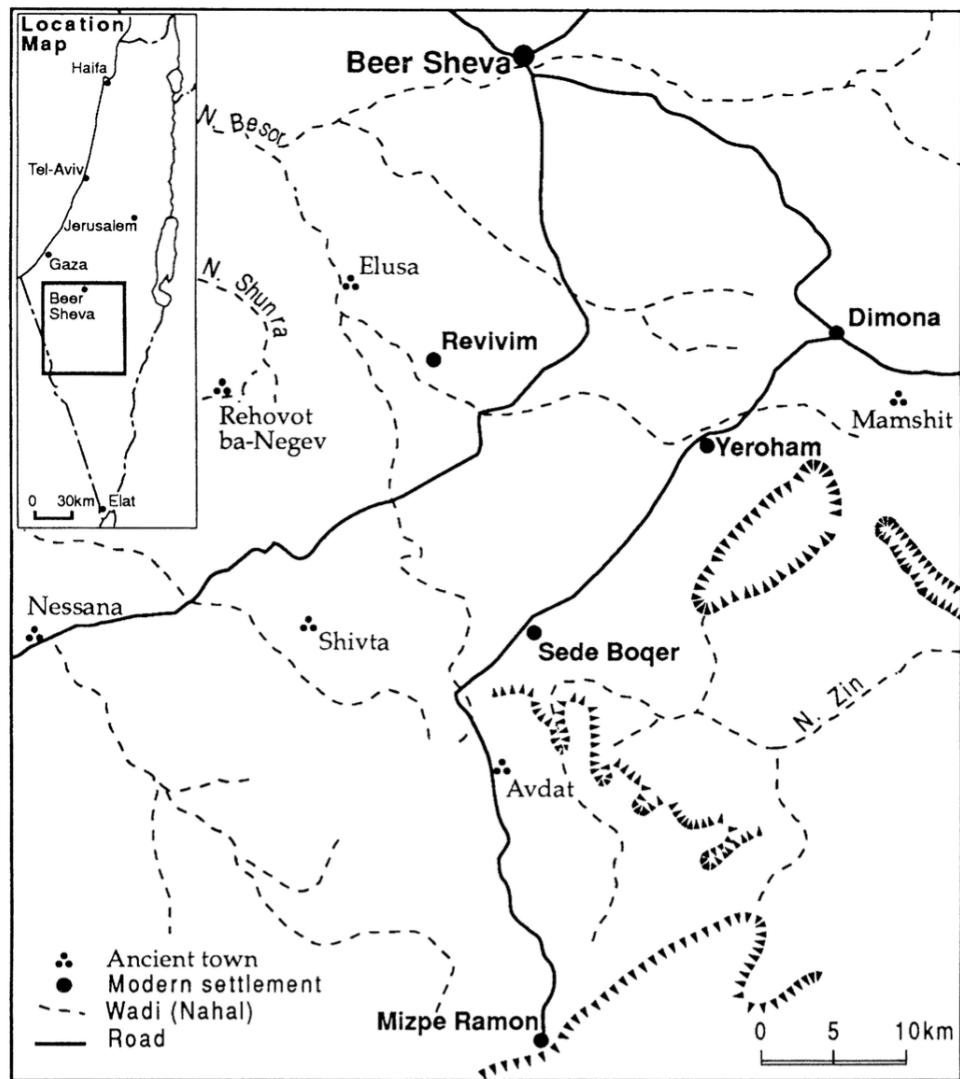


Figure 56: The Negev's major urban centers in the Byzantine Period (Rubin 1991, 198)

Petra verses Udhruh

The Negev Desert is not a perfect parallel for Petra's hinterland during the Byzantine period. Petra had rich agricultural zones dating back to the Nabataean period, and the Romans almost certainly utilized these, even if they did not annex Nabataea for the resource. The Negev Desert, on the other hand, was almost completely barren, despite the Nabataeans' knowledge of water management techniques, and Rome mostly ignored all but the frontier

there until the Byzantine period. Petra's hinterland was also on a frontier, but a much busier one with multiple other (economic) purposes.

But despite the economic differences, the Negev experienced a population boom at much the same time as Udhruh. While this can partially be explained by a general period of prosperity in the eastern empire and by the intensive Tetrarchic military buildup on this frontier, it does not indicate why other regions on the frontier failed to revive. Why Udhruh but not Petra, which received more rainfall annually? Aila was quite prosperous during the Early Byzantine period, but the auxiliary fort at 'Ayn Gharandal, only ca. 70 km from the Red Sea Port, likely went out of use before the start of the 5th century (Darby et al. 2012; Key 2015).¹²⁷ The fort at Yotvata, ca. 30km south of 'Ayn Gharandal, was also abandoned at the end of the 4th century (Davies and Magness 2014, 356).¹²⁸ Based on evidence from the Negev, Rubin argues that "settlement was an outcome of imperial initiative and policy and that the process of settlement in the desert depended on forces within the ecumene, not from the desert itself" (Rubin 1991, 204). It was not the regions that attracted population increase but the imperial actions enforced upon the land, which brought a unique mixture of people and their technological advances.

Although some disagree, archaeological excavations over and over again suggest that Petra experienced decline in the Early Byzantine period, even if it did not lose its title of provincial "capital" (Fiema 2002, 213). There is much evidence indicating that great swaths

¹²⁷ The 'Ayn Gharandal team is still in the process of excavating but one of the ceramicists, Tiffany Key, has noted to the author that there appears to be no ceramic material dating definitively after ca. 400.

¹²⁸ It is not clear why Yotvata fails to appear in the *Notitia Dignitatum* while 'Ayn Gharandal is listed if both sites go out of use at approximately the same time (Davies and Magness 2014, 356).

of the city did not recover after the 363 earthquake. This includes the Great Temple, Temple of the Winged Lions, parts of ez-Zantur (later destroyed again by the earthquake in 419) (Fiema 2002, 195), in addition to new evidence from Petra's North Ridge and the Petra Garden and Pool Complex.¹²⁹ The size of Petra's population during this period remains unclear, but it was likely negatively affected by the 363 earthquake. Perhaps it is notable that the *Expositio Totius Mundi*—an anonymous document that lists wealthy Syro-Palestinian cities thriving because of trade—fails to mention Petra (Fiema 2002, 225). With the exception of Jabal Haroun, southern Jordan benefited from no religious centers, which might have attracted pilgrims and their wealth (Fiema 2002, 226). But even if the city offered sites to attract religious tourists, Petra offered no garrison to protect the city.

At the same time that Petra and its immediate hinterland were almost completely abandoned (Jabal Haroun, Jabal ash-Shara, Umm Sayhoun, Bayda), Udhruh itself and a number of exterior sites continued to prosper or even grow at approximately the same time as Diocletian reestablished security along the eastern frontier. The Wadi Musa Waste Water Survey identified Early Byzantine on half of the sites in the Wadi Musa and at-Tayyiba sectors ('Amr 1998, 516-535; Fiema 2002, 207). Certainly the 4th century witnessed increased stability—the end of the crisis of the 3rd century and the policies of Diocletian and later Constantine—in a way that would have allowed outward expansion into the hinterland. Perhaps in conjunction with the destructive earthquake, which forced Petra's inhabitants either to abandon the city or spend excessive resources rebuilding, Petra's previous inhabitants were propelled from their homes. Some resided on small farms while others

¹²⁹ Evidence of construction activity at the Petra North Ridge Church and the Petra Church indicate there was some minimal recovery after these catastrophic events.

moved to the nearest city, Udhruh.

Udhruh was not the only military site near Petra in the 4th and 5th centuries (in addition to the numerous towers the region supports, which Killick identified as littering the landscape) and there is much evidence of a military presence in the region during the Early Byzantine period. Eusebius' *Onomasticon*, a compilation of the bible's holy places for pilgrims at the end of the 3rd or beginning of the 4th century, mentions that Thaiman/The man (location unknown) has a garrison of Roman soldiers there (Eusebius *Onomasticon* 1904, 96, II, 19-21; 97, II 14-19).¹³⁰ The work also mentions a garrison at Carca, one day's journey from Petra (Eusebius *Onomasticon* 1904, 116, II, 17-19; 110, II. 13-15). The Beersheva Edict also references Carca/Cartha (Mayerson 1986, 144). The *Notitia Dignitatum* places the "First Fortunate Regiment of Mounted Palestinian Native Archers" at Sabura, believed to be modern day Es-Sabra (6.5 km south/southwest of Petra) (Kennedy 2004, 183).

Archaeological finds also support a landscape with a great military presence. A partial Greek inscription found on Petra's North Ridge "certainly mentions *Palaestina Salutaris* and also seems to mention 'speakers of a barbarian tongue' and 'fighting'. It may be honoring a person, perhaps a soldier" (Egan and Bikai 1999, 510-511). A late 4th/ early 5th century Greek graffito at a road station on Wadi Sleisel reads "in this holy place, made in memory of Abdoobodas son of Abdoobodas, by men of the former Magister of the Soldiers (stationed) at M..... between Samar and MPSI" (Zayadine 1992, 218-222). Tall Abara, 2km south/southwest of Udhruh, looks to have contained a temporary marching camp (Kennedy

¹³⁰ It is possible that Jebel Tahuna is Thaiman/The man. The site is ca. 12 km east/northeast of Ail and ca. 12 km southeast of Udhruh. Killick dated the pottery as 'Byzantine' (Killick 1987, 32; Kennedy 2004, 183).

2004, 180).

The soldiers on the eastern frontier lived differently during this period than they had during the Roman period. They were *limitanei*, or frontier soldiers who were also part time farmers. Udhruh's legionary residents certainly farmed during this period, and field systems around the fortress contain a variety of ceramic material dating to the 4th and 5th centuries. Further study is needed to determine if Udhruh's residents continued to use the fields after the legion left.¹³¹

For those accustomed to nucleated settlement, Udhruh was the obvious choice. It offered a large population, in the form of soldiers and their families. The *vicus* was likely rather large already, in order to house the families of the 1,000-2,000 soldiers. They would have required imported food and presented a tempting market for other goods. The kiln that likely existed right outside the fortress (perhaps dating to the 4th century) itself attests to the growing population. If a kiln was necessary—given that the kilns in Wadi Musa continued to operate—demand must have exceeded the region's increased needs or perhaps a local producer had an economic advantage over ceramics imported overland from 15 km away. If nothing else, Udhruh's taxes listed in the Beersheba Edict confirm a thriving, wealthy community. Petra could not compete.

Conclusion

Even in prehistory the Udhruh region attracted settlement. The spring created an environment suitable for nomadic subsistence and for sedentary population in the Iron Age. As the growing Nabataean population pushed the margins of their territory further east in the

¹³¹ As Sufyan Karaimeh at Leiden University is writing his dissertation on the material collected from the Udhruh field systems, that material will not be reviewed here.

late first century BC, Udhruh witnessed renewed permanent occupation. But that does not mean that Udhruh's residents lived on single farmsteads. Udhruh's extra-Leugam settlement certainly indicates substantial building activities facilitated by a large group of Nabataeans in the periphery. Smaller sites were certainly present, but the extent to which they were occupied year-round or seasonally is unknown. But, although the Nabataeans marked Petra's hinterland with signs of their presence, it seems likely that some preferred city life, with its promise of economic and social stability.¹³² Petra's size and prosperity in the 1st century AD suggest a densely occupied hinterland, but parts may have only been seasonally occupied. Until hinterland sites are excavated, permanent rural settlement cannot be definitively ascertained.

AD 106 was a major turning point. With the catastrophic events of the annexation, Petra witnessed an initial population decline, recalling those in the hinterland to the safety of the city, now enclosed behind walls. Petra's population likely declined as some of the former Nabataean soldiers were moved to other provinces to serve in auxiliary units, and others were enslaved or forcibly removed. Those who remained continued to favor nucleated settlement and might have switched to pastoralism in order to avoid the full weight of Roman taxes. As Petra's economic prosperity declined in the mid-3rd century and the entire empire suffered from the crisis, the incense routes bypassed Petra in favor of other cities, such as Aila and other seaports to the south. When the crisis ended, the incense trade through Petra had almost ceased (except presumably for some local consumption). Petra perhaps looked more

¹³² As the number of hinterland sites during the Nabataean period cannot be compared to those in any other period, some Nabataeans obviously cultivated a rural (not urban) lifestyle.

like the parasitic city advanced by Finley.¹³³

Ca. 300, *legio VI Ferrata* constructed a fortress in Udhruh, which sat right on the eastern edge of the agricultural zone, effectively protecting the zone from Saracen intruders. The fortress could have attracted civilian settlement by former Nabataeans eager to sell their goods to the soldiers and their families. When the 363 earthquake hit Petra, many of the city's remaining inhabitants migrated elsewhere, choosing not to rebuild. Some perhaps returned to smaller farms in the hinterland, newly protected by the legion, but many were likely attracted to the growing urban center at Udhruh, which provided economic, social, and military security. By the 6th century, Udhruh (now styled Augstopolis) had effectively replaced Petra in all but name as the provincial center.

Udhruh must also have suffered from the 363 earthquake, but without excavation this is largely unknown. Perhaps the Islamic period inhabitants cleared out earlier evidence of occupation from within the fortress itself and little remains to be found, as suggested by Abudanh's 2008 excavation. But until more evidence is available, it can only be suggested that Udhruh/Augstopolis triumphed while Petra slid into obscurity.

¹³³ Petra continued to export ceramics as evidenced by Aila and the Negev (for examples of Dekorphase 4 at Oboda, see Erickson-Gini 2010, 259). However, Petra certainly exported less and less material in the 4th and 5th centuries. In a 2014 conference paper, S. Thomas Parker noted that there was a dramatic decline in imported coarse ware ceramics from Petra after the 3rd century (Parker 2014).

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