Bridging the Eastern and Western Mediterranean: The Roman Harbour Sites on the Coast of Cyrenaica, North-Eastern Libya

Part I

Thesis Submitted for the Degree of

Doctor of Philosophy

at the University of Leicester

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2014

Abstract

This thesis examines the results of an archaeological survey along a 50 km coastal strip of al-Jabal al-Akhdar (Green Mountain) in Cyrenaica (north-eastern Libya). The survey aimed to assess Cyrenaican ports during the Roman period, and secondary and minor harbours in particular. The conclusions demonstrate that a significant amount of productive and trading activity took place in this area in antiquity. This challenges previous assumptions that only major ports such as Apollonia, Ptolemais and Berenice were involved in trade.

This study demonstrates the potential of secondary and small harbours to inform research about the economic role, mechanisms and hierarchy of harbours, in contrast to the prevalent trend among scholars to focus on the study of mega and major-ports.

The new evidence has greatly increased our knowledge about productive activity along the coast of Cyrenaica, for example via the identification of 12 new amphora kilns. Initial estimates of the capacity of the vats recorded suggest that these harbours were involved in large-scale manufacturing. A further important strand of research involved an in-depth study of the physical features of the harbours and the construction techniques used in the buildings. An initial typology of these harbours was created to distinguish their roles and hierarchy, and provide a broader framework for their chronology. This analysis suggested that the secondary and minor harbours and other major ports were all well organised and interconnected. Each harbour seems to have played a particular role within the complex trade networks operating out of Cyrenaica.

Finally, an investigation of the products imported to Cyrenaican harbours over time uses the ceramic evidence recorded during field survey or published sherds. This allows the discussion of some of the principal components of the import-export trade. A detailed gazetteer of the sites studied is presented in the appendices.

Acknowledgements

First of all, I would like to express my thankfulness to Allah for providing me with health and patience to complete this task.

I would like to express my sincere gratitude to Professor David Mattingly for his valuable criticism, understanding, patience and guidance. I thank him for putting so much of his professionalism and experience and for sharing his exemplary intellectual wealth into this piece of work. I am privileged to have him supervise the work and on the course, I have learnt a great deal from him. I truly appreciate the time he spent on this thesis (from the initial conception to this stage), despite his other numerous engagements. To Professor Marijke van der Veen, even though she has joined the supervision at a later stage, her invaluable comments and contributions have fine-tuned the approach of this thesis and in bringing out my full potential. I owe both of you so much more than I can write.

Thanks are also due to Dr Victoria Leitch for her generous assistance in reading and commenting on this work. I am especially indebted to Dr David Stone, Dr Nicola Flemming, David Davidson, Dr Martin Sterry, and Dr Mathew Hobson for their help, suggestions, comments and assistance in providing me with references that have benefited this study. Also, my gratitude goes to Professor Michal Bonifay and Loïc Mazou for helping me identify some of the pottery sherds collected during my study.

I would like to thank the staff of the Department of Archaeology, especially Debbie Miles-Williams, for providing a welcoming and supportive environment.

The Department of Antiquities at Cyrene kindly permitted me to conduct my survey and provided access to their archive. I am also indebted to Dr Salleh Akab, the former president of the Department of Libyan Antiquities, and the many people who facilitated my fieldwork, especially my friend Ahmed Al-Hian.

I am grateful to my fellow postgraduates at the department, including Ahmad Emrage, Andrea Scarpato, Andy Lamb, Antonino Crisa, Botan Tofiq, Damjan Krsmanovic and Mireya Gonzalez Rodriguez, for their rewarding and energising discussions throughout the study.

Finally, I am indebted to my family - my parents, sisters and brother - for their encouragement and generous support. To my wife and children, I serve you a double portion of my thankfulness, for your patience, understanding and endurance of my absence during my studies - I can only recognise but never repay.

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List of abbreviations

ARS = African Red Slip Ware

BRH = Base, Rim and Handle

LRA1 = Late Roman Amphora 1

LRA2 = Late Roman Amphora 2

MRA1 = Mid Roman Amphora 1

MRA8 = Mid Roman Amphora 8

SCSC = Survey of the Coastal Sites of Cyrenaica

Part I

Chapter 1: Introduction to the Project

1.1 Outline

The coastal area of Cyrenaica preserves a large amount of archaeological evidence, variously represented by occasional finds off-shore during fishing, (*e.g.* pottery and architectural fragments), along the shore (found on the coasts and relating to sites built on the shore) or inland (simply visible on the shore). This archaeological evidence confirms the existence of intensive coastal activity in all historical periods.

The historical and archaeological evidence from the coastal sites can be employed to explore changes in the economy and commercial transactions in detail. Probably one of the most important indications of change in classical antiquity is the emergence of many new large ports and subsidiary harbours. Among the most important centres in the area were the ancient cities of Apollonia (Susa – the harbour of the ancient city of Cyrene), Euesperides (Benghazi), Ptolemais (Tolmeta), and Taucheira (Tocra) (Fig. 1-1). There were also other minor harbours located along this shore. There are many harbours lying on the coast of Cyrenaica correlating to the 25 or so sites mentioned by ancient sources, though their modern locations remain uncertain (Tables 2-1 and 2-2). Knowledge regarding these harbours is still confined to a small number of ports. In other words, there is a large gap and some ambiguity between the information existing on the ground and in ancient documents. The scarcity of published information about Cyrenaican harbours has considerably complicated the construction of an integrated picture of maritime trade activities in Cyrenaica and the region's relationship with the wider Mediterranean. An important point of debate concerns the extent to which the harbours of Cyrenaica were involved in Mediterranean trade networks and the nature of their role within wider trade patterns.

1.2 Introduction to the Project

In recent years, there has been a trend among archaeologists and historians to attempt to identify and characterise Roman trade. Many different approaches have emerged for measuring the growth of commerce and trade during the Roman period (Bowman and Wilson 2009; 2011). This interest stems from the fact that the Roman Empire reached a significantly higher level of economic and productive output than previous civilisations during the Classical Greek and Hellenistic periods (Hopkins 1978). The archaeological remains of large-scale industrial/agricultural complexes such as oileries, farms with several wine presses and fish installations with considerable storage capacity have been identified in different parts of the Mediterranean, including North Africa, Spain, France, Italy and Greece (Ahmed 2010; Brun 2003; 2004; Février 1982; Marzano 2013; Mattingly 1995; Slim et al. 2004). These appear to reflect advanced economic and urban growth.

Several factors seem to have contributed to this process. Population growth, increased demand from Rome, the permanent need to supply armies based along the frontiers, the imposition of taxes on conquered provinces (Hopkins 1980) and hence new opportunities for export (represented by new and larger ports) all led to increased production and economic growth. Unquestionably, the expansion and dominance of the Roman state throughout the Mediterranean basin, into non-Mediterranean regions (*e.g.* Lusitania and Britannia etc.), along important navigational rivers (*e.g.* the Rhône and the Ebro) and the unification of Roman territory into a single monetary system (Hopkins 1978) created a stable environment ideal for the growth of trade and commerce. There were thus major trade networks linking not only the Roman provinces, but also the lands beyond the Roman frontier, the *Garamantes* in the desert in southern Libya (Mattingly 2007; Mattingly and Daniels 2010), and even India (Tomber 2008; 2012a).

Ports undoubtedly played a major role in the prosperity of the regional and trans-regional economies. They were an interface and a bridge between the main emporia and redistribution centres and towns, where primary products (*e.g.* wool, hides, textiles etc.) were produced, and their immediate hinterlands (arable lands) where the bulk of the surplus staples were produced. In other words, ports were important not only as hubs for exporting and facilitating the flow of traded products, but also as direct shippers of imposed taxes to the central government in Rome (Hopkins 1980).

A significant proportion of this trade was concerned with contacts across the Mediterranean Sea and involved the richest provinces of the Roman Empire, such as North Africa, Egypt, Anatolia, Greece, southern France and Spain. The Mediterranean was essentially Rome’s internal sea where ships could sail without fear of pirates and competition between states (Hopkins 1978).

The transformation of the maritime façade directly reflected the increase in long-distance trade and connectivity during the Roman period (Horden and Purcell 2000).

There was a considerable trend towards investment in the infrastructure of harbours, and in many cases the construction of artificial harbours (*e.g.* the Claudius harbour at Portus and the Caesarea harbour). Also, the dramatic increase in the size and loading capacity of merchant ships (Wilson 2011; 2011b) is a further indicator of intensive long-distance trade and exchange.

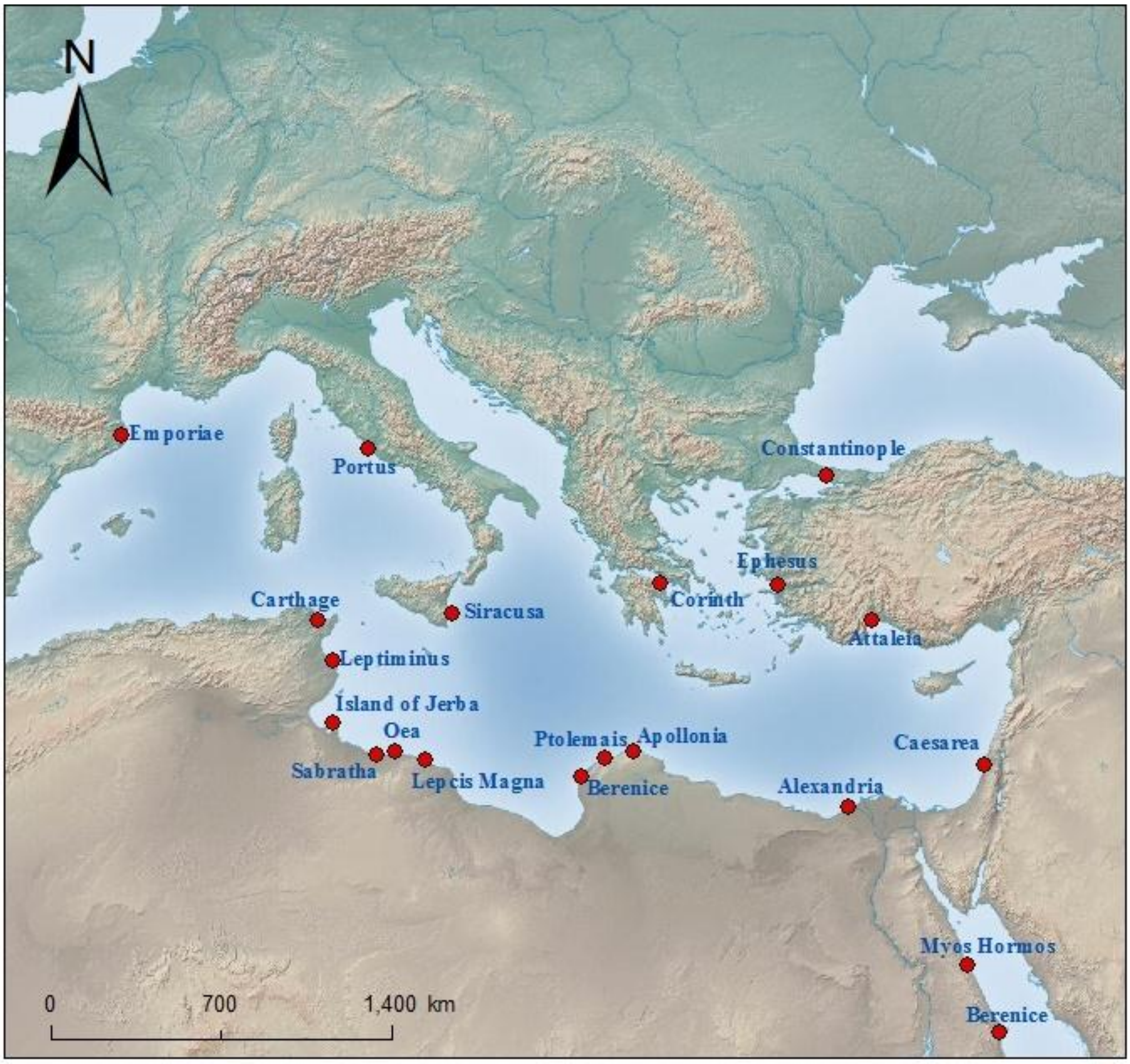


Figure 1-1: Some of the major ports along the Mediterranean and Red Sea coasts during the Roman Period

Many scholars have endeavoured to investigate long-distance trade and exchange networks across the Mediterranean through the study of harbours, but they have tended to concentrate their research on the mega-ports such as Portus, Carthage and Alexandria, ignoring their relationship with other neighbouring small harbours. In other words, research is missing on the role of small harbours in wider trade. Without doubt, the minor harbours played a crucial role in facilitating the movement of products to and from the major harbours. The lack of synthetic studies investigating their roles, can be argued to be a failure to fully address Roman inter/intra-provincial trade and commerce.

The location of Cyrenaica makes it an ideal case study for furthering this debate: close to the Aegean world, it is a bridge between the eastern and western Mediterranean, and sits between two important regions – Egypt to the east, and Tripolitania to the west. Although Cyrenaica was not one of the most important regions it was nonetheless very active in maritime trade, and offers vital clues as to how minor harbours interacted with wider commercial networks for the dissemination of goods to regions beyond the main ports.

1.2.1 Historical outline

It is beyond the scope of this thesis to provide a detailed historical account of ancient Cyrenaica. However, this section briefly introduces the most important historical phases relevant to the thesis.

The ancient history of Cyrenaica begins with the Battiad dynasty, a monarchical regime. A number of immigrants from Thera established the ancient city of Cyrene (modern-day Shahaat) in 631 BC (Herodotus, IV: 150, 171, 204) and their leader became King Battus I. This period continued from the establishment of Cyrene until the death of Arkesilas IV in 450 BC.

The main feature of this period was the emergence of the major Cyrenaican cities. These included Cyrene and its port (which later became Apollonia), Barce and its port (later known as Ptolemais), Taucheira and Euesperides (Herodotus, IV: 171, 204). In the early part of this period the region witnessed stability and prosperity, as they were on friendly terms with the neighbouring Libyan tribes and the Greek immigrants who settled at Cyrene. However, in the latter part of the period an influx of new settlers from the Greek world (*e.g.* the Peloponnese, Crete and other Greek islands) put an end to the positive and stable relations which has existed between the Libyan tribes and the Greeks. A number of armed conflicts occurred between the two parties, ending in the defeat of the Libyan tribes. Furthermore, power struggles and armed conflicts amongst the royal family brought further instability to the region.

The second phase of the history of Cyrenaica is known as the rule of city-states. This phase started from the death of Arkesilas IV in 450 to the 323 BC. In this period, the region continued to suffer from chaos and turmoil. The cities of Cyrenaica competed with each other to lead the region, leading to repeated conflicts (Jones 1974).

The next era began around 331 BC. The region had peacefully submitted to the reign of Alexander the Great when he conquered Egypt, although the region appears to have had some autonomy (Jones 1974). The region's economy appears to have flourished in this period, as Cyrenaica exported a large amount of grain to Greek cities when drought hit the Greek world during this period.

This large quantity of grain exported to Greece, estimated at 805,000 Greek bushels (Chamoux 1953; Laronde 1987), may be an indicator of the region's economic growth. This growth does not only reflect the prosperity of agriculture, but also suggests that the region had extensive exporting facilities in its harbours. Moreover, exporting this quantity of shipments to 42 different destinations at once demonstrates that Cyrenaican ports were well-connected to wider Mediterranean trade networks.

After the death of Alexander the Great, conflicts and civil war restarted among the competitive Cyrenaican cities, especially between Cyrene and Barce. Thibron (a Spartan condottiere) exploited these divisions among the Cyrenaican cities and attempted to take over Cyrenaica. Thibron went towards Cyrenaica, capturing the ports of Cyrene (Apollonia) and Taucheira, and besieging Cyrene (Diodorus of Sicily, XVIII: 108). Ptolemy, the Hellenistic ruler of Egypt, took advantage of this opportunity to include Cyrenaica in his overlordship and kingdom. Ptolemy sent an army commanded by Ophellas to defeat Thibron and his Cyrenaican loyalists. After a period of war, Ophellas managed to take over Cyrenaica and annexed it to Ptolemy's kingdom (Diodorus of Sicily, XVIII: 108).

As a consequence of this conflict, the Cyrenaican economy experienced a downturn. It can be argued that for a period commercial activity at Cyrenaican ports was reduced as they lost their connections to the wider commercial networks.

Afterwards, Cyrenaica seems to have ultimately recovered and gained a period of relief and stability under the rule of Ptolemy's dynasty. This can be seen in the rise of Cyrenaica's coastal cities during this period. For instance, the elevation of Cyrene's port to the rank of city occurred during the Ptolemaic era, most probably during the reign of Ptolemy III (Jones 1974). It can also be argued that the dynastic names given to a number of coastal cities, such as Ptolemais for the port of Barce, Arsinoe for Taucheira and Berenice for Euesperides, is a clear indicator of the attention paid to these ports during this period.

At the end of the rule of the Ptolemaic dynasty, after the death of Ptolemy VIII Euergetes II, Cyrenaica became a separate kingdom from Egypt. At this point it was ruled by his illegitimate son, Ptolemy Apion. In 96 BC at his own death, Ptolemy Apion bequeathed the kingdom to Rome (Jones 1974). Through this bequest Cyrenaica fell peacefully and smoothly into Roman hands, although the Roman senate initially gave the province autonomy to manage its own affairs (Larond 1987). It seems that at this stage Rome confined itself to annexing the royal lands and imposing a levy on public land and the export of silphium (Jones 1974).

A short time later Roman interest in Cyrenaica seems to have increased, presumably as a result of the disorder that engulfed the province resulting from the absence of direct political control. Rome made Cyrenaica a Roman province in 74 BC, sending a quaestor to govern the province and manage its affairs (Jones 1974). Cyrenaica and Crete were united as a single Roman province in 67 BC, and both regions were governed by a propraetor (Harrison 1985; Jones 1974; Jones 1985). During the Roman civil war, Cyrenaica became a kingdom once again when Antony gifted the province to his daughter Cleopatra. Cyrenaica in this period seems to have been affected by the general Roman political conflicts and the increase in piracy around the Mediterranean. These matters had a considerable negative impact on the region's economy and maritime trade.

Shortly afterwards in 27 BC, Augustus re-annexed and reunited Cyrenaica with Crete, assigning both provinces to the Roman senate. Cyrenaica appeared to regain its stability and prosperity, in particular after the reforms of Augustus. However, Cyrenaica's buildings then underwent massive destruction as a result of the Jewish revolts which occurred during the reign of Trajan in AD 115 (Larond 1987).

The unification of Cyrenaica and Crete into a single province established close commercial relations between the two regions. The strength and growth of the region's economy may be indicated by the large number of Cretan amphora-borne products found in Cyrenaica, in particular in the second and third centuries AD (see Chapter 7) and the impressive provincial building programme and marble architecture (Lloyd 1990).

Cyrenaica and Crete were officially split again in AD 294 by the reforms of Emperor Diocletian (AD 285-305) (Harrison 1985; Jones 1974; Jones 1985). It is worth noting that the reforms of Diocletian further divided Cyrenaica into two parts: Libya Superior (Pentapolis with its capital Ptolemais) and Libya Inferior (Marmarica).

Cyrenaica appears to have faced several crises in the later Roman period. Perhaps the most significant disaster occurred when an earthquake struck the area in AD 365 (Goodchild 1968). Moreover, there were recurrent attacks from Libyan tribes on Cyrenaican cities. These circumstances led the region's economy to degenerate. Justinian's reign (AD 527-565), however, seems to have brought stability and renewed prosperity to the area. This is evident through the significant construction activity which occurred in the cities and the fortifications distributed in different parts of the region. In the middle of the seventh century AD, the Arab conquest of the province put an end to the Roman period in Cyrenaica (Goodchild 1981). Table (1-1) illustrates the main dates of important events in Cyrenaica.

Date	Event	Reference
631 BC	Establishment of Cyrene by Greek immigrants from Thera and start of the Battiad dynasty	Herodotus IV
450 BC	The end of the Battiad dynasty	Diodorus of Sicily XVII
331 BC	Submitted to Alexander the Great	Diodorus of Sicily XVII
324 BC	Thibron attacked Cyrenaica	Diodorus of Sicily XVII
322 BC	Submitted to the Ptolemaic Dynasty	Diodorus of Sicily XVII
96 BC	End of Ptolemy Dynasty and start of Roman Province	(Laronde 1987)
67 BC	Unification of Cyrenaica and Crete into a single Roman province	(Harrison 1985; Jones 1974; Jones 1985)
115 AD	Jewish revolt	(Fraser 1950)
294 AD	Cyrenaica separated from Crete and split into two parts: Libya Superior and Libya Inferior	(Harrison 1985; Jones 1974; Jones 1985)
365 AD	Earthquake hit Cyrenaica	(Goodchild 1968)
643 AD	The end of the Roman period and the conquest of Cyrenaica by Arabs	(Goodchild 1981)

Table 1-1: The main events of Cyrenaica

1.3 State of Research

1.3.1 Introduction

Minor and major ports have enormous potential to aid our understanding of the maritime dimension of economic patterns and long-distance trade in the ancient Mediterranean. The capability of ports to link with larger emporia capable of consuming surplus local products stimulated landowners to increase production and hence their wealth (Robinson and Wilson 2011a).

It is clear that the Romans were aware from the outset of the importance of the Mediterranean for both communication and increasing their wealth and power. The large number of ports that were scattered around the Mediterranean reflects the interdependency of the Roman world through their coastal interaction. For instance, there were more than 40 ports along the coast of North Africa between Mauretania Tingitana and Cyrenaica (Stone Forthcoming), which indicates a high level of connectivity between North Africa and other Roman ports around the Mediterranean. Although ports are a significant indicator for the scale of socio-economic growth in any region (Karmon 1985), few synthetic studies have been devoted to the analysis of ports in the context of their particular functions and roles within wider networks.

The following section presents the most important literature associated with the Mediterranean ports. These studies are presented briefly in two main sub-sections, and will be divided between small-scale (1.3.2) and large-scale (1.3.3) studies. However, more in-depth analysis of these studies are given in the next chapters. For instance, studies related to the structures and types of ports will be discussed in Chapter 7, whereas those related to commerce and connectivity will be discussed in Chapter 8.

1.3.2 Small-scale studies

David Blackman was one of the first to study Roman harbours around the Mediterranean with two pioneering articles. The first article attempted to understand harbours through numismatic, iconographic and historical documents (Blackman 1982a). The second looked at the structures and development of harbours and their general functions (Blackman 1982b). His work was based on several case studies of harbours around the Mediterranean, and is significant as it stimulated more research on harbour sites. Blackman's more recent publications deal with shipsheds and their role in ancient times (Blackman 1999; 2008; Blackman and Rankov 2013). These recent publications have made significant contributions to our knowledge and understanding of these important elements, which featured in many ports around the Mediterranean including Apollonia in Cyrenaica (Flemming 1971). His work highlighted many issues relating to the different functions of the port (see Chapter 7).

In 1985 series of articles were published in the proceedings of the first international workshop on ancient Mediterranean harbours. A group of these papers addressed both the geo- and socio-economic aspects of ancient Mediterranean harbours (Raban 1985). Among these studies, Rickman raises a set of important points about the differences between harbours and ports, in addition to introducing a new approach towards the study of Roman ports in terms of socio-economic patterns (Rickman 1985; 1991).

Michael Fulford published two pioneering, controversial and very influential articles dealing with the interaction and connectivity between the eastern and western Mediterranean using ceramic assemblages (Fulford 1987; 1989). For instance, Roberta Tomber also published an article using ceramic evidence but extended her case study to include more Mediterranean ports (Tomber 1993). Rice conducted a study similar to those of Fulford and Tomber, and attempted to assess the connectivity between Roman harbours in the Mediterranean by examining a number of harbours in different

Mediterranean regions (Rice 2011). In her PhD thesis, Rice also addressed the connectivity and interdependency between the east and west Mediterranean by examining the ceramic assemblages recovered from a number of sites around the Mediterranean (Rice 2012) (For more discussion of these themes, see Chapter 8).

More recently, Andrew Wilson's studies have focused on the socio-economic patterns of ports, and addressed maritime shipping and trade (Wilson 2011; 2011b). He made several influential attempts to estimate the growth of the Roman economy through examining the construction of ports and the changing size of ships. Wilson et al. (2012), in a study of Roman ports and Mediterranean connectivity discussed the socio-economic connectivity of the eastern and western Mediterranean through an assessment of the distribution of ceramic assemblages in North Africa and the eastern Mediterranean.

Schörle further studied ports along the coast of central Tyrrhenia (Schörle 2011). Her innovative paper measured the economic capacity of the harbours along this coast by setting up port hierarchies through gauging the area's harbour basins and their associated infrastructure. She argues that the economic role of a harbour depended on its capabilty to accommodate ships easily and safely.

Stone investigated the harbours along the North African coast (Stone Forthcoming). His study attempts to gain a wider understanding of economic patterns in North African by categorising the harbours according to their size and artifical components. Stone argues that the infrastructure and artifical elements of a harbour reflects its role in trade, and that looking at all the harbours in North Africa in this way allows us to estimate economic growth in the area. He believes that estimating the capacity of a harbour's infrastructure (*e.g.* quays, jetties, etc.), rather than the basin area, is the most secure method for evaluating the capacity of a harbour and its economic pattens (for more dicussion of this topic, see Chapter 7).

In terms of sailing and navigation in the ancient Roman Mediterranean, Arnaud has written several articles which evaluate ancient sailing routes and how they might have affected trade. His studies discuss the region's geographic and oceanographic conditions, in addition to the influence of seasonal winds and currents on the sailing routes used by merchants and sailors. Generally, he derives his observations from a combination of studying both ancient sources and archaeological data (Arnaud 2005; 2011a; 2011b).

1.3.3 Large-scale projects

Most research on Roman harbours has treated the harbour from a single point of view. In other words, there have been no studies that combine maritime and terrestrial archaeology as a necessary complement to one another. The scientific term “the maritime cultural landscape” has been developed by Westerdahl “for the unity of remnants of maritime culture on land as well as underwater” (Westerdahl 1992:5). This allows for further study of the “material and immaterial remnants of maritime human life”, which will better develop our understanding of harbours (Westerdahl 1992:5). This "maritime human life" can be traced underwater through evidence of shipwrecks, and on terrestrial sites by using topography and place names (Westerdahl 1992:7-9). This approach has had limited use in studies of the Mediterranean basin, so it is the intention here to follow this methodology for the greater exploitation of the data and to increase our knowledge of harbours in Cyrenaica, as well as to demonstrate the importance of this combined approach.

1.3.3.1 The Portus project

The Portus Project in Italy is a large-scale study focusing on one of the most important ports of the Mediterranean. The project aims to identify the connectivity of the port with other ports by examining material evidence such as ceramics, marble and so on. Although the project has used many advanced archaeological techniques (*e.g.* chemical analysis, computer graphics, laser scanning, remote sensing and geophysics) in addition to traditional approaches such as field surveys and excavations, it has not yet attempted to adopt the Westerdahl approach (a combination of underwater and terrestrial archaeology) (Keay et al. 2005; University of Southampton 2014). Another problem with this study is that it fails to take into account the role of neighbouring secondary and small harbours, and does not consider how they might have facilitated the movement of goods and the development of commerce and trade.

1.3.3.2 North African coastal projects

At the ancient site of Leptiminus, a Roman port on the eastern coast of modern Tunisia, an ambitious project was carried out by an Anglo-Tunisian mission between 1990 and

1999. The project aimed to gather more information about the port in terms of urbanisation, its economy, and its subsequent growth and decline (Ben Lazreg and Mattingly 1992; Stirling et al. 2001; Stone et al. 2011a) and combined underwater and terrestrial archaeology (through field survey, geophysics and excavation). The project was also involved in the creation of a museum in the modern town of Leptiminus. The significance of this work is that it did not confine itself only to the port city of Leptiminus, but also studied the port and its place in the wider context. Three comprehensive volumes resulted from this project, one of the most important works to have been carried out along the North African coast.

A geo-archaeological survey conducted by a French-Tunisian team along the Tunisian coastline from 1987 to 1997 covered the area from the Libyan border to the east to the Algerian border to the west. The core objectives of this work were to study ancient environmental change and the human activities along this part of the North African coast (Bonifay 2002; Slim et al. 2004).The publication of this project without doubt increased our understanding of ancient North Africa's economic situation. Many fish processing sites were found - 45 along this coast - which demonstrates the massive scale of fish processing during the Roman period in this part of the Mediterranean. This geo-archaeological study is one of the few examples of effective collaboration and research combining both geologists and archaeologists in the Mediterranean basin (Stone 2006).

Another American-Tunisian project was carried out between 1996 and 2001 on the Island of Jerba (Fentress et al. 2009a). This aimed to improve our understanding of the ancient economy, as well as the region's trade networks from pre-history to the medieval period. The study's goal was to acquire information about the agricultural economy and exploitation of marine resources within the context of the relationship of the port with the mainland. Ethnic groups were also examined through the cultural materials that were collected in the field. However the size of the island, which is about 500 km^2, the long chronological period (prehistory to the medieval age), and the wide and various objectives meant that not enough information about the ports themselves was collected. Many questions about the structural features of the ports and their roles and connectivity thus remained unanswered.

At ancient Carthage, an international project was undertaken between 1972 and 1979 in conjunction with UNESCO called the 'Save Carthage Project'. In a rare example of multi-national collaboration in the Mediterranean basin a number of international missions participated in this project, including teams from Germany, Italy, France, Great Britain and America. The work of the latter mission (University of Michigan) concentrated on two areas, which were the: *"terrain qui jexte au sud de l'actuel supermarché"* and *"la zone du cirque"*. Details about the excavation have been published in four volumes (Humphrey 1975; 1988) .

The British team focused on three areas. The first site was the Ilôt de l'Amirauté, in the centre of the circular harbour. The second was a site on the northern side of the harbour, and the third was near the ancient conurbation. The aims of the project were to build a comprehensive picture of Carthage in terms of the environmental, economic and political change which took place from the late Punic to the end of Byzantine periods. The excavation work of the British mission was undoubtedly one of the most comprehensive, as it followed a strict stratigraphic method which yielded more than 15,000 kg of pottery. Additionally, the mission excavated an archaeologically significant area on the side of the circular harbour (Hurst and Duhig 1994; Hurst and Roskams 1984; Peacock et al. 1994). Unquestionably, the project as a whole is one of the greatest works to have been carried out in the Mediterranean basin in terms of scientific techniques of excavation. However, its first priority was to document and protect the site, and secondly to construct a comprehensive picture of the economic and political trends of Carthage from the late Punic to the end of the Byzantine periods. However, existing accounts fail to put the site within its regional context and so failed to gain a wider understanding of commercial and trade networks, not only in other parts of the Mediterranean basin but also within its own region.

Unlike Tunisia, the coast of Tripolitania has not yet experienced investigation on a similar scale. The majority of the research and excavation in the region has concentrated on the cities themselves, with little or no attention paid to the harbours. For instance, the port of Lepcis Magna is considered to be one of the most prestigious and important ports in North Africa, yet it suffers from a lack of new scientific research and approaches. Work has concentrated on urban areas within the city, ignoring the role of the port in the growth and success of the city (Walda 1995; 1996; 1998; Walda et al. 1997). The only work that exists on the harbour is that by Bartoccini (1958). This publication is the outcome of three decades of excavation in the city and the harbour by the Italian mission (Bartoccini 1958). However, the work concentrated on documenting the harbour infrastructure, and did not study the harbour within its wider context. The port of Lepcis Magna was one of the main emporia in Northern Africa, and exported its surplus agricultural production from its rich hinterland (Ahmed 2010; Laronde 1988b; Mattingly 1995). The lack of interest in the harbour and how it was connected to the city and hinterland has left a serious gap in our knowledge.

At Sabratha, major excavations were conducted between 1948 and 1951 by Dame Kathleen Kenyon and John Ward-Perkins. The work concentrated on the urban areas of Sabratha, and while details were eventually published in the 1980s by the Libyan society (Fulford et al. 1994; Keay et al. 1989; Kenrick and Bailey 1986), the harbour was not investigated. Mattingly (1995) classified the harbours of Tripolitania, including Lepcis Magna, Oea, Sabratha and Tacapae, by location, size and the available infrastructure. Again, this research did not examine the relationship between these harbours or how they interacted with each other.

A survey project was launched in 2010 along the western coast of Lepcis Magna; however, it was interrupted by the revolution in Libya after one season of work. The survey aimed to develop the current state of the coastal economy of Tripolitania and the characteristic patterns of production (Schörle and Leitch 2012). The survey found evidence for intensive activity: more than 50 sites were found, including productive villas, ceramic kilns, wine/oil presses and possible fish installations. Publication of further results of this type of work will surely increase our knowledge about this part of North Africa.

1.3.3.3 Caesarea harbour project

The excavation work at the harbour of Caesarea is considered to be one of the most significant contributions to the study of Roman harbours in the eastern Mediterranean. The project was carried out over the five years from 1980 to 1985. Underwater and terrestrial archaeology were combined here, although more attention was paid to the underwater excavations. The project's first publication considered the excavation work (Raban 1989), while the second was concerned with the ceramic finds and the remains of ships (Oleson et al. 1994). In addition, the project released an edited volume of papers concerning the excavation works and the background to the harbour study (Vann 1992). The general results provide detailed information that enabled the reconstruction of the whole harbour. There is no doubt that the Caesarea harbour project shed new light on Roman harbours in the Mediterranean in terms of their structure and artificial components. However, the work did not attempt to study the port in its wider context in relationship with its hinterland. In other words, the work mainly emphasised the construction techniques and the analysis of materials regardless of their wider economic context.

1.3.3.4 The Myos Hormos – Quseir Al-Qadim Project

Similar work has been carried out on the important site of Myos Hormos - Quseir Al-Qadim - near the Red Sea. The importance of this site, along with its neighbouring harbour (Berenice) (Cappers 2006; Sidebotham 2011) some 250 km to the south of Myos Hormos, is that it was a trading bridge between Roman Egypt on the one hand, and India, the East and Africa on the other (Tomber 2012a).

The excavation work was carried out between 1999 and 2003 by the University of Southampton under the supervision of David Peacock and Lucy Blue. Two volumes of findings have been published: one concerns the surveys and excavations at the Roman and Islamic ports (Peacock and Blue 2006), while the second examines the results of the excavations (Peacock and Blue 2011). As with the Caesarea project the focus of Myos Hormos was on the harbour area, and little attention was paid to the area's economic life and its role and relationship with its hinterland (veen der 2011). However, Tomber conducted a comprehensive study of both of the above ports in the context of their economic patterns and trade routes, as well as their role in the wider economy. Tomber's studies were published in two separate articles (Tomber 2008; 2012a).

1.4 Debates on the Roman Economy

1.4.1 Introduction

> *The ancient economy is an academic battleground. The contestants campaign under various colours – apologists, Marxists, modernizers, primitivists* (Hopkins 1983:ix).

The ancient economy has been subject to a great deal of dispute. It has been widely debated by archaeologists and ancient historians for many years (for more discussion of the history of the theory of Roman economy, see Greene (2000), Scheidel et al. (2007a), Hobson (2012) and Scheidel (2012).

Broadly speaking, there are two traditional approaches concerning the nature of the ancient economy, which are primitivism and modernism (Rostovtzeff 1957; Scheidel 2012; Scheidel et al. 2007b). The former is an orthodoxy which was masterminded by A. H. M. Jones (Jones 1937) and Moses Finley (Finley 1973), and subsequently adopted widely by other scholars of ancient history (Brunt 1971; Hopkins 1983; Whittaker 1983).

The proponents of this approach argue that the success of the Roman economy and its wealth derived from agricultural production. This “new orthodoxy”, as Hopkins termed it, “stresses the cellular self-sufficiency of the ancient economy; each farm, each district, each region grew and made nearly all that it needed” (Hopkins 1983:xi). This approach also argues that the ancient cities and their populations, with some exceptions such as Rome, were mainly preoccupied by the growing demands for more food. The local landowners and governors established periodic market places for the exchange of local production. This periodic market could also be used by the artisans and craftsmen, who produced objects according to local needs (Garnsey et al. 1983).

According to Finley and his followers (Brunt 1971; Finley 1985), long-distance commerce was limited and confined to the most prestigious commodities. This was due to the high costs of transportation by both land and sea. In addition, the uniform environmental and climatic conditions of Mediterranean regions meant that similar crops were grown everywhere, leading to self-sufficiency. Finley states that “individuals could not move bulky merchandise long distances by land as a normal activity, nor could any but the wealthiest and most powerful communities” (Finley 1985:126). Similarly, Jones argues that “trade and manufacture played a very minor part in the economy of the Roman empire. The basic industry was agriculture; the vast majority of the inhabitants of the empire were peasants, and the wealth of the upper classes was in the main derived from rent” (Jones 1937:30).

Polanyi (1957), on the other hand, argued that there were three types of mechanism through which goods could be circulated: reciprocity, redistribution, and markets. However, Polanyi argues that markets only emerged with the rise of capitalism in the nineteenth century. Exponents of this theory believe that market structures existed. However, they argue that the degree of interaction between these markets across the Mediterranean was relatively small, limited and weak (Erdkamp 2005). On the other hand, Whittaker (1995) argued that there are four objections to the existence of markets in the ancient economy: the *annona*, supplementary cargoes and transport, military needs, and the aristocracy.

It is clear that the above scholars paid little or no attention to the archaeological material which confirms intensive economic growth took place in some trades and markets during the Roman period. However, in the past few years interest in studying the ancient Roman economy through archaeological evidence has grown. Such work suggests the existence of an advanced economy and commercial trade during the Roman period. These new contributions mean that our understanding of ancient technologies and economies is evolving daily.

David Mattingly, for instance, has made a significant contribution to this subject. His works illustrate the importance and scale of olive oil production in the Roman period, and discuss how this contributed to the success of the Roman economy and their long-distance trade (Mattingly 1988; 1988b; 1995; Mattingly and Salmon 2001). As another example, Andrew Wilson has carried out several studies into Roman manufacturing and maritime trade. He sheds light on the significant scale of marine exploitation, direct shipping and long-distance connectivity during the Roman era (Robinson and Wilson 2011b; Wilson 1999, 2001a, 2004a, 2006; 2008; 2009a, 2009b, 2011).

There are also several recent studies which present Roman economic patterns in terms of markets, distribution and connectivity. These studies aim to quantify the pottery assemblages and other archaeological data to analyse aspects of the ancient economy in more depth. Such studies show how the Roman Mediterranean was connected with and involved in wider inter-provincial trade and networks (Ahmed 2010; Bonifay 2003; 2005; Hobson 2012; Leitch 2010; Rice 2012; Tomber 2008; 2012a). Therefore, this old debate (primitivism) is no longer framed in adequate terms to guide our work.

1.4.2 The theory of ideal types of city

The last two decades have witnessed a considerable interest in studying the role and concept of historical cities in both the economic and social spheres. This ongoing debate seems to revolve around the nature of cities as proposed by the sociologist Weber. In the late nineteenth century Weber constructed a set of ideal types of city, for instance the 'consumer city', which he believed described the ancient city, as well as the producer and commercial city-types (Weber 1976; 1978). Later on, Finley (1985) adopted the consumer city model, which continues to influence historians and archaeologists today (Colognesi 1995; Greene 2000; Hopkins 1983; Parkins 1997; Scheidel and Reden 2002; Whittaker 1995).

The concept of the consumer city, as mentioned above, considers the relationship between urban cities and their hinterlands. In other words, the model "characterises the economy of ancient cities as reliant on the exploitation of their hinterland, as well as the collection of rents and taxes, for their sustenance and wealth" (Shaw and Saller 1981: 13).

Recent studies, however, have seen some important attempts to develop and generate new approaches to the functions of ancient cities in general and of the Greek and Roman cities in particular. For example, Engels's (1990) work on Roman Corinth introduces a new ideal types model: the "service city" model. In Engels's opinion, Corinth did not depend on the hinterland; in fact, the city earned a large amount of its income through services such as transhipment of goods, and made a good income from foreign visitors and tourists.

Mattingly, too, tested Weber's ideal types, and tasted his theory by examining Weber's consumer city model through analysing the archaeological evidence at Leptiminus in Tunisia. The archaeological data, however, agreed more clearly with the concepts of producer city. In fact, Mattingly's innovative work represented the first comprehensive explanation of the producer city model which harbour had powered as a medieval type (Mattingly et al. 2001).

Though pre-Roman, excavation work at Euesperides nevertheless revealed manufacturing facilities such as purple dye installation and pottery kilns, which would have been used for the manufacture of coarse wares (Wilson et al 2005; 2006). A key diagnostic of the producer city might be the presence of manufacturing activity for export.

This thesis will, among other aims, test Weber's and Engels's ideal types against the harbour cities of Cyrenaica and the archaeological evidence from my field survey to see if any of these three models adequately characterises their nature. The aim of my study is to advance this debate and it will show that we can most fruitfully use a combination of elements from different ideal-types is describe the data.

1.5 Aims and Objectives of the Study

The research questions that lie behind this project are at two different levels. Firstly, the set of higher-level questions relate to the wider context of the Cyrenaican material in debates about Mediterranean harbours, trade and inter-regional networks. Secondly, there are specific issues that pertain to the archaeology and history of harbours in Cyrenaica.

First: The broader aims of the research questions

The main aim of this thesis is to develop our understanding of the role of small harbours within wider Mediterranean trade and cultural contact, alongside the issues below:

a) How did Cyrenaican harbours interact with the wider networks of Mediterranean trade and exchange?
b) How can Cyrenaican harbours shed light on the different roles and new types of Roman harbours along the coast of Mediterranean?
c) How does the research on Mediterranean networks, colonisation, commerce, and so on relate to the Cyrenaican data?
d) What is the relative value of the ideal-types of ancient cities in the Cyrenaican context?
e) What patterns can be read in the evidence of provenanced trade goods? What goods were imported, from where, and what was locally manufactured for trade and exchange?
f) Can the development and emergence of harbour sites be shown to signify the growth of maritime trade and exchange in Cyrenaica and the Mediterranean?

Second: The locally focused objectives of the research

a) Conduct an archaeological survey of a section of the Cyrenaican coast.
b) Record and present the archaeological evidence for harbour sites along this stretch of coast.

c) Examine the present archaeological evidence for economic activities carried out at these sites (i.e. evidence for manufacture and economic production)
d) Analyse the archaeological evidence for contact/trade at these sites with other parts of the Mediterranean (i.e. pottery sherds originating from outside Cyrenaica).
e) Determine the chronology of these harbours using the evidence collected.
f) Determine the extent to which these sites were involved with Mediterranean-wide trade.
g) Investigate whether or not large and small harbours have different roles, and create a typology of the harbour sites in Cyrenaica.

There are many basic questions which need to be resolved regarding the harbours of Cyrenaica. Up until now, information about the types and chronological sequences of these harbours has been unclear, and there have been doubts about the location of a number of harbours. It remains uncertain whether the modern locations of many harbours correlate to the approximately 25 sites mentioned by ancient historians. Our knowledge regarding these harbours is still confined to a small number of ports. In other words, there is a huge gap and ambiguity between the information on the ground and that in ancient documents (see Chapter 2).

Furthermore, there is no explicit information about the role of small harbours. Were small harbours between the major ports simply required as a useful source of food and water for coastal shipping, or were they places of shelter from sudden storms and wind? Did they play a subsidiary role in facilitating trade? The scarcity of published information about Cyrenaica’s harbours has considerably complicated the process of building an integrated picture of maritime trade activities in Cyrenaica. An important point of debate concerns the extent to which the harbours were involved in commerce and the Cyrenaican economy. With this is mind, how can the archaeological evidence from the coastal sites be employed to explore changes in the economy and commercial transactions over time?

The key question here is the extent to which the Cyrenaican harbours were involved in broader Mediterranean trade networks, and their role in these wider trading activities.

The above discussion has raised questions about the factors that led to the emergence of new harbours on the coast of Cyrenaica, and which favoured the development of some of the pre-existing ports into independent cities (*e.g.* the port of Cyrene, which was established as a small harbour to serve the city, was then extended considerably and became the independent city of Apollonia). Did the growth of maritime trade and exchange in Cyrenaica lead to the development and construction of new harbours?

1.6 Summary and Structure of the Thesis

> *Harbours should not be studied just as structures, but in relation to the purpose which they served. They have to be seen as part of a network of ports, fulfilling a function in the Roman world. To their study, therefore, we have to bring not just archaeological techniques, but the questions and skills of the social and economic historian. Why were ports positioned where they were, in relation to geography, population, manufacture or political need? Who paid for them and why? What governed their success and how were ports used?* (Rickman 1985:105).

At the general level, this thesis describes the results of the archaeological survey that I carried out over the last few years. However, this thesis is not simply a study of Cyrenaica's harbours and the construction of comprehensive and solid knowledge about their size, features, and place in the landscape; it is also a study of their socio-economic role in a wider context. This research thus explores their economic functions in terms of trade and manufacture.

Generally, this thesis is divided into two parts (see Fig. 1-2). The first part has been organised into eight chapters, and begins with an introductory chapter (Chapter 1). This chapter starts with an outline of the thesis's topic. It is followed by a discussion of the current state of research, and a description of the debate over the Roman economy. The chapter also presents the research questions which explain why this study is needed. Chapter Two is devoted to the background of the research case study (Cyrenaica). It discusses both the modern and the ancient literature that mentions the Cyrenaican harbours. In addition, it addresses the geography and geomorphology of Cyrenaica. The third chapter focuses on the methodology used in my field survey. It describes in detail the process followed from the preparation of the survey to the recording methods, the definitions and terminology given to the identified sites, and the post-survey and database documentation. Chapter Four presents the key elements of the sites and sub-sites visited during the field survey. It also deals with the construction techniques, organisation and sizes of these sites. Moreover, the chapter includes a comparison of the different patterns found in the rural and coastal settlements.

The analysis of the recorded productive installations, such as pottery kilns, fish-related installations, wine presses, purple dye and tanning processes, are examined in the fifth chapter. Each of these is analysed in detail in order to estimate the scale of the productive activities carried out along the ancient Cyrenaican coast.

The typology of the Cyrenaican harbours and their chronology are outlined in Chapter Six. This chapter identifies the types of Cyrenaican harbours and how these would have matched with the other harbour types along the coast of Mediterranean. The seventh chapter is devoted to an investigation of the long-distance trade and connectivity of the Cyrenaican harbours through the pottery evidence collected during the field survey, as well as other pottery finds from the excavation work at Berenice and Ptolemais.

Finally, Chapter Eight summarises the most important results, evaluate the project and address the future need for more archaeological research in this region and to discuss briefly the ideal-type models. Part Two of this thesis is divided into three sections, the first of which presents my site gazetteer in detail. The remains recorded within each site are organised into four sub-sections (*i.e.* buildings and walls, industrial features, water supplies, and other features). Each heading or sub-section includes the appropriate archaeological features that were recorded during my survey. The second section is allocated to the appendices. The first of the two appendices (Appendix I) contains supplementary additional figures, in particular the data collected during the field survey. The second (Appendix II) contains the tables used in this thesis. Lastly, following these sections is the bibliography.

Figure 1-2: Structure of the thesis

Chapter 2: Literature Review of the Coastal Sites of Cyrenaica

2.1 General Introduction

This chapter presents a brief review of the most important works carried out along the coast of Cyrenaica. It also discusses references from ancient texts, and examines the accounts of a number of nineteenth-century travellers which provide valuable additional information.

This chapter is divided into four sections. The first (2.2) addresses the most significant references to the coastal sites by ancient writers. The next section (2.3) discusses the writings of nineteenth-century travellers who visited the area and left records about a number of coastal sites in Cyrenaica. Sections 2.2 and 2.3 have been written in chronological order, starting with the oldest references.

Discussion on more recent investigations into Cyrenaican harbours has been divided into two sections (2.4 and 2.5). The former focuses on Cyrenaican major ports (*i.e.* Apollonia, Ptolemais, Taucheira, Euesperides and Berenice), and the latter on minor coastal sites. The sites in both sections (2.4 and 2.5) have been organised and presented according to geographic location, from east to west. As mentioned in the first chapter, the literature review of Cyrenaican ports presented here is a brief description of the most important work carried out on number of Cyrenaican harbours. A more detailed analysis will be carried out in later chapters.

2.2 The Coastal Sites of Cyrenaica in the Ancient Literature

2.2.1 Introduction

There are many harbours on the coast of Cyrenaica. A number of these correlate with the more than 25 sites mentioned by ancient historians, although the modern location of some remains uncertain (Table 1-2). Knowledge regarding these harbours is still confined to a small number of ports. In other words, there is a large gap and ambiguity between the information on the ground and that found in ancient documents. Tables 1 and 2 list the Cyrenaican harbour sites mentioned by ancient historians (see Figs. 2-2 and 2-3). The harbours shown in these tables are arranged according to their location, beginning from the east of Cyrenaica and ending in the west. .

2.2.2 Ancient references

The oldest description of the Cyrenaican coast can be found in the fourth book of Herodotus. He refers to a number of Cyrenaican coastal sites in the midst of his description of the early history of Cyrenaican settlements. These sites are Platia, Darnis, the port of Cyrene (Apollonia), Taucheira and Euesperides (Herodotus IV, 150, 171, 204).

In the fourth century BC, we see the emergence of a number of both minor and major harbour sites. Pseudo-Skylax, for instance, mentions the minor sites of Cherronesus and Phycus (Fig. 2-1), as well other major sites (*e.g.* Apollonia, Ptolemais, Taucheira and Euesperides) (Pseudo-Skylax 108, see Shipley 2011:185-190).

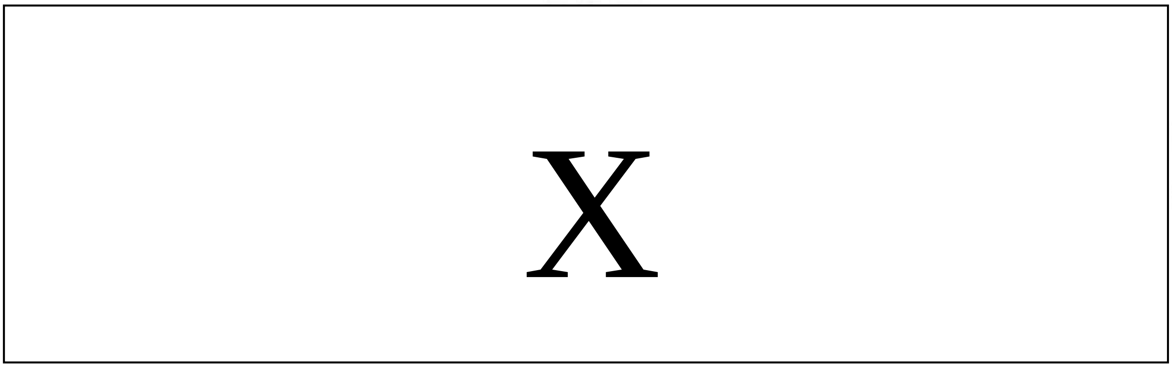


Figure 2-1: The Cyrenaican coastal sites mentioned in Pseudo-Skylax's Periplous (Shipley 2011:186)

In the mid-first century BC, three of the major Cyrenaican harbours (i.e. the ports of Cyrene (Apollonia), Taucheira and Euesperides) are mentioned by Diodorus of Sicily in the *Bibliotheca historica* in the section about Thibron's ambitions to take over Cyrenaica. Diodorus tells of Thibron's siege of the port of Taucheira, and of his attack on the port of Cyrene (Apollonia) and subsequent seizure of the Cyreneans present (Diodorus of Sicily XVIII, 20, 1-6).

Slightly later, Strabo's work points to more minor harbours along the coast of Cyrenaica (see Table 1). This is the first occurrence of the name Apollonia; Strabo seems to be the first ancient source to use this name instead of referring simply to "the port of Cyrene". This suggests that it was at this moment that it became the independent city known as Apollonia (Strabo XVII, 3, 20-22). In the first century AD, Lucan records that Cato the Younger tried to land his vessels at the port of Phycus during the civil war. According to Lucan, Cato razed the city to the ground as punishment to the citizens of Phycus who prevented his fleets from anchoring at the port.

> *When Phycus dared to close its harbour against the fleet [which belonged to Cato the Younger], he overthrew it and laid in ruins a town which deserved to be sacked without mercy* (Pharsalia IX, 300).

In the same era, Pliny the Elder (V, 5) gives us a geographical description in terms of the location and distances between the major harbours of Cyrenaica, as well as information on two other minor sites (Cherronesus and Phycus). On the other hand, the Stadiasmus Maris Magni mentions the major Cyrenaican harbours in addition to five minor harbours, namely Erythron, Naustathmos, Phycus, Ausigda and Boreum.

We note that in the second century AD there was an increase in the number of coastal sites in Cyrenaica. For example, Ptolemy documents 24 coastal sites between Cyrenaica's eastern border with Egypt and the western border with Tripolitania (Ptolemy's *Geography* IV.4). However, in the third century AD the Antonine Itinerary records only three major harbours (Apollonia, Ptolemais and Berenice), in addition to the small coastal site of Hadrianopolis. Similarly, Peutinger's map documented Apollonia, Ptolemais and Taucheira, as well as the minor harbour of Kainopolis. Both the Antonine Itinerary and Peutinger's map mention a limited number of coastal sites, perhaps because they set out to record the cities located on the main road rather than along the coast.

From the late fourth century AD to the sixth century AD only a small number of harbours are mentioned in the sources. For example Synesius does not mention Apollonia, although he does refer to other major ports, including Ptolemais, Taucheira and Berenice, in addition to a number of minor harbours such as Erythron and Phycus (Synesius 101, 129, 133, 170, 171). Stephanus of Byzantium confines his records to Erythron, Phycus and Apollonia. On the other hand, Procopius mentions the reforms of Emperor Justinian and the fortifications built at the major ports of Cyrenaica (*e.g.* Apollonia, Ptolemais, Taucheira and Berenice) (Procopius VI, 2.1-21).

2.2.3 Conclusion

Going by the ancient sources, there seems to have been an increase in the number of harbours along the coast of Cyrenaica, especially during the first three centuries AD (Fig. 2-4). However, in the late Roman period there was a noticeable decline in the role of a number of major harbours. This decline seems to have been accompanied by a rise in the status of minor ports at the expense of major ones. This can be seen in the absence of any references to Apollonia in Synesius' letters, along with references indicating that ships sailed on direct routes from Phycus to the main emporia in the eastern Mediterranean.

However, the decline of other major ports in late antiquity could be for two reasons. First, the constant attacks by Libyan tribes, particularly in the exposed eastern cities such as Berenice (Jones 1974; Jones 1985); and secondly, due to water supply problems. For instance, Ptolemais was gradually abandoned due to scarcity of water, especially after damage to the city's aqueduct (Procopius VI, 2, 9, Jones and Little 1971a; Pedley 1975). All these factors seem to have favoured small harbours such as Phycus. However, in the sixth century AD the major ports, especially Apollonia, seems to have been reinvigorated and repopulated, especially after the reforms of Emperor Justinian were enacted and his fortifications constructed in Cyrenaica (Procopius VI, 2, 8).

Site		Ancient Sources															
Ancient name	Modern name	Pindar	Herodotus	Thucydides	Pseudo-Scylax	Diodorus of Sicily	Strabo	Lucan	Pliny the Elder	Stadiasmus	Pausanias	Ptolemy	Antonine Itinerary	Synesius	Peutinger's map	Procopius	Stephen of Byzantium
Petras	?											√					
Ardanis	?											√					
Catabathmus	Saloum						√		√			√					
Scythranius	?											√					
Antipyrgos	Tubrok						√					√				√	
Batrachus	?											√					
Phthia	?											√					
Platia	?		√		√		√										
Ardanis	?				√		√										
Menelaus	?						√										
Cherronesus	Ras et-Tin				√				√			√					
Darnis	Derna		√		√							√					
Chersis	Karsa											√					
Zephyrium	Ras Bu Meddad?						√					√					
Erythron	Lathrun									√		√		√			√
Naustathmos	Ras el- Hilal						√			√		√					
Apollonia	Susa	√	√		√	√	√		√	√		√			√		√
Phycus	Zawiet el-Hamama				√		√	√	√	√		√		√			√

Site		Ancient Sources															
Ancient name	Modern name	Pindar	Herodotus	Thucydides	Scylax	Diodorus of Sicily	Strabo	Lucan	Pliny the Elder	Stadiasmus	Pausanias	Ptolemy	Antonine Itinerary	Synesius	Peutinger's map	Procopius	Stephen of Byzantium
Cape of Phycus	al-Mamluh				√		√					√					
Aptouchou	Zawiet el-Hanya				√							√					
Ausigda	Gergerummah				√					√		√					
Kainopolis	el- Agla				√										√		
Ptolemais	Tolmeta				√		√		√	√		√	√	√	√	√	
Taucheira	Tocra	√	√		√	√	√		√	√		√	√	√	√	√	
Hadrianopolis	Driana												√				
Euesperides	Benghazi		√	√	√	√					√						
Berenice	Benghazi						√		√	√		√	√	√		√	
Boreum	Bu Grada						√					√				√	
Diarrhoea	?											√					
Hyphali	?											√					

Table 2-1: The coastal sites of Cyrenaica mentioned in ancient sources

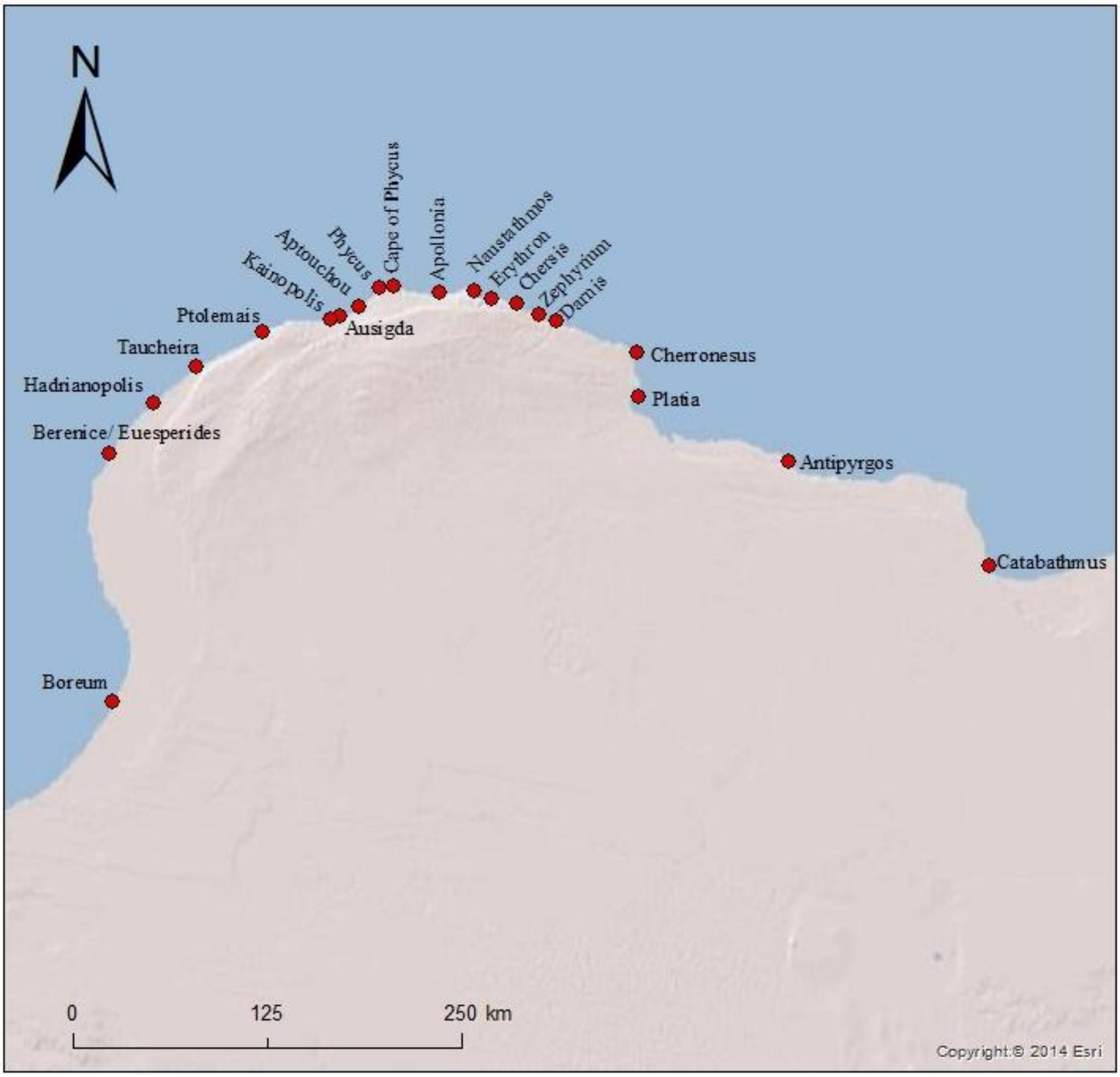


Figure 2-2: Known locations of Cyrenaican coastal sites mentioned in Table 2-1

Ancient sites in Cyrenaica

Ancient name	Modern name
Plateia	Gasr el-Bomba?
Phaia	Bomba?
Dionysos	Ras et-Tin
Chersonesos	Ras et-Tin
Aziris	Wadi el-Chalig
Darnis	Derna
Zephyrion	Ras Bu Meddad
Chersis	Karsa
Erythron	Lathrun
Naustathmos	Ras el-Hilal
Apollonia	Susa
Phycus	Zawiet el-Hamama
Aptouchou	Zawiet el-Hanya
Ausigda	Ain Giargiarummah
Kainopolis	el-Agla/ Gasr el-Gaama
Ptolemais	Tolmeta
Taucheira	Tocra
Hadrianopolis / Kaukalou Kome?	Driana
Berenice – Euesperides	Benghazi
Theotimaion	Tereth?
Boreion	Ras Taiunes
Chersis	Sidi Bu Fachra
Amastor	?
Herakleion	Ras Carcura
Boreum	Bu Grada
Automalax	Bu Sceefa

Table 2-2: The coastal sites of Cyrenaica shown in the Barrington Atlas of the Greek and Roman World

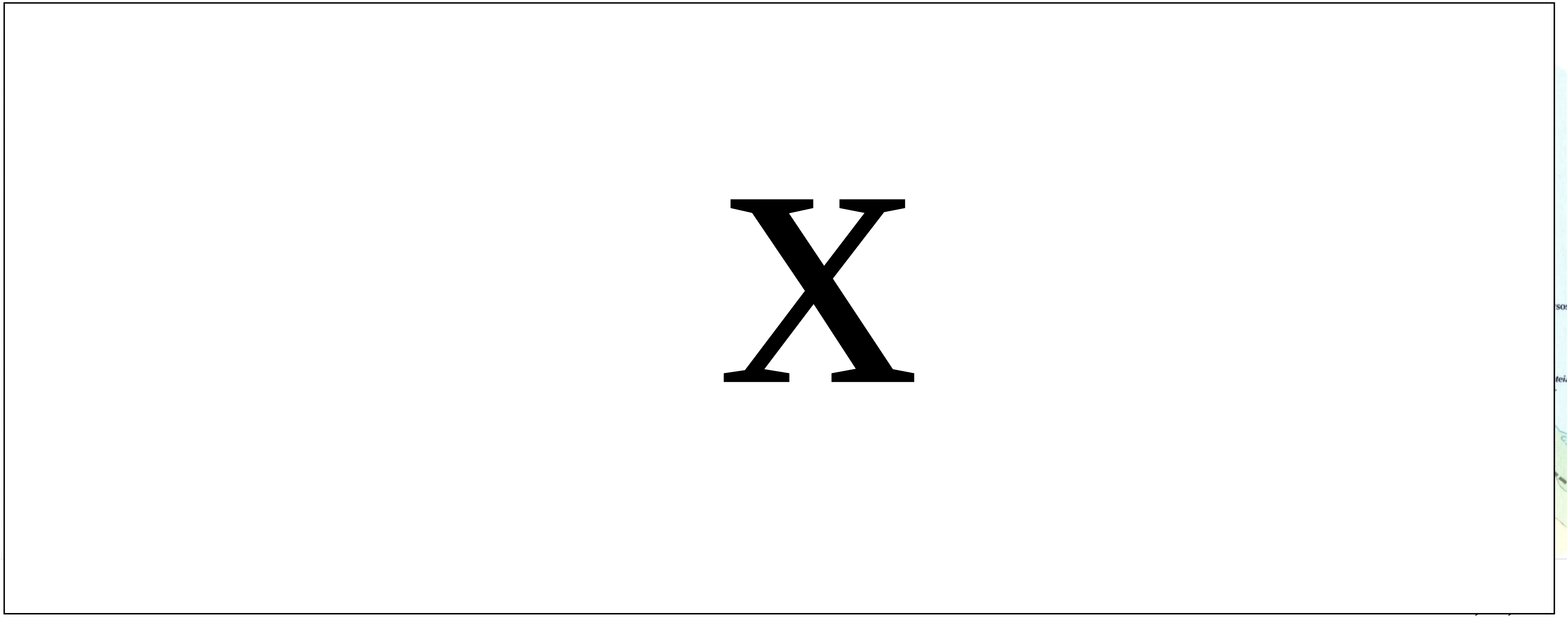
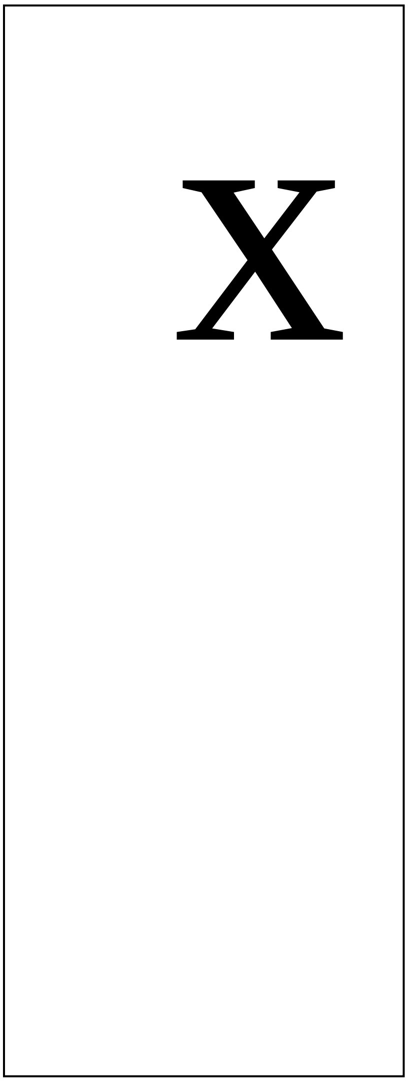


Figure 2-3a: The northern coastal sites of Cyrenaica (Barrington Atlas of the Greek and Roman World)



1: 1,000,000

Figure 2-4b: The western coastal sites of Cyrenaica (Barrington Atlas of the Greek and Roman World).

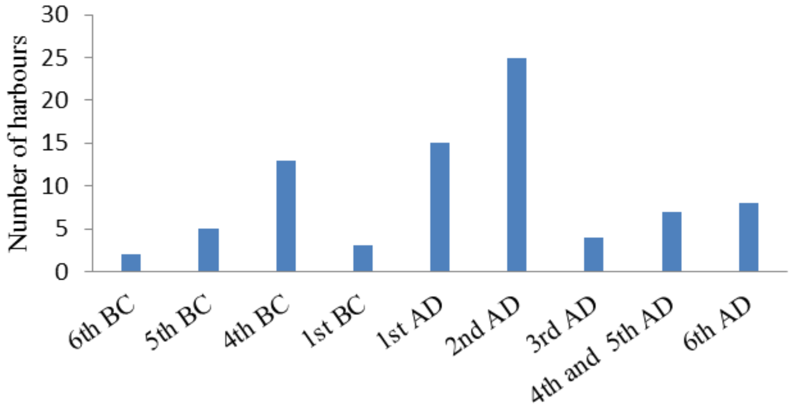


Figure 2-5: The number of harbours along the coast of Cyrenaica mentioned by ancient sources

2.3 The Coastal Sites of Cyrenaica in Nineteenth-Century Travellers

2.3.1 Introduction

There is no doubt that the works of nineteenth-century travellers played a considerable role in the discovery of ancient monuments in Cyrenaica. The writings of these wanderers represent considerable body of archaeological and typographical literature about a number of Cyrenaican sites (Elhadar 2011). Unquestionably, these works were the baseline for many scholars and archaeologists in the twentieth century.

2.3.2 Traveller's references

Nineteenth-century traveller's tales are widely considered to be one of the main sources of evidence for the socio-economic environment of their period. Their accounts also provide useful information about the ancient remains in Cyrenaica. Della Cella seems to have been one of the first travellers to leave a general description of some of the sites along the Cyrenaican coast during his visit in 1817 (Della Cella 1822). His book seems to have motivated a number of the subsequent travellers to the area. Five years after Della Cella's visit, the Beechey brothers conducted one of the most important journeys in Cyrenaica in 1822 (Beechey and Beechey 1828). They visited a number of major Cyrenaican ports and made detailed descriptions of the archaeological remains at Apollonia, Taucheira, Ptolemais and Berenice. For instance, they provide us with a detailed account of the circuit walls and defensive features of the city of Apollonia:

> *It has been completely surrounded by a very strong wall, with quadrangular turrets on three of its sides (that to the westward). As the wall has been carried along the brow of the hill, more attention has been paid to its strength than to its symmetry, but the turrets are for the most tolerably equidistant, being about eighty yards apart. The two circular turrets at the north-western angle of the wall have been built with even greater attention to solidity the other parts of this well-defended town* (Beechey and Beechey 1828 :494-95).

They also describe the harbour area and provided information about some submerged features, as they stated:

> *Extensive remains of building, apparently the foundation of a quay, are still visible, stretching out from the beach into the sea, at the depth of a few feet under water. Some quarries, which have been formed in*

> *the rock to the north-eastward of the town, are also now under water* (Beechey and Beechey 1828 :497).

In addition, they produced the first maps and plans of both the archaeology and topography of these cities (Figs. 2-5a and b; 2-6a and b; 2-7a and b, 2-8). The Beechey brothers visited the ancient sites of Naustathmos and Erythron, located to the east of Apollonia. However, they provide little information about these two sites.

Three years later in 1825, Pacho carried out a remarkable visit to Cyrenaica (Pacho 1827). However, he visited the same coastal sites recorded by the Beechey brothers. Pacho made a number of paintings recording archaeological remains, but his work in general seems to be less accurate than that of the Beechey brothers. Also, it seems he did not visit the sites located along the coastal area between Apollonia and Ptolemais, although he states he nearly reached the ancient site of Phycus but was unable to visit it. However, he confined himself to give a brief account of the site via the ancient sources:

> *Je quitte Apollonie, et laissant Cyrène à ma gauche, je continue mes excursions vers l'ouest. Je franchis de nouveau les hautes terrasses des montagnes qui, décrivant ici un grand coude vers le nord, vont former le promontoire brumeux du Phycus. Deux fois, dans mes traversées maritimes, je me suis approché de ses falaises; et dans ces occasions, comme dans celle-ci, je n'ai pu les visiter. Cependant , au défaut de mes témoignages sur ce sujet, j'en puiserai dans l'antiquité* (Pacho 1827: 169).

Many other travellers visited the coastal sites (Table 2-3) in Cyrenaica, including (Barth 1849; Dennis 1867; Haimann 1882; Hamilton 1856; Smith and Porcher 1864; Weld-Blundell 1896). However, the work of the Beechey brothers remains the most outstanding, and their maps are still in use today.

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Travellers	Year of visit	Sites: Euesperides	Berenice	Hadrianopolis	Taucheira	Ptolemais	Phycus	Apollonia	Naustathmos	Erythron	Reference
Della Cella	1817	√?	√?	√	√	√		√			(Della Cella 1822)
Beechy brothers	1822		√	√	√	√		√	√	√	(Beechy and Beechy 1828)
Pacho Jean	1825		√	√	√	√		√	√	√	(Pacho 1827)
Barth H	1845	√	√		√	√		√			(Barth 1849)
James Hamilton	1852	√?	√?		√	√	√	√	√		(Hamilton 1856)
Smith and Porcher	1860	√	√		√	√	√	√	√		(Smith and Porche 1864)
George Denis	1867	√	√		√			√			(Denis 1867)
Giuseppe Haimann	1881	√	√		√	√		√			(Haimann 1882)
Weld-Blundell	1895					√		√			(Weld-Blundell 1896)

Table 2-3: Travellers who visited the coastal sites of Cyrenaica

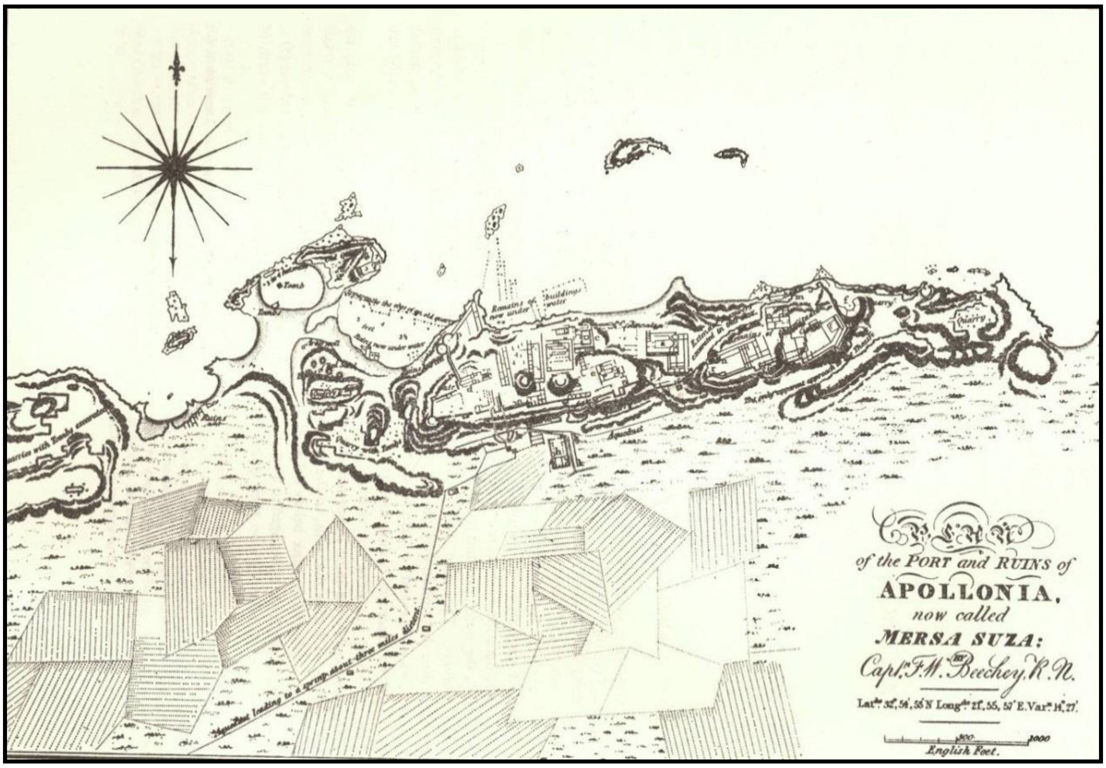


Figure 2-6a: Archaeological and topographical map of Apollonia drawn by the Beechey brothers in 1822.

Figure 2-5b: Google earth imagery (2014) shows the archaeology and topography of Apollonia.

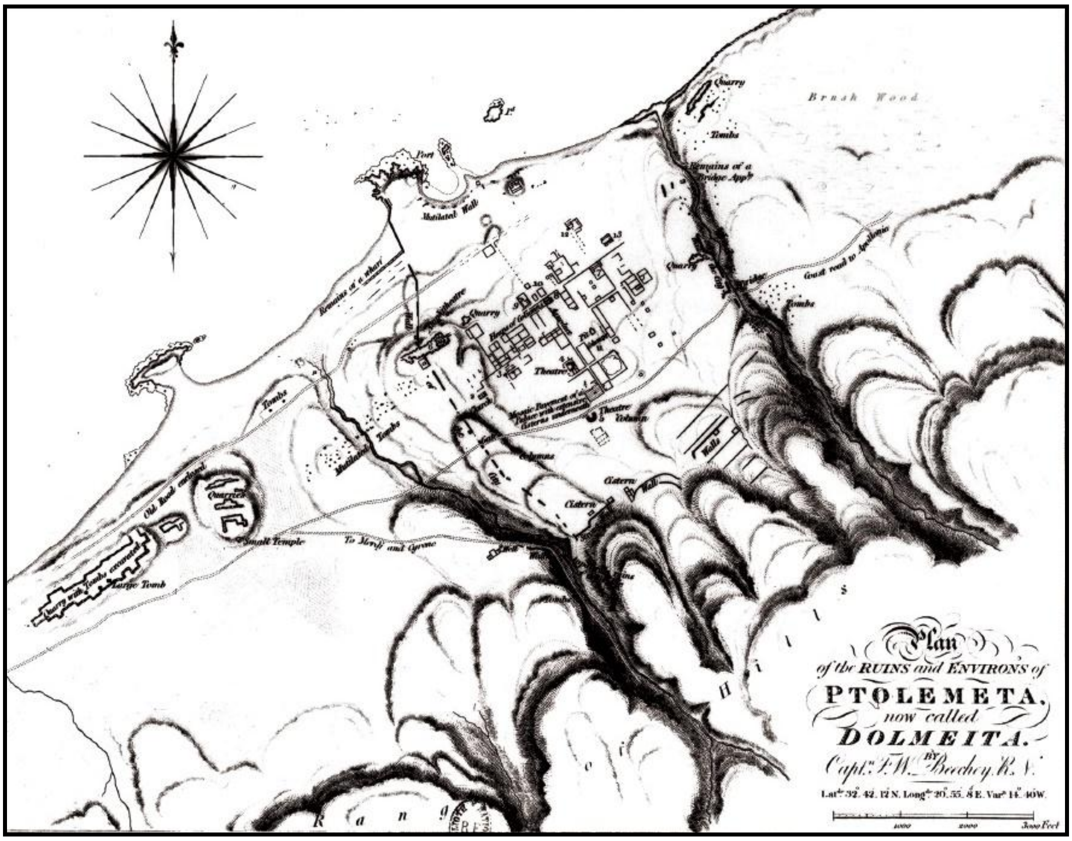


Figure 2-7a: Archaeological and topographical map of Ptolemais drawn by the Beechey brothers in 1822.

Figure 2-6b: Google Earth imagery (2014) shows the archaeology and topography of Ptolemais

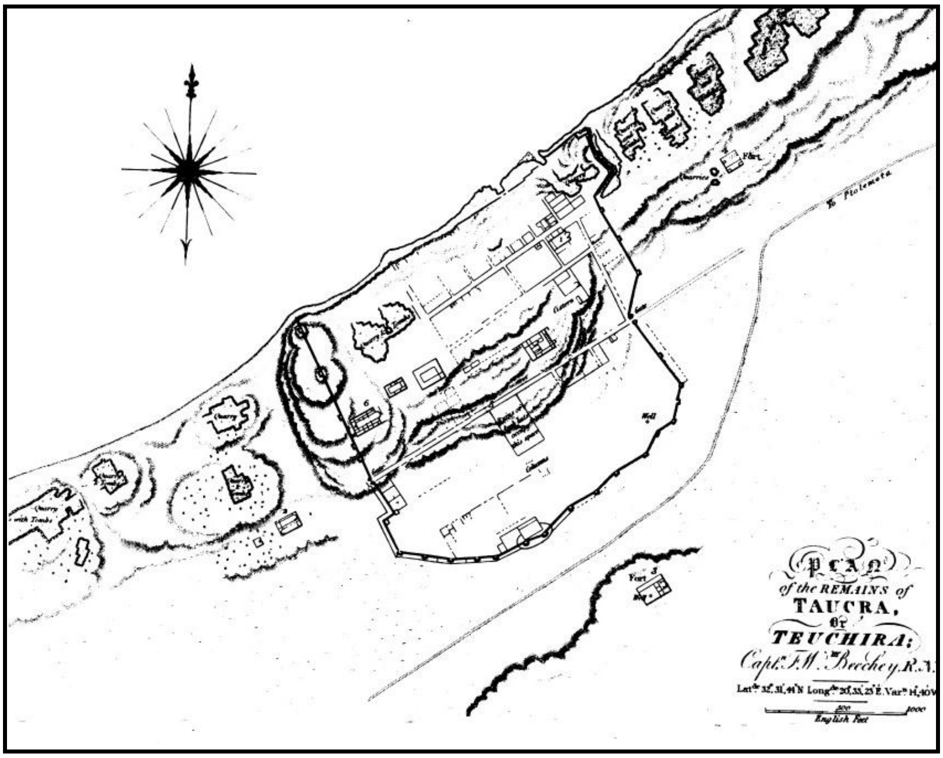


Figure 2-8a: Archaeological and topographical map of Taucheira drawn by the Beechey brothers in 1822.

Figure 2-7b: Google earth imagery (2014) shows the archaeology and topography of Taucheira

Figure 2-9: Archaeological and topographical map of Berenice drawn by the Beechey brothers in 1822.

2.3.3 Conclusion

Although the region of Cyrenaica received constant visitors, the ancient coastal sites were little explored or described by travellers. Most travellers concentrated on recording the remains of major ports, such as Apollonia, Taucheira and Ptolemais (Table 2-3). A few minor coastal sites were also visited (Beechey and Beechey 1828 ; Hamilton 1856; Smith and Porcher 1864), but only their geographical locations were described, and not their archaeological remains. This was probably because the major coastal sites lie on the main routes, while the minor ones are further off. For instance, the travellers who came from Berenice (Benghazi) seem to have taken the coastal road that passed Taucheira (Tocra) and Ptolemais (Tolmeta). This road then goes towards the upper plain to Barce (el-Marj), then to Cyrene (Shahat), then down to Apollonia (Susa) and on to Darnis (Derna), passing Naustathmos (Ras el- Hilal) and Erythron (Lathrun). This explains why the sites located between Apollonia and Ptolemais were rarely visited or mentioned by travellers (Fig. 2-9).

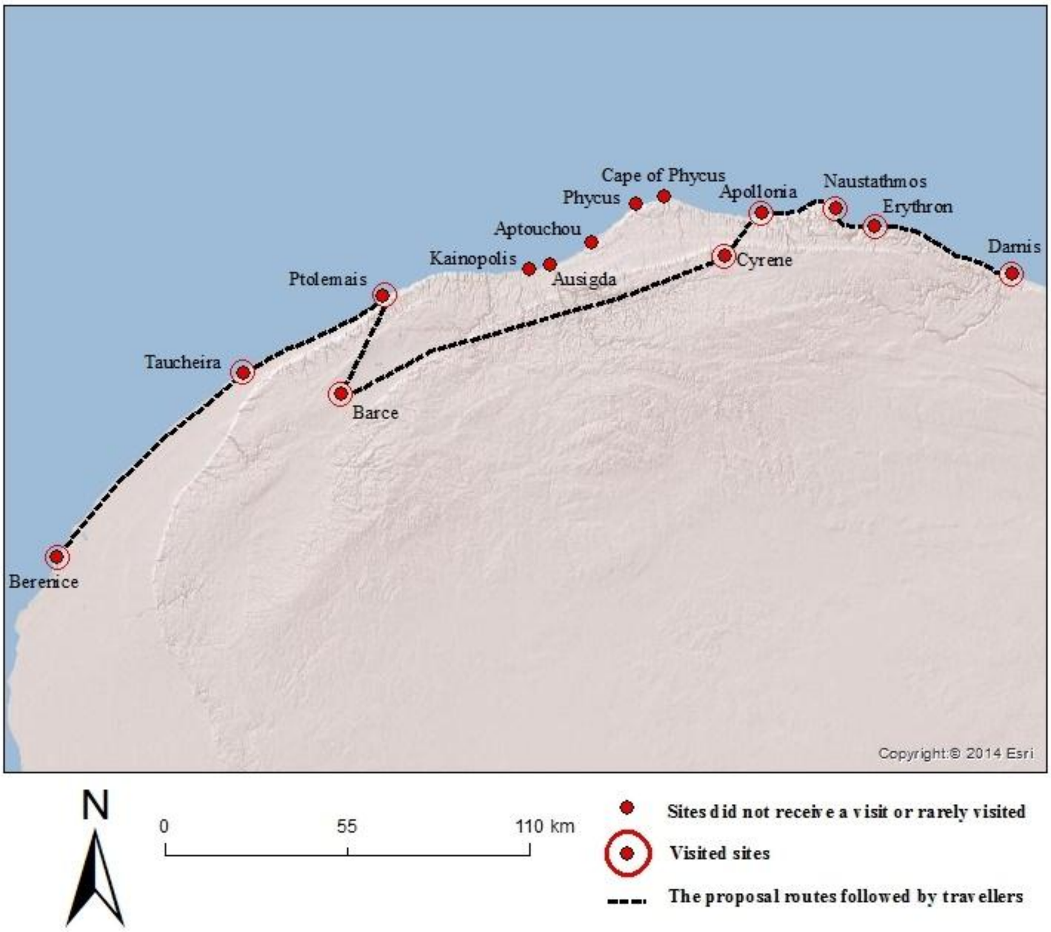


Figure 2-10: The proposed routes followed by the nineteenth-century travellers who visited Cyrenaica

2.4 The Major Cyrenaican Ports

There are five major harbours along the coast of Cyrenaica. These are Apollonia, Ptolemais, Taucheira, and Euesperides, which later moved to Berenice. It was long believed that Taucheira was not a major port (Beechey and Beechey 1828), as no trace of a protected shelter or harbour elements were visible by the sea and the city was established in a harbourless area. However, this assumption has been challenged since the 1970s, when an underwater investigation revealed that Taucheira had a submerged artificial port containing two possible basins (see below) (Jones and Little 1971a; Yorke and Davidson 1973; Yorke et al. 1972).

2.4.1 Susa (Apollonia)

2.4.1.1 Introduction

This site is located about 20 km to the north-east of Cyrene, in a relatively narrow coastal plain measuring about 2 km from the shore to the foot of the hills. Apollonia is one of the most important ports of the ancient Mediterranean in general, and the eastern Mediterranean in particular. Its importance lies in the fact that it is one of the oldest ports along the North African coast, and that it was one of the first ports to have artificial elements (Laronde 1985; 1996; Stone Forthcoming). It is also the largest submerged port in the ancient world (Flemming 1971). The site was established in the seventh century BC to serve as an outlet for ancient Cyrene. The port grew considerably in the late Hellenistic period, and a circuit wall and defences were built (Pedley 1967). In the earlier Roman period, most probably in 67 BC, it became an independent city and was known as the city of Apollonia. In late antiquity the importance of the city seems to have risen. Its name changed to Sozousa (Laronde 1985), and it became the capital (metropolis) of Cyrenaica and the seat of residence for the governor. Although the site has been known since the 1800s (Beechey and Beechey 1828), it has only attracted the attention of archaeologists since the 1950s.

2.4.1.2 Previous work at the site

Apollonia has undergone intensive archaeological investigation, especially in comparison to other sites along the coast of Cyrenaica. Ghislanzoni made the first attempt to study the site in 1922, during the Italian colonisation of Libya. However, Ghislanzoni’s works were confined to the restoration and raising of the columns of the Eastern Church (Romanelli 1943). On the other hand, Goodchild highlighted the archaeological potential of Apollonia, and further advanced research by conducting a number of excavations at different parts of the site, concentrating in particular on the late Roman monuments and the churches and palace of the Dux (Goodchild 1976; Widrig and Goodchild 1960).

In the middle of the 1950s, Pierre Montet led a French mission which carried out excavations for three seasons (1953 to 1956). The work concentrated on three different parts of the site (Montet 1953; 1954; 1955). The first area excavated was located to the east of the eastern basilica (Fig. 2-10), below the acropolis. The second site lies to the west of the eastern basilica, while the third was further to the west of the second palace. The mission produced the first topographic map (Fig. 2-11) of Apollonia (Lauer 1963), and revealed a number of buildings which were interpreted as shops (area one), houses (area two), and public baths (area three).

In 1965 and 1966, an archaeological mission led by D. White from the University of Michigan undertook a survey and excavation at Apollonia. Its objectives were to: 1) to draw a complete plan of the entire site (Fig. 2-12); 2) to study the city walls; 3) to gain a comprehensive understanding of the site environment; and 4) to conduct a number of excavations inside and outside the city walls (Fig. 2-10). The excavations in two areas outside the city walls revealed the foundation of a Doric temple, which is located to the west of the city. They also revealed a single fort 3 km to the west of Apollonia, at the foot of the hill between the mountain and the sea. The work was published in two interim reports (Pedley 1967; White 1966), and another comprehensive volume was published ten years later (Humphrey 1976). This volume is not confined to the results of the University of Michigan campaign, but also includes the previous work conducted by Goodchild in the 1950s and 1960s.

The French mission resumed work at Apollonia under the supervision of François Chamoux in 1976, after an interruption of 20 years. The mission aimed to complete work on the three areas opened up by Montet in 1954 (Chamoux 1976-1977; 1977). In 1981 André Laronde was appointed mission director, who extended the work to include other areas of Apollonia such as the shore line, the submerged port, the western off-shore island, and Calacratia and its surrounding area (east of the Eastern Church) (Laronde 1985; 1996; For the most recent work of the French mission at Apollonia see, Michel 2012).

In terms of records of its infrastructure and studies in general, the port of Apollonia seems to be in a better state than many other ports along of the coast of Cyrenaica. Underwater research has been carried out here since the 1950s. A team from the University of Cambridge conducted the first limited underwater research in Apollonia (Flemming 1965; 1971; 1980), identifying various artificial features of the harbour. The team was able to reconstruct the shape and the form of the submerged port, and produced the first map of its recorded features (Fig. 2-13).

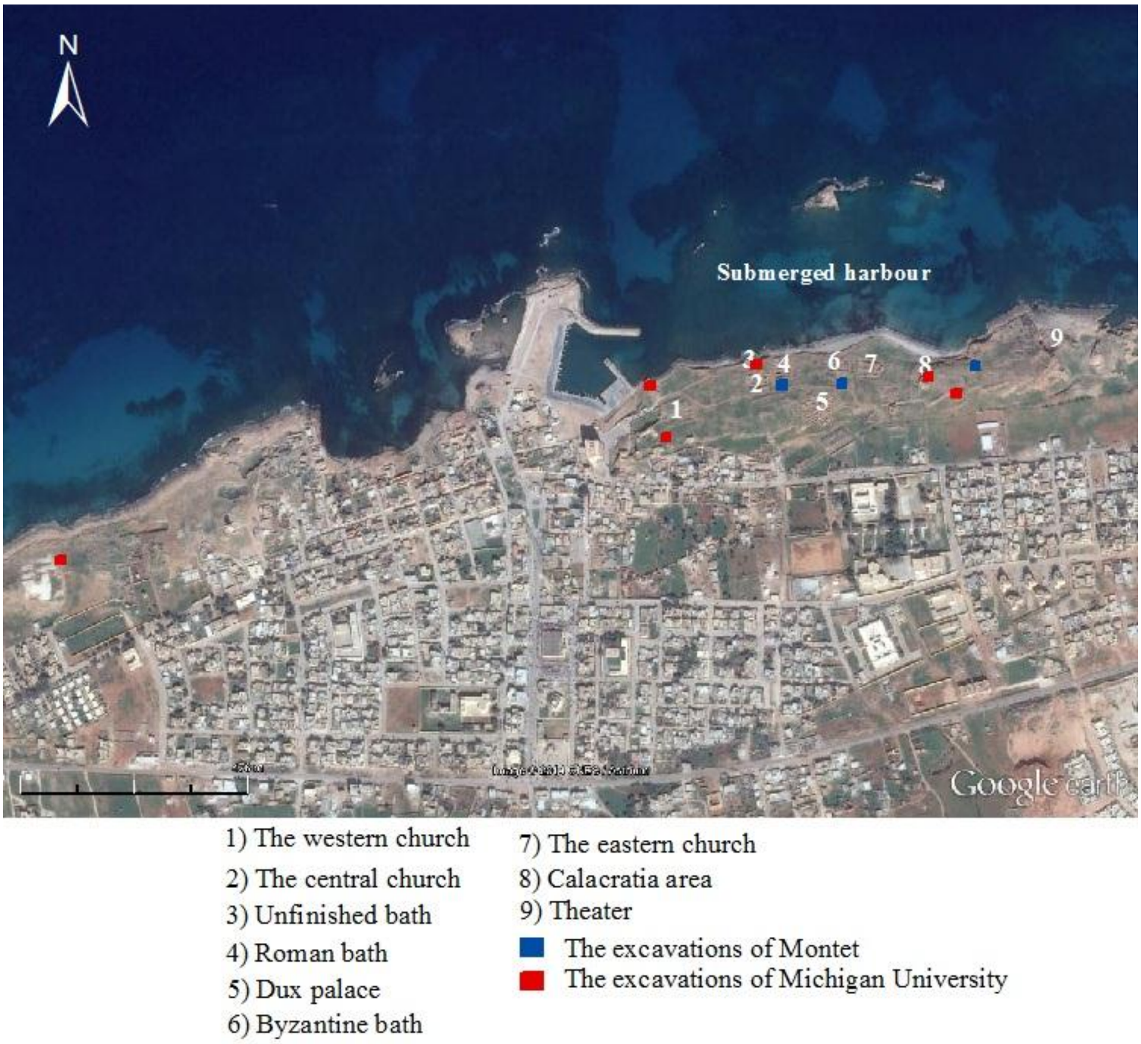


Figure 2-11: The distribution of Montet and Michigan University excavations at Apollonia

Since 1980, the French archaeological mission has attempted to study the submerged port through sporadic underwater investigations (Laronde 1990). They have worked in the channel connecting the outer and inner basins of the harbour (Laronde and Sintés 1998), and have identified two shipwrecks sunk in the outer basin (Laronde 1990). In addition, the French mission completed a comprehensive study of the shipyard and partially submerged off-shore islands (De La Brière et al. 2004; 2005; Sintés 2010). In 2009 a short investigation was carried out to locate a suitable national underwater park in Libya (Pizzinato and Beltrame 2012). This brief work re-documented some previous submerged features.

X

Figure 2-12: Topographic map of Apollonia (Lauer 1963)

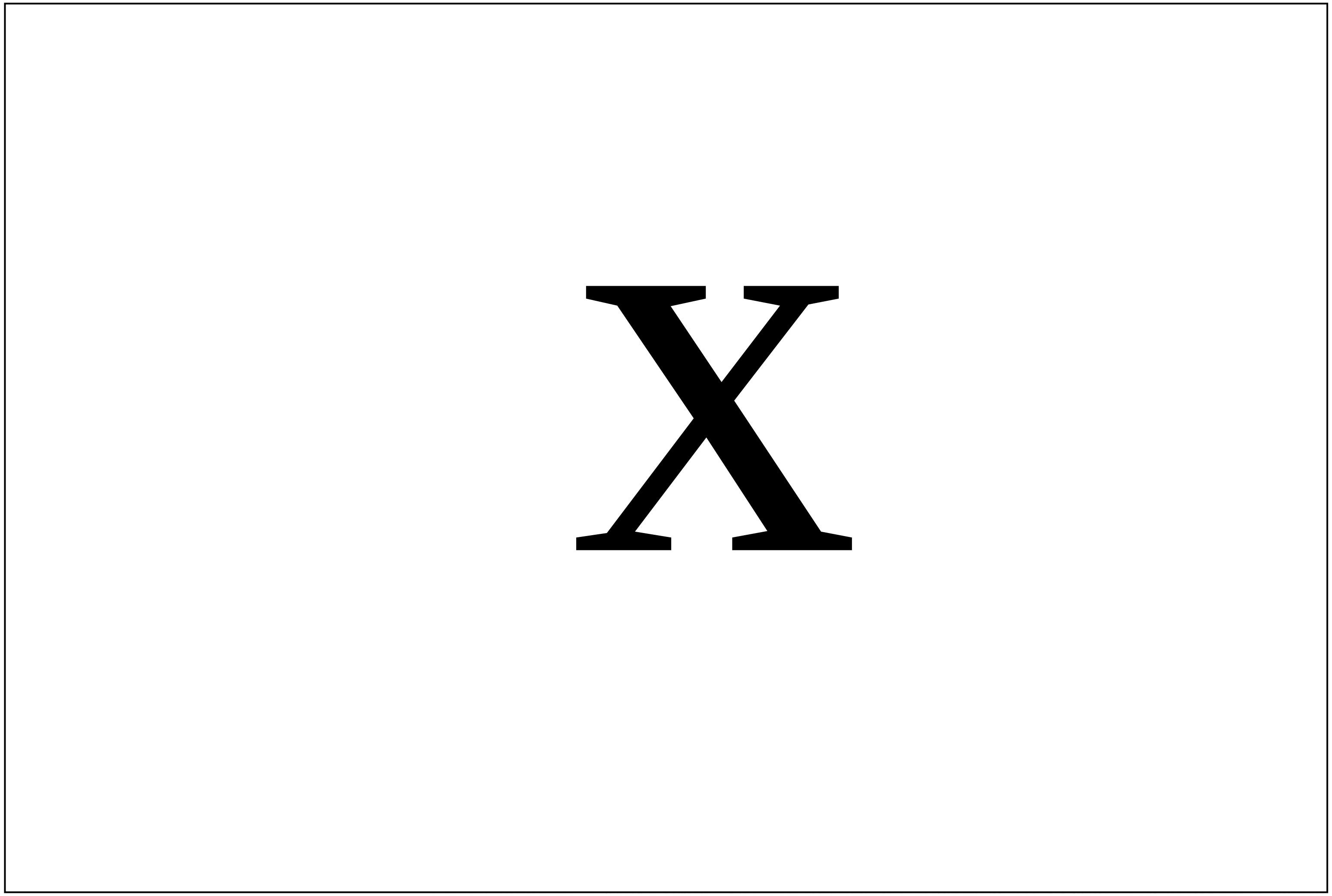


Figure 2-13: Plan of Apollonia (Pedley 1967: Plate 47, Fig. 1)

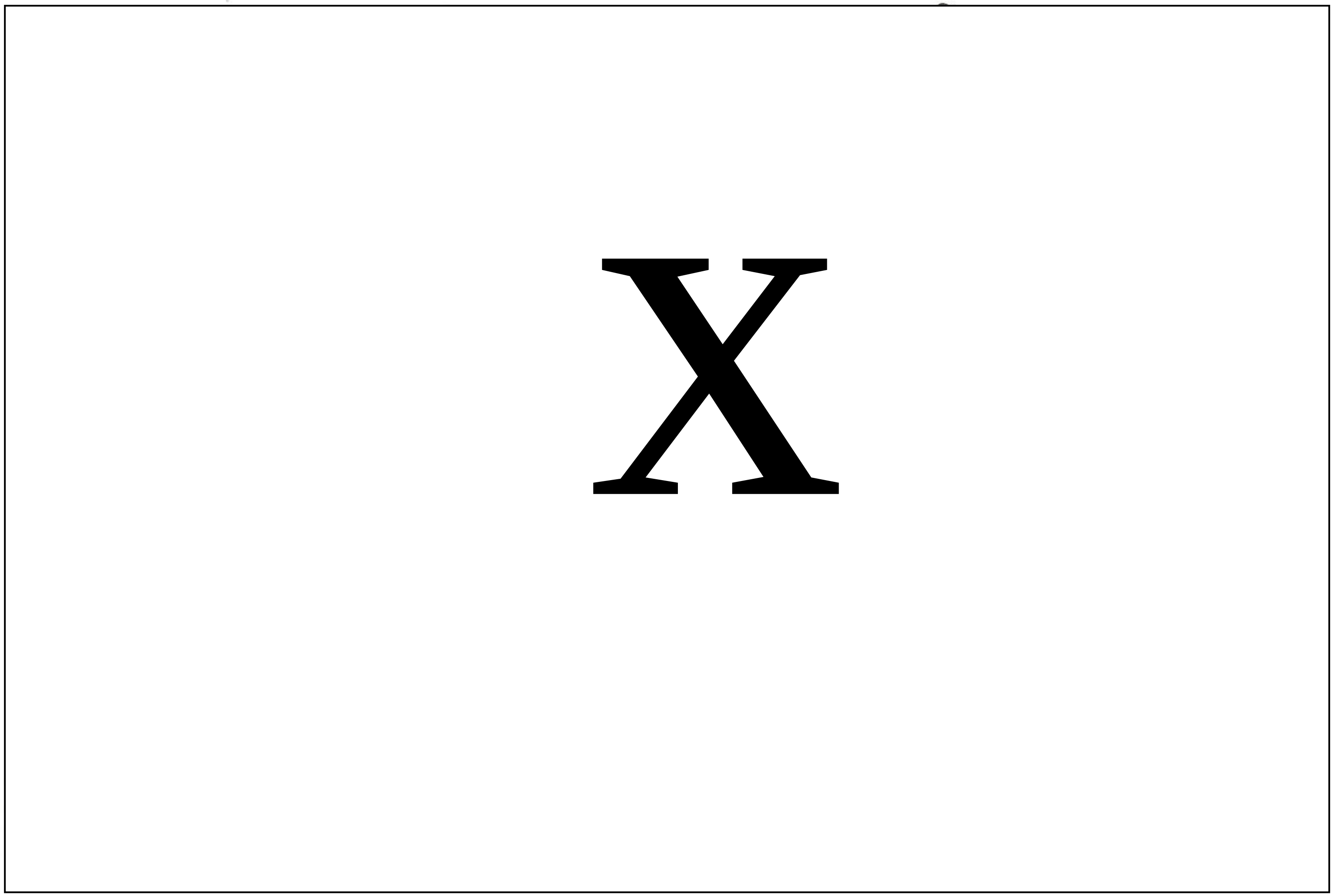


Figure 2-14: General map of the submerged harbour of Apollonia (Flemming 1971: Fig. 14)

2.4.2 Tolmeta (Ptolemais)

2.4.2.1 Introduction

This site is located about 25 km to the north of the inland city of Barca. Ptolemais seems to have had a similar history to Apollonia in terms of its founding and political and geographical conditions. The city lies in a narrow coastal plain that extends for 2 km from the shoreline to the foot of the hills. The site was set up at the outset, most probably at the end of sixth century BC, to serve as an outlet to Barca. It grew considerably in the Hellenistic periods, and become a royal city bearing the name of Ptolemais (Laronde 1987; 1992). The status of the city rose in the third century AD, and it became the capital of Cyrenaica (Pentapolis) for more than three centuries (Jones 1974; Laronde 1987).

2.4.2.2 Previous work at the site

The site of Ptolemais was noted by nineteenth-century antiquarians, and excavations and surveys were carried out during the Italian colonised period (Caputo 1954; Pesce 1950). In the post-war period archaeological exploration at Ptolemais intensified (Fig. 2-14). Between 1956 and 1958, a detailed excavation of the site was carried out by the Oriental Institute of Chicago, under the supervision of Kraeling. The mission excavated three areas within the city’s walls: an early Roman Empire "villa", a public building on the street of the monuments, and the city bath of the Byzantine period. The results were published in a comprehensive volume of four chapters (Kraeling 1962). The first addresses the history of the city from its founding until the late Byzantine period, the second is concerned with the city plan and organisation, while the third describes the excavation itself. The fourth volume presents the excavation’s findings (Fig. 2-15).

In 1960, a brief survey was undertaken by the Department of Libyan Antiquities under the direction of R. M. Harrison. The city area was investigated, and an interim report published about the mosaic floors of a Roman house (Harrison 1962). A small-scale survey was carried out by Jones and Little at the end of the 1960s as part of a several summand of sites along the coast of Cyrenaica (Jones and Little 1971a). This paid little attention to the site itself, and only briefly mentioned an aqueduct. In the 1970s, the Society for Libyan Studies sponsored an excavation at Ptolemais in the north-east Quadrant. This mission was directed by John Ward-Perkins and John Little.

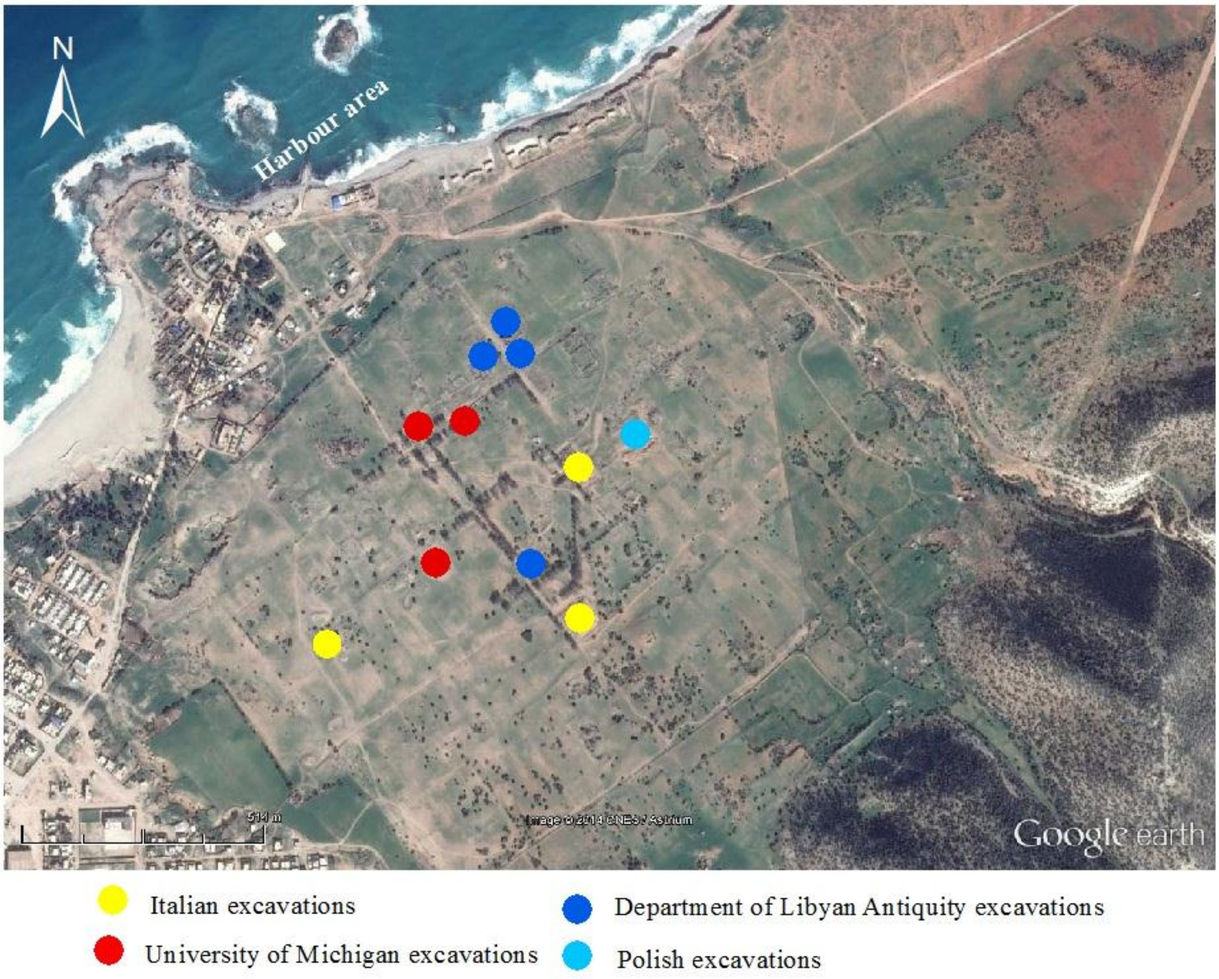


Figure 2-15: The distribution of excavations conducted at Ptolemais

This team excavated three houses located on one of the two main roads running through the town. The aim of the work was to establish the original date of the buildings. Their results were published in four interim reports (Gibson et al. 1978; Little 1980; 1985; Ward-Perkins et al. 1986). It is worth noting that this work was related to earlier unpublished and unfinished work carried out by Goodchild.

In the early 1970s, a survey was carried out by Arthur and Bazama which aimed to investigate the aqueduct and water supply to Ptolemais. The scholars were able to trace the course of the aqueduct from its source to Ptolemais (Arthur and Bazama 1975).

From 2001 until the present day, a Polish archaeological mission from the University of Warsaw has been conducting excavations at Ptolemais. This work has concentrated on an area called the Palazzo delle Colonne (a residential area) (Fig. 2-16). The mission aims to gain new knowledge about the urban architecture of the city from the

Hellenistic period to late antiquity. The mission also aims to obtain a wider view of the society and inhabitants of Ptolemais during this period.

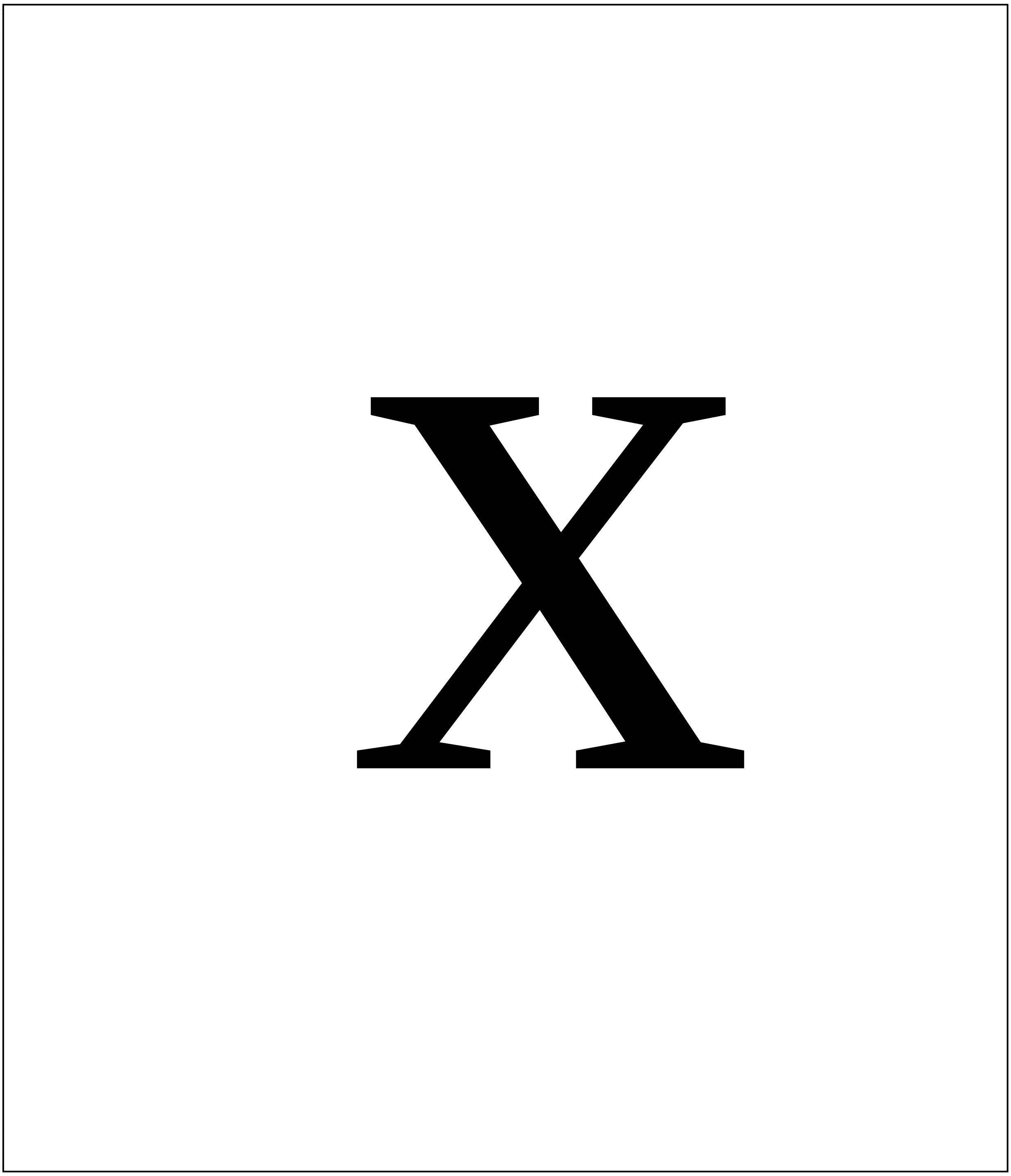


Figure 2-16: Plan of Ptolemais by the University of Michigan (Kraeling 1962: Plan XXII)

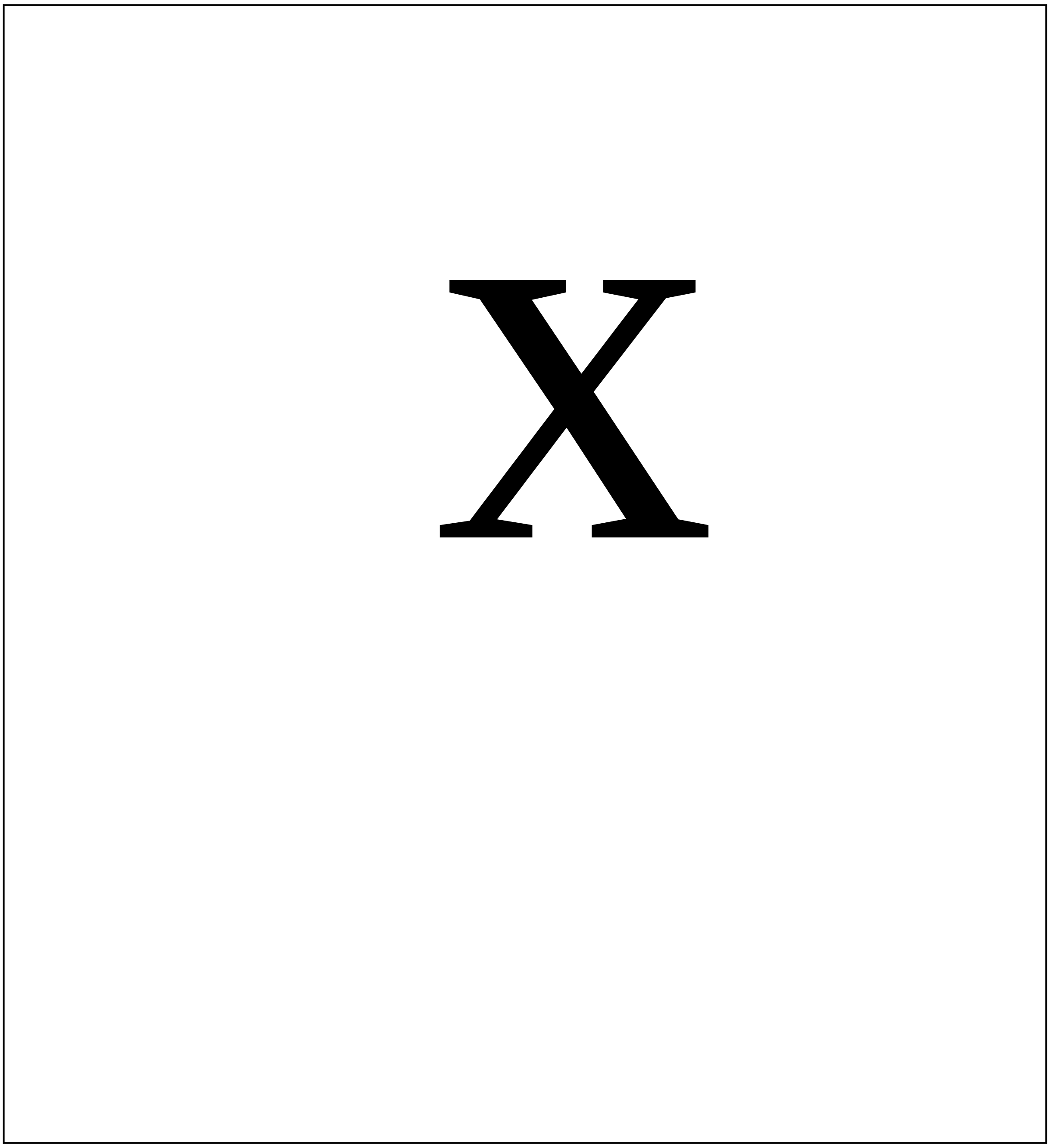


Figure 2-17: The area excavated by the Polish archaeological mission at Ptolemais (Nowakowski et al. 2011: Plate 10, Fig. 25)

A set of interim reports of the excavation works have been published (Stępniowski and Maciałowicz 2011), in addition to an extensive volume containing twenty-two chapters (Żelazowski 2012). However, only one chapter addresses the trade route issue. This is based on quantified analysis of recovered finewares, but does not pay attention to the imported amphorae (Domżalski 2012). In general, the volume seems to focus on the excavation techniques, methods and general aspects of Ptolemais, rather than on the study of the wider context of the city's socio-economic history.

Unlike Apollonia, the port of Ptolemais has not received much underwater survey and excavation. However, in 1970, a British team investigated the underwater remains of the Harbour of Ptolemais (Yorke and Davidson 1971-72; 1973; Yorke et al. 1972). The team managed to determine the exact position of Ptolemais' harbour as well as other artificial features (see chapter 7). It is worth mentioning that the full results of this work are still unpublished, but are now being prepared for press by York and Davidson. In 2009, an underwater survey took place within the context of a project for creating an underwater park in Libya. The survey allowed for the re-documented and analysis of pre-known features (Beltrame 2012).

2.4.3 Tocra (Taucheira)

2.4.3.1 Introduction

The ancient site of Taucheira is located about 40 km west of Ptolemais (Tolmeta) and about 60 km to the east of Euesperides (Benghazi). The city lies on a relatively wide coastal plain in comparison to Ptolemais and Apollonia, which measures about 5 km from the sea to the foot of the hills. The city was apparently founded in the late seventh century AD by a group of settlers from Cyrene (Boardman 1963). In late antiquity the city was chosen by the Byzantine administration to be the province's last stronghold against the Arab invasion, which put an end to Byzantine control in Cyrenaica (Jones and Little 1971a).

2.4.3.2 Previous work at the site

The first excavation work at the site of Taucheira took place in 1848, when Joseph Vattier de Bourville excavated a sixth-century basilica (Serres-Jacquart 2001). However, the site did not receive any further attention until the beginning of the twentieth century (Fig. 2-17) when an Italian mission directed by Gennaio Pesce began to excavate three areas within the city circuit wall. These areas found a large public building in the centre of the city, the west Gate, and a colonnaded square building (Barnett 1945). In 1954, G. Wright led another excavation outside the city walls. Wright stated that these works were "undertaken with the double purpose of providing material for a museum of classical archaeology and investigating the sepulchral history of a typical Cyrenaican colony" (Wright 1963:26).

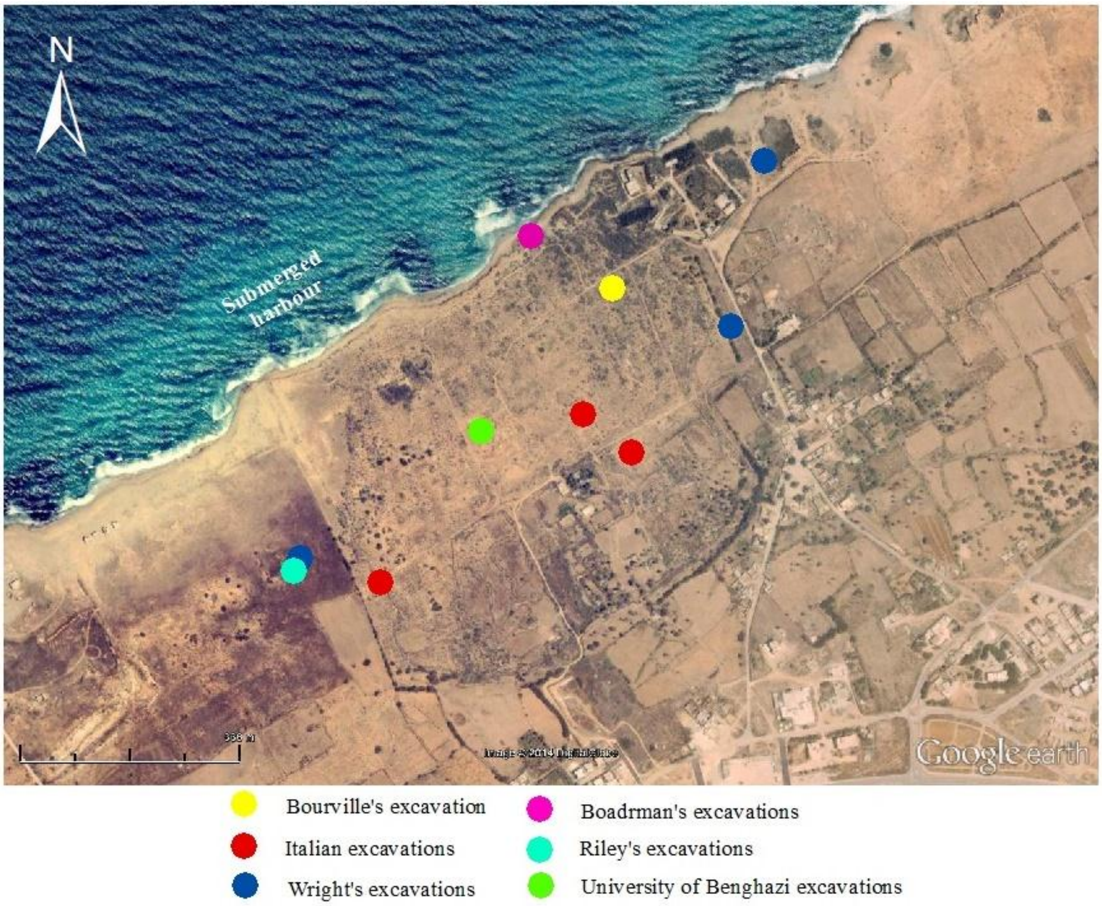


Figure 2-18: Distribution of excavation works carried out at Taucheira

Wright ultimately excavated three areas. The first lies 100 m to the west of the city wall, near to the quarry. A pottery kiln dump was found during the work in this area. The second area was located to the east of the city wall, where four tomb chambers were found and excavated. The third area was a few meters to the north of the second site, where another tomb was found (Fig. 2-18). The excavation work yielded a considerable amount of pottery materials. Their findings were published in a large report in 1963 (Wright 1963).

Between 1963 and 1966, joint excavations were carried out by the British School at Athens and the Libyan Department of Antiquities (Boardman 1963; 1965). The area of excavation was located on the north-east of the city (Fig. 2-17), by the shore-line within the wall circuit. It has been suggested that the area was the centre of the Greek town (Boardman 1963). The full results of the excavation were published in two volumes. The first describes the site and the excavation work, the pottery and other finds (Boardman and Hayes 1966). The second volume contains the materials from the 1965 work not published in the first volume (Boardman and Hayes 1973). However, the bulk of the published materials were from the archaic deposits, as the excavations were conducted in the early town.

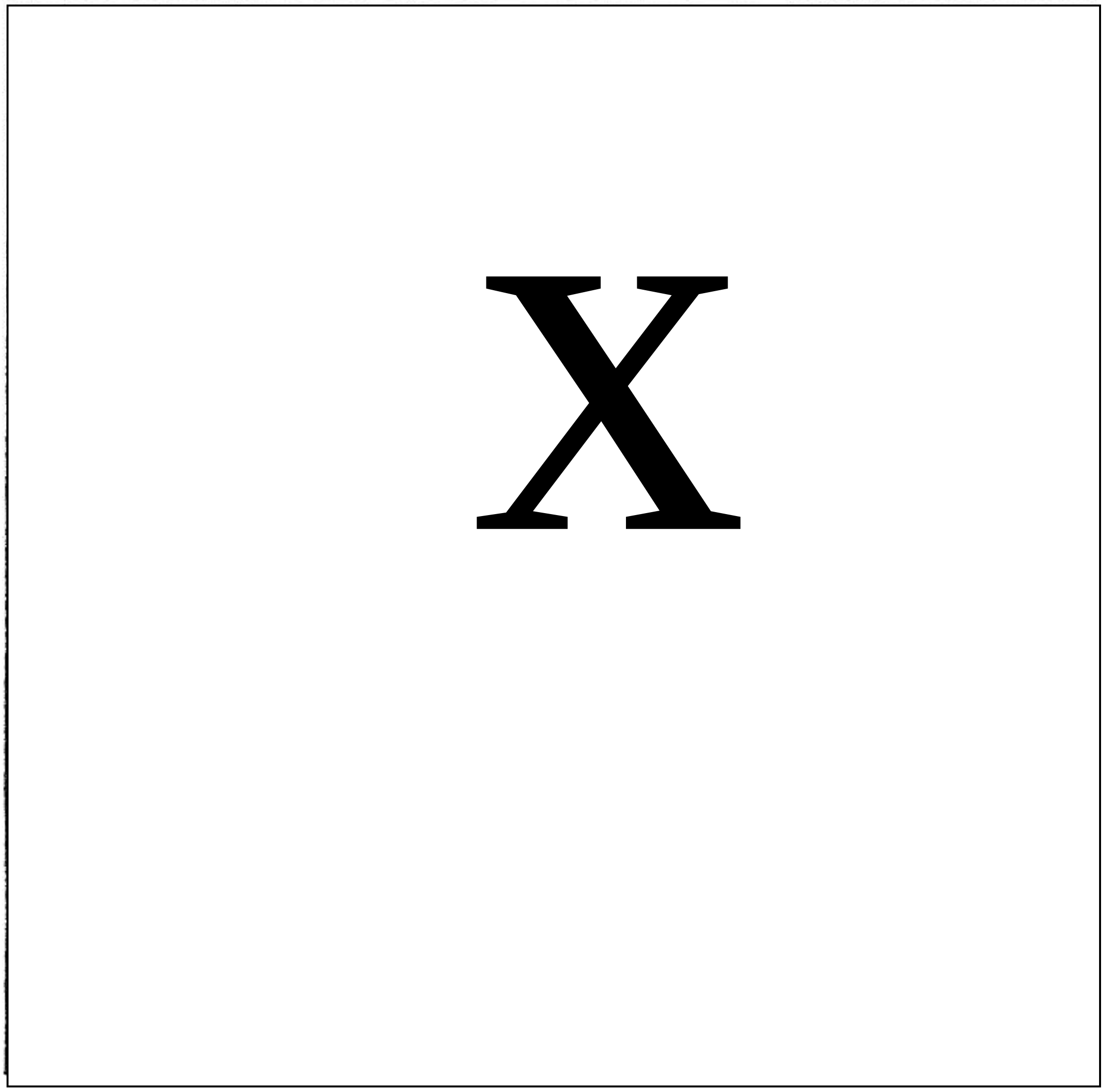


Figure 2-19: General plan of Taucheira and the location of Wright's excavations (Wright 1963: 27, Fig. 2)

David Smith undertook a field survey in 1966 and 1967, supported by the British School at Athens. The team aimed to accurately survey the visible remains of the site. A further objective was to study the fortifications and their wider role within the city. The work produced a detailed plan of the circuit wall, the towers of ancient Tocra, and plans of a number of other buildings (Smith and Crow 1998).

The site was also excavated and surveyed at the end of 1960s by a British team led by Jones, who were studying the costal settlement at Cyrenaica (Jones 1983; Jones and

Little 1971a). The team was able to identify the position of the harbour and a number of its submerged features (see Chapter 7).

In 1972 the Department of Archaeology at Benghazi University initiated an annual training excavation program at the ancient city of Tocra. A complex was partly excavated, of which the southern part was occupied by an apsidal hall furnished with four successive floor levels (Bentaher and Dobias-Lalou 1999). The building was tentatively interpreted as part of the bishop's residence (Ward-Perkins et al. 2003). In 1976 these training seasons moved to another area located in the approximate centre of the walled city, some 80 m west of the so-called Roman villa. The excavations have brought to light two kilns and a number of late Roman buildings (Buzaian 2000) (see Chapters Six and Seven).

A limited excavation was executed by John Riley in 1974 to re-examine the pottery kiln dump found by Wright. The aim of this excavation was to shed light on the structure and organisation of the Cyrenaican pottery industry and its place within the wider North African pottery trade (see Chapters Six and seven). The work was published in two separate articles with full results of the types of pottery and fabrics found (Riley 1976; 1979b).

In 2004, a team sponsored by the Society for Libyan Studies working at the ancient site of Euesperides examined the exposed seaward escarpment of the ancient site of Tocra. This visit was made at the request of the Department of Antiquities of Benghazi and aimed to assess the damage caused to the area by a recent winter storm. The submitted report shows the degree of damage and erosion to the shore-line of the ancient city (Bennett et al. 2004). This study is a good demonstration of the significant natural hazards that are threatening the harbour sites of Cyrenaica.

At the end of the 1960s, an attempt was made to identify the ancient harbour of Tocra. A British team conducted the first and only effort to detect the harbour (Jones and Little 1971a; Yorke and Davidson 1971-72; Yorke et al. 1972). Fortunately, the team succeeded in finding the submerged harbour and its artificial features (for more details and discussion see Chapter 6 and 7).

2.4.4 Benghazi (Euesperides)

2.4.4.1 Introduction

The ancient site of Euesperides is located about 60 km to the west of Tocra. The actual site of the modern Moslem cemetery of Sidi Abeid, at the northern edge of the salt-marsh known as Sebkhat el-Selmani, was occupied by the ancient site of Euesperides. This now lies within the limits of the modern city of Benghazi. The city was established by the settlers from Cyrene or Barce around 515 BC (Goodchild 1962). Around the middle of the third century BC, the ancient city of Euesperides was abandoned in favour of the new city of Berenice (Fig. 2-19) (see below). Why the city was abandoned has long been a subject of debate. On the one hand, Goodchild claims that the lagoon at Euesperides, which was connected to the sea and served as the city's harbour, seems to have gradually silted up. As a consequence, the settlers of the city moved nearer the sea, where Berenice is situated, until Euesperides was eventually completely abandoned in favour of the new city (Goodchild 1962).

On the other hand, Laronde suggests that the city was suddenly abandoned as result of a political resolution being made as punishment to the settlers of Euesperides who stood up against Ptolemy II (For more details about the this conflict see, Laronde 1987). New evidence from recent excavations at Euesperides favours the sudden abandonment theory. The excavation revealed that eight wells and one cistern were deliberately filled with homogeneous materials dating back to the mid of third century BC (Wilson 2006 : 145).

2.4.4.2 Previous work at the site

The early discovery of the ancient town as an urban site came about through aerial photography taken during World War 2 (Fig. 2-20) (Goodchild 1952a; 1962). Since the beginning of the 1950s, the site's archaeological remains have received considerable attention. The first excavation work took was conducted by a team from the Department of Antiquities under the supervision of Mr Johns who was controller of the Libyan Department of Antiquities, in collaboration with the Ashmolean Museum of Oxford. Unfortunately there are no published reports from the 1950s, and the results remained obscure until interest in Euesperides revived in the 1990s.

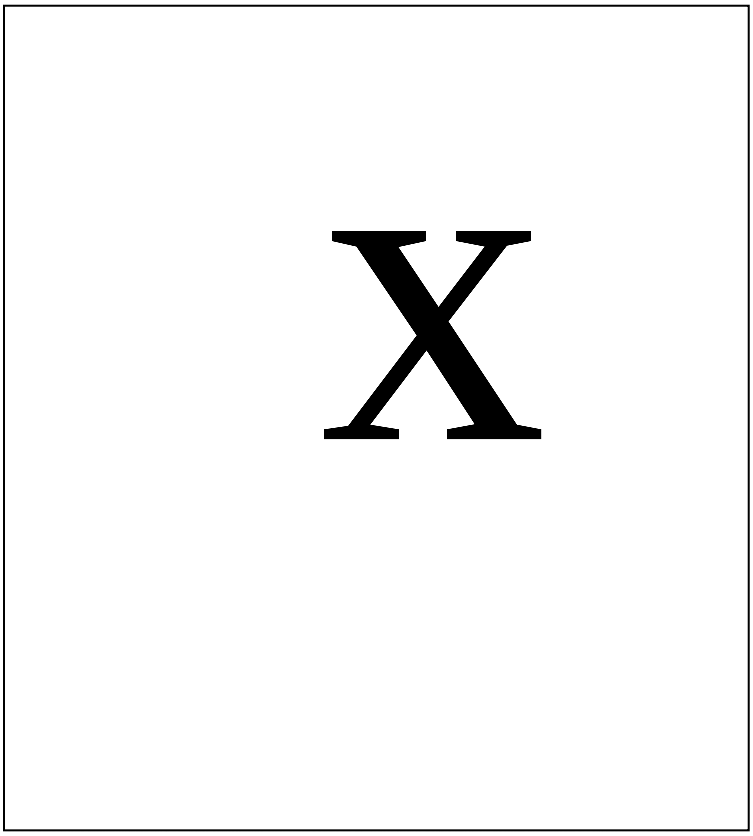


Figure 2-20: The location of Euesperides and Berenice (Jones and Little 1971a: 66, Fig. 4)

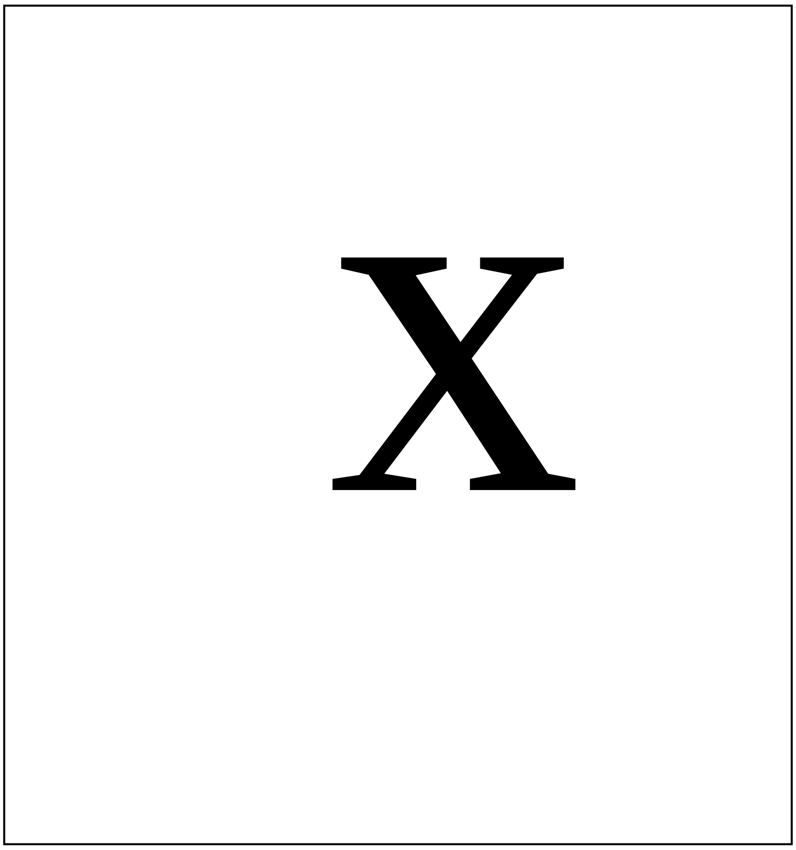


Figure 2-21: Aerial photograph of Euesperides (Goodchild 1962)

However, Vickers et al. (1994) attempted to obtain information about the 1950s excavations using letters and the Ashmolean's annual report for 1952 and 1953 (Vickers et al. 1994). This allowed a clear picture to be drawn of the location of the main areas that were excavated, the plans of the excavated remains, and the associated ceramic finds.

According to the Ashmolean's annual reports, an area of 15 hectares survived. Excavations were carried out in both the flat extension near the salt lake (site B, the lower town) and on the Muslim cemetery (site A, the upper town) (Fig. 2-21). The excavation in area A seemed to reveal a number of buildings, streets, city walls and houses. Meanwhile area B uncovered a rectangular structure interpreted as a tower, another part of the city wall, lines of streets, and a number of large rectangular building blocks (Vickers et al. 1994).

In the early 1960s, walls of stone houses and a city wall at the lower end of Euesperides were recorded by an American mission directed by Theresa Carter from the University of Pennsylvania (Carter 1963). The mission dug a number of trenches to obtain traces of Bronze Age habitation. However, they collected massive amounts of pottery sherds which indicated three levels of occupation at the site, from the sixth century BC to the third century BC.

Towards the end of the 1960s, another brief excavation and survey was carried out at the ancient site of Euesperides by Jones (Jones 1983; Jones and Little 1971a). This work was organised as an urgent rescue excavation of the site of Euesperides, as well as to finish and prepare a publication for the work carried out at the site by Goodchild. However, the work was brought to an early end in 1969 due to political instability in Libya.

An important excavation took place between 1994 and 2006 at the site of Euesperides, and was conducted by the Society for Libyan Studies, the Libyan Department of Antiquities, and the Department of Archaeology at the University of Garyunis (Buzaian and Lloyd 1996). The work was conducted at the request of the Libyan Department of Antiquities as the archaeological site was threatened by construction and development work. The mission started with a survey in 1994, and was followed by large excavations (Hayes and Mattingly 1995).

Figure 2-22: Upper area (A) and lower area (B) at Euesperides (Vickers et al. 1994: 130)

2.4.5 Benghazi (Berenice)

2.4.5.1 Introduction

After the city of Euesperides was abandoned around the middle of the third century BC (Wilson 2006), its citizens were transferred to a new city called Berenice. This site lies to the north-west of modern Benghazi, in an area known as the cemetery of Sidi Khrebish (see Figure 2-19).

2.4.5.2 Previous work at the site

Although the ruins of the ancient site of Berenice have been recognised since the nineteenth century, its archaeological potential was appreciated only in the twentieth century. The site was subject to a large-scale joint excavation by the Libyan Department of Antiquities and the Society for Libyan Studies from 1974. This excavation is widely considered to be one of the most systematic, scientific and quantified excavations ever carried out on one of the most important sites along the Mediterranean coast. The excavation yielded a huge quantity of valuable data and shed light on socio-economic life at this urban Roman site. The results of the excavations were published in four comprehensive volumes as supplements to *the journal Libya Antiqua* (Kenrick 1985a; Lloyd 1977; Riley 1979a). For more discussion of the results of this excavation, see Chapters 5 and 7.

At the present time, no underwater excavations or surveys have taken place at either Berenice or Euesperides. However, it is believed that the harbour of Berenice lies beneath the modern harbour of Benghazi (Jones and Little 1971a).

2.4.6 Conclusion

Despite the number of excavations which have taken place at the major ports of Cyrenaica, there is a lack of synthetic studies and publications addressing the socio-economic aspects of the harbours. Most of the works have been published in fragmentary reports and individual articles, and do not place the site within its wider context of its interactions with Cyrenaica and the outside world. In other words, the bulk of the work has concentrated on the urban area within the city. Little attempt has been made to analyse the harbour area or investigate the role of the harbour within the city's flourishing economy. Other negative side effects that can be seen clearly at Apollonia are that the missions working there have not attempted to quantify their results and attribute the data to their archaeological contexts, as happened at ancient Berenice. This matter makes it difficult to study this important emporium in Cyrenaica within its broader context. Moreover, it is difficult to compare it with other major ports around the Mediterranean and study its role in trade and connectivity within the wider Mediterranean on the basis of quantified materials (see Chapter 7).

However, a small number of studies (see Chapters 5 to 7) have examined trade routes, industrial archaeology and the Cyrenaican economy in comparison to other provinces in the Mediterranean using archaeological evidence obtained from the excavations at Berenice and Euesperides (Fulford 1989; Lloyd 2002; Riley 1979a; 1981; Wilson 2001; 2004b; 2013; Wilson and Tébar Megías 2008).

2.5 Minor Ports of Cyrenaica

2.5.1 Lathrun (Erythron)

2.5.1.1 Introduction

The ancient site of Erythron (Lathrun) stands on a high cliff that rises about 20 m above sea level on the mouth of valley of Lathrun. The site is located 30 km to the east of Apollonia. The hinterland of the site is very fertile and suitable for agriculture. Erythron has easy passes with the areas in the upper plateau. The site seems to have been established as an agricultural centre (Laronde 1987). However, the importance of the site rose in the Roman period, especially in the late Roman period when Apollonia, its western neighbour, became the capital of Pentapolis.

At the end of the fourth century and the beginning of the fifth century AD, Erythron was the seat of a bishopric and a large administrative area (Laronde and Michel 2004; Ward-Perkins et al. 2003). It is worth mentioning that the appearance in the literature of the names of five bishops from Erythron emphasises the site's prestigious status in the late period. For instance Dracontius, Bishop of Erythron, was the only bishop from Cyrenaica to attend the Council of Chalcedon (Widrig 1978).

2.5.1.2 Previous work at the site

The archaeological potential of the site was brought to light by Goodchild in the early 1950s (Goodchild 1952b). Ward-Perkins visited the site in 1955 and 1957 and noticed the eastern church (church A) (Ward-Perkins et al. 2003). However, from 1960 to 1965 three seasons of excavation work were carried out by Walter Widrig (Fig. 2-22) with the co-operation of the Department of Libyan Antiquities. Widrig discovered the west church of Erythron (church B) in addition to a number of architectural remains (Widrig 1978). In the early 1960s a limited survey was conducted by an American mission led by Theresa Carter, with the aim of identifying the Bronze Age inhabitants of the Cyrenaican coast (Carter 1963).

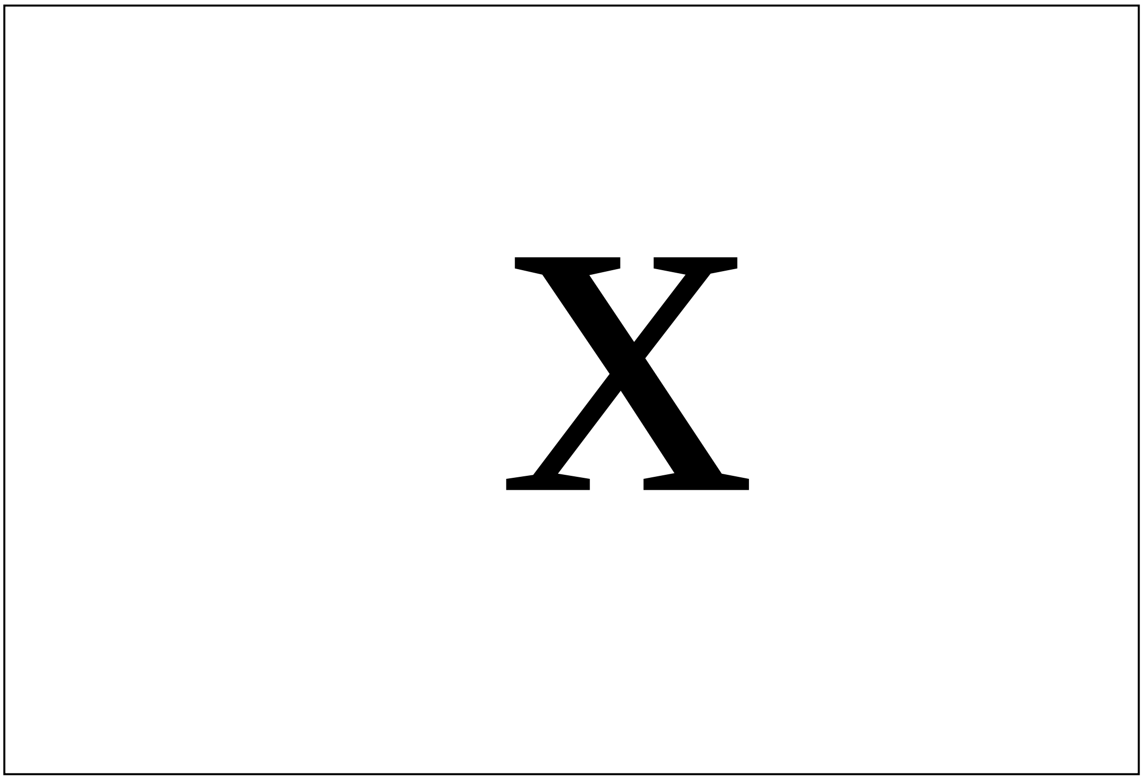


Figure 2-23: The distribution of archaeological remains at ancient Erythron (After Michel 2012: 96, Fig. 4)

In 2001, a French mission working at Apollonia under the direction of André Laronde extended its work to include Erythron. The project aimed to restore the churches (west and east) (Laronde and Michel 2004). However, in 2006 the mission started to survey the site and began an excavation at the centre of the village, between the two churches. The work revealed a Roman bath (Fig. 2-22), most probably built in the early third century (Michel 2012). A pottery kiln producing Mid Roman Amphora 1 was also uncovered (Mazou and Capelli 2011) (see Chapters Five and Six for more discussion). It is remarkable that there exists a possible harbour and shelter for ships at the site of Erythron. However, as shown in Figure 2-22, the area surrounding both places is very steep. This raises questions about their possible accessibility and how commodities and people reached the ships.

2.5.2 Ras el- Hilal (Naustathmos)

2.5.2.1 Introduction

This site lies about 25 km to the east of Apollonia, and 14 km to the east of Erythron. The site is situated on a cliff overlooking an anchorage area from the east. The settlement of Naustathmos is quite distinct from the harbour area.

2.5.2.2 Previous work at the site

Traces of settlement and remains of buildings have been recognised since the nineteenth century. Goodchild identified one of the buildings as a church (Goodchild 1966). In 1961, large-scale excavations were carried out at a sixth-century church by the Libyan Department of Antiquities under the direction of Harrison (Harrison et al. 1964). However, the ancient site of Naustathmos and its remains were recorded later by a number of scholars, including Stucchi, Laronde and Roques (Carter 1963; Laronde 1987; Roques 1987; Stucchi 1975).

2.5.3 Zawiet el-Hamama (Phycus)

2.5.3.1 Introduction

The ancient site of Phycus was one of Cyrenaica's minor harbours. The site lay 30 km to the west of Apollonia (Susa), and 70 km to the east of the ancient city of Ptolemais (Tolmeta). Phycus is located within the modern village of Zawiet el-Hamama, which is on the coast just 19 km to the north of Balagrae and 25 km to north-west of Cyrene (Shahat). It can be argued that the site served as a harbour to Balagrae, which lies to the west of the centre of the modern city of el-Beida, and as a second harbour to ancient Cyrene (Laronde 1987). According to Lucan, the Roman poet, Phycus was destroyed by the younger Cato to punish the citizens of Phycus who had objected to his fleet anchoring there during the civil wars (Pharsalia IX, 300). It seems that the site recovered soon after this devastation, and was mentioned again in Ptolemy, the Stadiasmus and Synesius, and in other sources. However, Roques conducted a historical study of the site by analysing the ancient sources that addressed the ancient site of Phycus (Roques 1999).

2.5.3.2 Previous work at the site

The site of Phycus has received few visits and is little explored, like the other small harbours on the shore of Cyrenaica. In fact, the only archaeological work completed to date has been the description of some of the visible structures under the sand. However, the site has been recognised since the 1950s (Stucchi 1975). Nick Flemming and his team were working at Apollonia (Susa) and visited the site and the eastern promontory area. They recorded a number of rock-cut vats located in the eastern promontory (Flemming 1971). Similarly, Jones and Little (1971a) conducted a brief visit to the site in 1969. They recorded the same features mentioned by Flemming, as well as other remains such as warehouses, a square masonry structure which seems to have been a lighthouse, and a set of storage tanks on the eastern promontory.

The harbour of the ancient site of Phycus has received little attention in terms of underwater surveys. However, one brief underwater survey was carried out by an Italian mission (Tusa 2010; 2011), who identified some stone anchors and other submerged features (see Chapter 7 and site gazetteer).

2.5.4 Zawiet el-Hanya (Aptouchos)

2.5.4.1 Introduction

Zawiet el-Hanya is located 20 km to the north-east of the ancient site of Balagrae (el-Beida), and 13 km to the north of ancient Artimis (Massa). It also lies about 55 km to the east of Ptolemais (Tolmeta) and 47 km to the west of Apollonia (Susa). This site lies 14 km to the south-west of Phycus and about 1 km to the west of the modern village of el-Hanya. It is located at the foot of an easy pass through both escarpments below the ancient site of Artemis (modern Massa). The ancient name of the site has been widely debated. Jones and Little (1971a) suggested that the ancient site of Ausigda is at modern el-Hanya. These scholars argue that the ancient sources prove the long life of Ausigda, and this corresponds with the surface pottery collected from the site of el-Hanya.

Nevertheless, André Laronde proposes that the ancient site of Aptouchos corresponds with the position of the modern village of el-Hanya, while ancient Ausigda is located about 15 km further to the west of el-Hanya, at a site called Gergerummah (Laronde

1987). Laronde bases his argument on a calculation of the distance between the sites mentioned by ancient sources. I believe that Laronde was correct in his identification of the position of both sites, and this has also been suggested by *the Barrington Atlas of the Greek and Roman World*. My field survey has shown that el-Hanya has many archaeological remains (see Chapter 5 and the gazetteer/Chapter 9) which date from the fourth century BC all the way up to the late Roman period. Also, the records from the site of Gergerummah suggest that the site was active for a long period (Abdussaid et al. 1984).

2.5.4.2 Previous work at the site

This site has been mentioned by scholars of the twentieth century without any detailed study of its archaeological remains (Chamoux 1974; Laronde 1987; Stucchi 1975). The work of Jones and Little (1971a) remains the only archaeological work carried out at the site up to now. Jones and Little conducted an initial survey in 1969, recording some of its visible features and collecting a number of diagnostic pottery sherds.

In 2009, Jean Pierre conducted a small underwater survey at the harbour of el-Hanya. The only underwater survey at the site, the work identified more than 12 stone anchors which together weighed more less than 25 kg (Pierre 2013).

2.5.5 Gergerummah (Ausigda)

2.5.5.1 Introduction

This site lies about 30 km to the south-west of Phycus. It has been identified as the ancient site of Ausigda (Laronde 1987) and is located at the mouth of the valley of Gergerummah.

2.5.5.2 Previous work at the site

This site has been mentioned by a number of twentieth-century scholars (Laronde 1987; Stucchi 1975). As with other minor coastal settlements at Cyrenaica, there has been little in-depth study. However, a brief survey was carried out in the early 1980s by a Department of Libyan Antiquities team at Cyrene (Abdussaid et al. 1984). The team recorded a number of features, such as a lime kiln, a building and a church (Abdussaid et al. 1984; Ward-Perkins et al. 2003). Unfortunately, the site has not received any underwater investigation to date.

2.5.6 El-Agla (Kainopolis)

2.5.6.1 Introduction

El-Agla is located about 30 km to the west of Phycus and 35 km to the east of Ptolemais. The site is divided geographically between a coastal area and a hilltop site. Laronde identified the site as the ancient site of Kainopolis (Laronde 1987). The site lies on the main ancient road that linked Cyrene with Ptolemais (Laronde 1983).

2.5.6.2 Previous work at the site

The remains of the site have been reported by a number of scholars (Abdussaid et al. 1984; Laronde 1983; 1987; Stucchi 1975). However, these works do not go beyond descriptions of the visible remains.

The site has received only one limited underwater survey, by an Italian mission under the direction of Sebastiano Tusa (Tusa 2010; 2010). The survey identified some submerged features (see Chapter 7). The mission also concentrated its work on the off-shore islands, recording various tanks (see Chapter 5).

2.5.7 Driana (Hadrianopolis)

2.5.7.1 Introduction

The site of Hadrianopolis lay on the coast of Cyrenaica between Berenice and the ancient site of Taucheira. According to an inscription found in Cyrene the city was established in the second century AD, based on a decision made by the emperor Hadrian in his attempt to assist the recovery of the province of Cyrenaica after the Jewish revolution (Fraser 1950; Goodchild 1952b; Jones and Little 1971a; 1971b).

2.5.7.2 Previous work at the site

The location of Hadrianopolis was debated by archaeologists for a long time. Goodchild for instance suggested that the site was located below the modern village of Tansoluch, 15 km to the west of Taucheira. The archaeological remains discovered at the site of Tansoluch included a structure that seemed to be a church, a quarry and rock-cut tombs. These were interpreted by Goodchild as the ancient settlement of Hadrianopolis (Goodchild 1952b; 1954; Ward-Perkins et al. 2003).

Jones and Little (1971a), on the other hand, have successfully identified the true location of the site as the modern village of Driana, about 10 km west of Tansoluch. They identified the site based on several factors, including the cisterns, the aqueduct running from the south of Driana to the coast, and a cave containing a spring feeding the city's aqueduct (Fig. 2-23). They also found a pottery kiln (see chapter 4) on the south side of the site. A number of tombs, a street grid and many buildings were also found (Jones and Little 1971b). However, the work of Jones and Little is all we have on this.

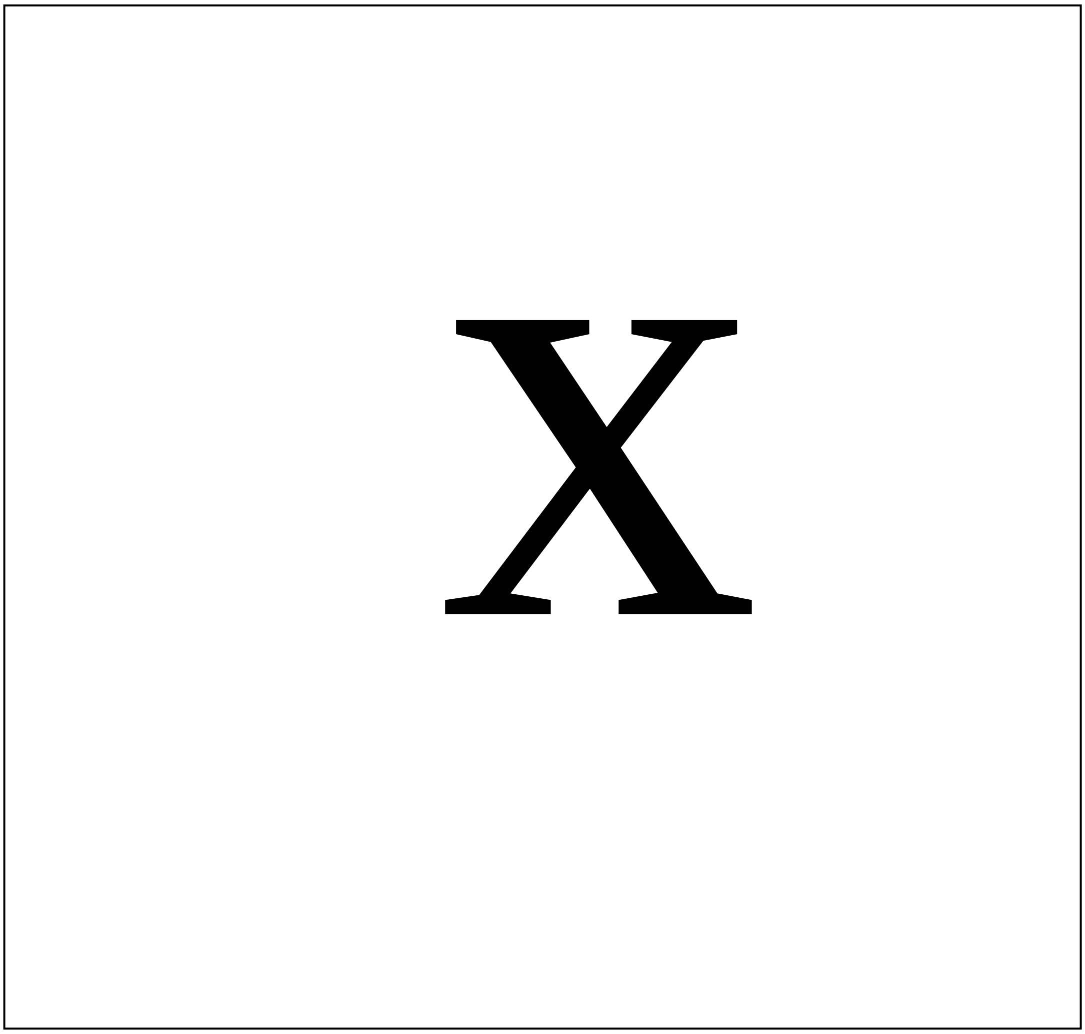


Figure 2-24: General plan of the site of Hadrianopolis and its water supply (Jones and Little 1971a: 68, Fig. 5)

2.5.8 Conclusion

It is clear from the above review that work on the minor harbours at Cyrenaica lacks a synthetic study and contextualisation within the broader socio-economic questions, and is even short on basic information about structures and archaeological remains. Work on these types of sites would allow us to draw important conclusions about these small harbours and their place within the Mediterranean economy, and indeed the role of small harbours in general.

2.6 General Conclusion

This chapter examined the most important references to the sites along the coast of ancient Cyrenaica recorded by both ancient historians and nineteenth-century travellers. The chapter also reviewed a number of essential works by modern scholars who carried out excavations and surveys at a number of major and minor coastal sites. To conclude, the reviewed studies were not able to put these harbour sites into their wider context.

It can be argued that there are two explanations for this failure. The first is that most of these works have concentrated on exploring the monumental features of the urban sites (as presented at the excavation works at Apollonia, Ptolemais and Tocra). Secondly, apart from the excavation work at Berenice, few works have attempted to quantify their data or the finds recovered. It was thus not possible to extract information about the economic growth of these harbour cities.

Another possible weakness of these studies is the local context of the Cyrenaican region in general, and of these harbours in particular. The works carried out so far in Cyrenaica have left many unanswered questions. Although the studies which have taken place have successfully demonstrated some productive features, including kilns, vats, presses, and tonnes of amphora sherds, there are clear limitations in our knowledge about their typologies, functions, capacities, and how they might have participated in economic activity. This thesis makes a considerable effort to address these issues and so increase our understanding of the role of Cyrenaican harbours in both the local and wider contexts. The following chapter (Chapter 3) will examine the chosen study area and the survey carried out along the Cyrenaican coast, outlining the importance of this work for filling in the gaps highlighted by the present chapter.

Chapter 3: Survey Aims and Methodology

3.1 General Introduction

This chapter introduces the sites chosen as case studies for this project along with their exact geographical locations. It also discusses the reasons they were chosen and the aims of the survey. The methodology used to address this thesis' research questions are also discussed (see Chapter 1), along with the challenges and limitations faced during the field survey.

The following section (3.2) looks at the aims of the survey. The next section (3.3) illustrates the geographical location of the study area and how the size of the targeted area changed after the first survey season. The method for selecting the area is also explained. Section (3.4) discusses the methods applied during the field survey. The final section (3.5) addresses the main problems and limitations of the survey. This chapter uses the code SCSC (Survey of Coastal Sites of Cyrenaica) to refer to the study and field survey.

3.2 Survey Aims

The principal aim of any archaeological survey is to systematically acquire unbiased information to help answer questions and issues relating to a site. The goal of my survey was to gather materials and data to enable a better understanding of the Cyrenaican coastal sites in terms of their commercial and trade activities (networks and exchanges) and links with other sites in the Mediterranean basin. The survey additionally aimed to create a comprehensive picture of the locations, chronological sequences, typologies, functions, and manufacturing activities of coastal sites in Cyrenaica.

In other words, the main aim of my survey is to record as many of the structural details of each site in my survey area as possible (this is discussed in Chapter 4 and gazetteer section/Chapter 9). Also, I aim to look for any evidence of manufacturing carried out along the coastal sites within my study area in particular, and along the Cyrenaican coast in general (this information is presented in Chapter 5). Another aim is to collect data which can provide initial information about the hierarchy and functions of the Cyrenaican harbours and their chronology (Chapter 6 discusses this information and data pattern). Also, the survey aims to look for evidence about the position of

Cyrenaican harbours in the wider network and how they interacted with other sites around the Mediterranean region (see Chapter 7 for discussion of this).

3.3 The Geographical Location of the Study Area

The coastal region (Sahel) of Cyrenaica can be divided into three sub-zones (Fig. 3-1), according to their geographical features. Zone One extends westwards from the ancient site of Taucheira (Tocra), where the lower escarpment of al-Jabal al-Akhdar (Green Mountain) meets the sea, to Automalax (al-Egila). This area contained several harbour sites, including Euesperides, Hadrianopolis and Taucheira. Zone Two is the coastal strip in front of al-Jabal al-Akhdar; this zone extends from Taucheira (Tocra) in the west to Darnis (Derna) in the east. This zone contained major ports such as Apollonia (Susa) and Ptolemais (Tolmeta). This part of the coastal plain (Sahel) is up to 1.7 km wide, whereas in other areas - especially between Ptolemais and Kainopolis - the plain is less than 10 m wide. Zone Three is the Marmarica coast, extending from Darnis (Derna) to Catabathmus (Sallum).

The target area of this investigation includes as many sites as possible along the Cyrenaican coastline in order to help address questions about the geographical distribution of Cyrenaican harbours. The border area extends from Taucheira (Tocra) in the west to Cherronesus (Ras et-Tin). The area of study is confined to an area of 50 km in length, located along the coastal strip of al-Jabal al-Akhdar (Green Mountain), between longitude 21° 19.972'E and 21° 48.419'E and latitude 32° 46.351'N and 32° 54.802'N. More precisely this area extends from ancient Kainopolis (El- Agla), located about 37 km to the east of Ptolemais (Tolmeta), to an area called Noat, about 17 km to the west of Apollonia (Susa) (Fig. 3-2).

This area was chosen for a number of reasons. Firstly, the area along the coastal strip of al-Jabal al-Akhdar (Green Mountain) has received little attention from scholars and archaeologists. Only a few reports and records mention sites along this coastal strip, and these few reports do not address the archaeology. Secondly, the area located between the two major ports of Cyrenaica (Ptolemais and Apollonia) has not been studied. Finally, this area is located in front of one of the most fertile areas of Cyrenaica (Middle Plateau – el-Usita/see Chapter 5) which produces even today cereals and a variety of fruits (Fig 3-2). It is economically significant and as such deserves more in depth study.

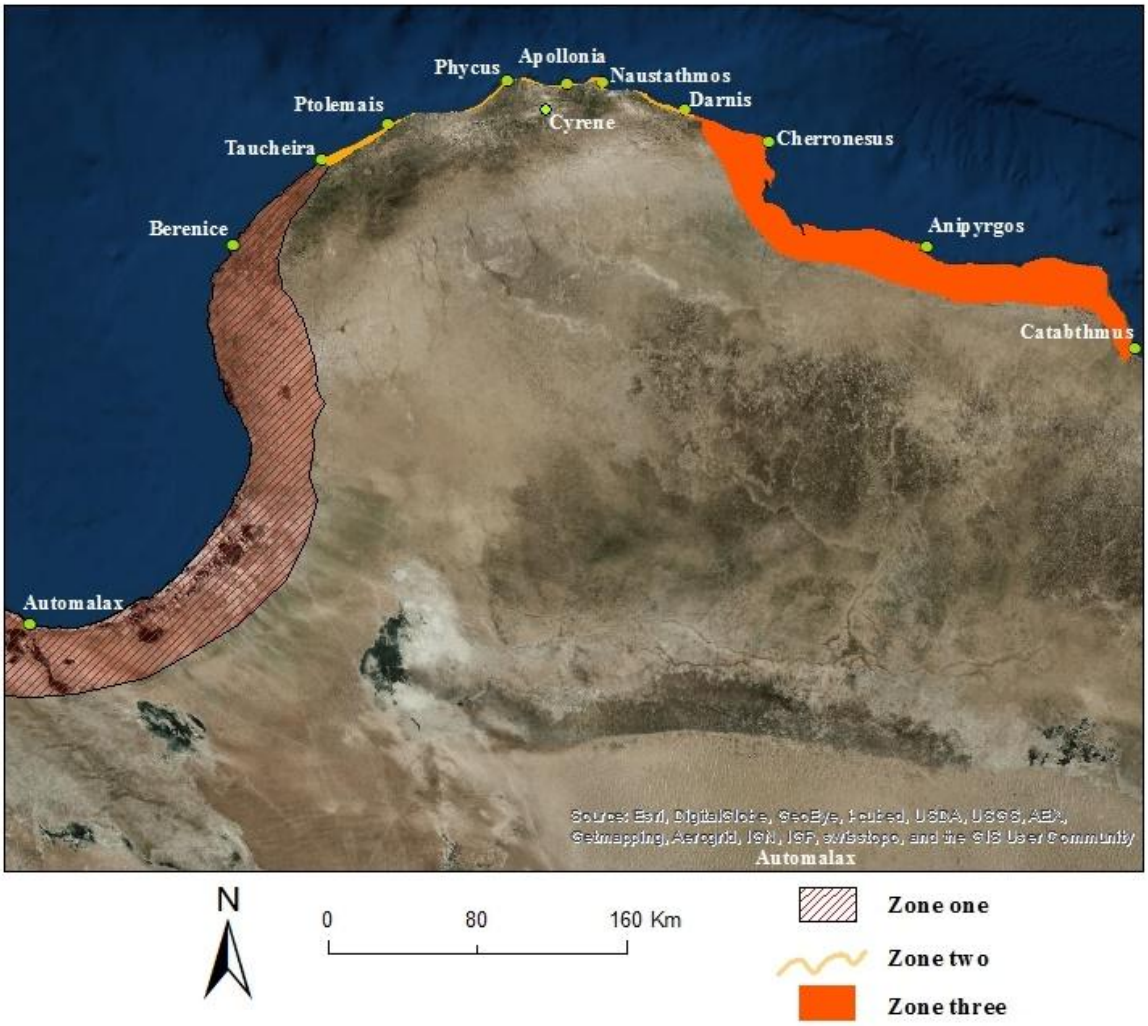


Figure 3-1: The Cyrenaican coastline.

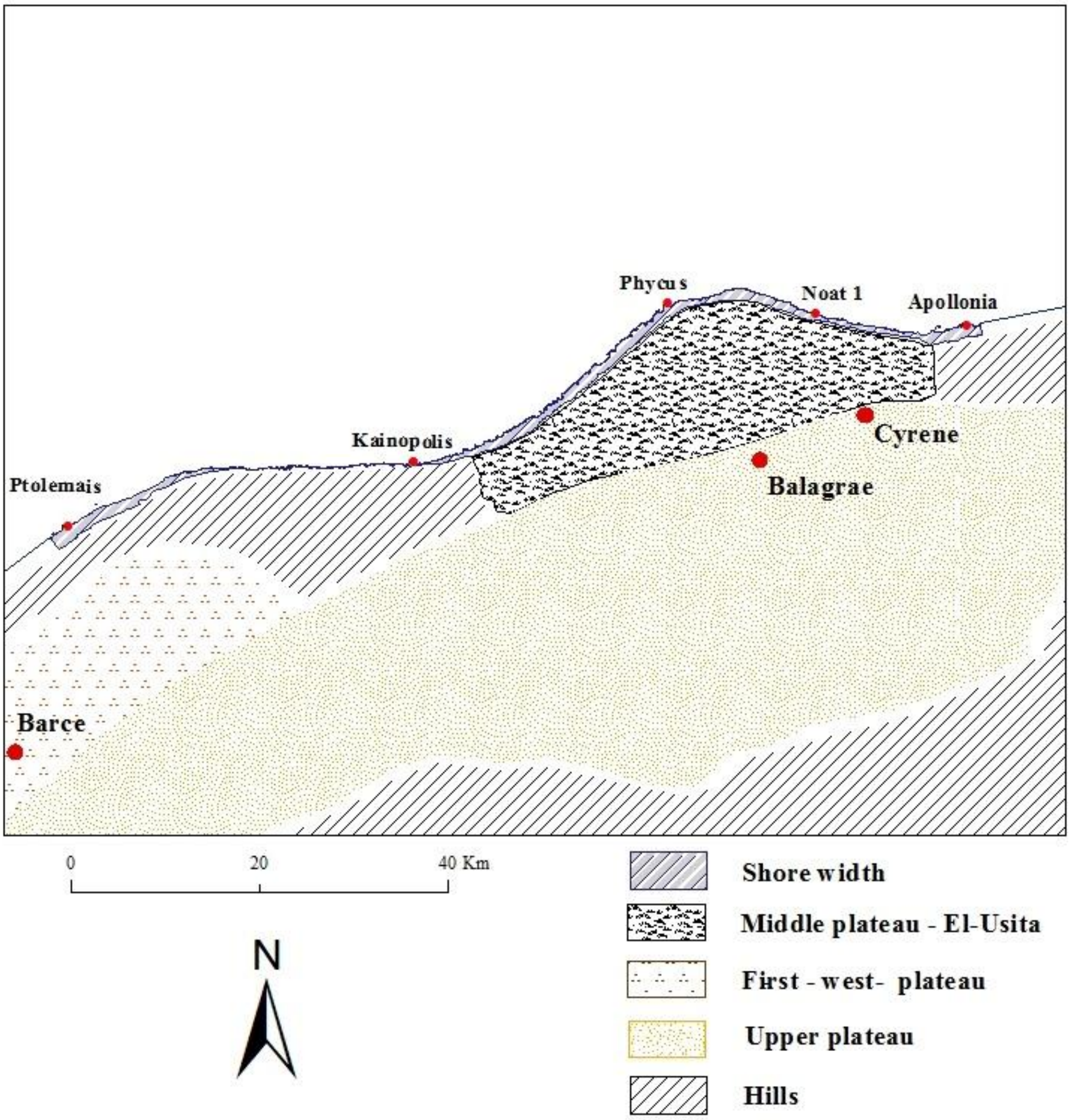


Figure 3-2: The location of the study area

3.4 Survey Methods

3.4.1 Introduction

Major projects, such as the excavations and surveys conducted at the harbour site of Leptiminus in Tunisia (Mattingly 1992; Stone et al. 2011b), the surveys on the ancient Island of Jerba (Fentress et al. 2009b), the work at ancient Utica (Kallala et al. 2010), and the survey and excavation projects at Portus (Keay et al. 2005) normally take several years of research and investigation with huge skilled teams. This PhD project cannot hope to match these endeavours in terms of materials and results. However, with careful planning it was possible to find a methodology that suited the scale and resources of my project and would at the same time produce significant findings.

This section on the methodology is divided into four parts. The first (3.4.2) addresses the cartography and previous studies, followed by a topographical section (3.4.3). The third part (3.4.4) is devoted to an analysis of Google Earth imagery, and includes examples of how the imagery was analysed. The final part (3.4.5) looks at the surface survey methods.

3.4.2 Cartography and previous studies

Archaeological study in any region must start by using all available existing information in the form of maps (Figs. 3-3 and 3-4), excavation plans and previous studies. During the early stages of my research, I thus endeavoured to collect together existing materials relating to Cyrenaican ports. These sources included maps and plans produced by travellers and excavation plans relating to work at Euesperides, Berenice, Ptolemais and Apollonia (see Chapter 2). I also studied the available references in the ancient sources, including Herodotus, Pseudo-Scylax and Strabo, in addition to recent scholarly articles published in various foreign languages (see Chapter 2). All these studies have played a major part in this project, and I have added my own observations and fieldwork to this baseline knowledge.

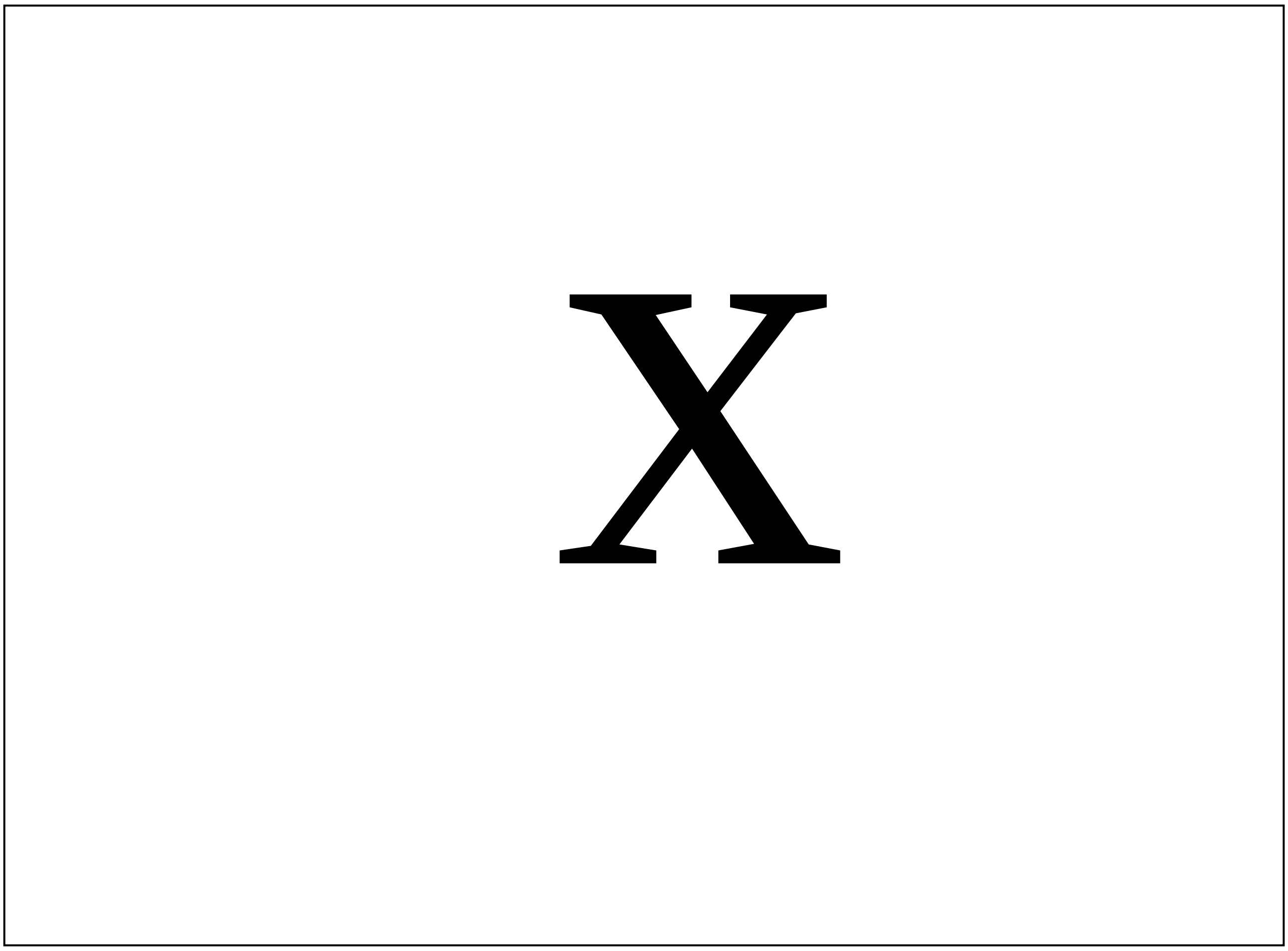


Figure 3-3: General map showing the distribution of the archaeological remains at Cyrenaica (Goodchild 1952b)

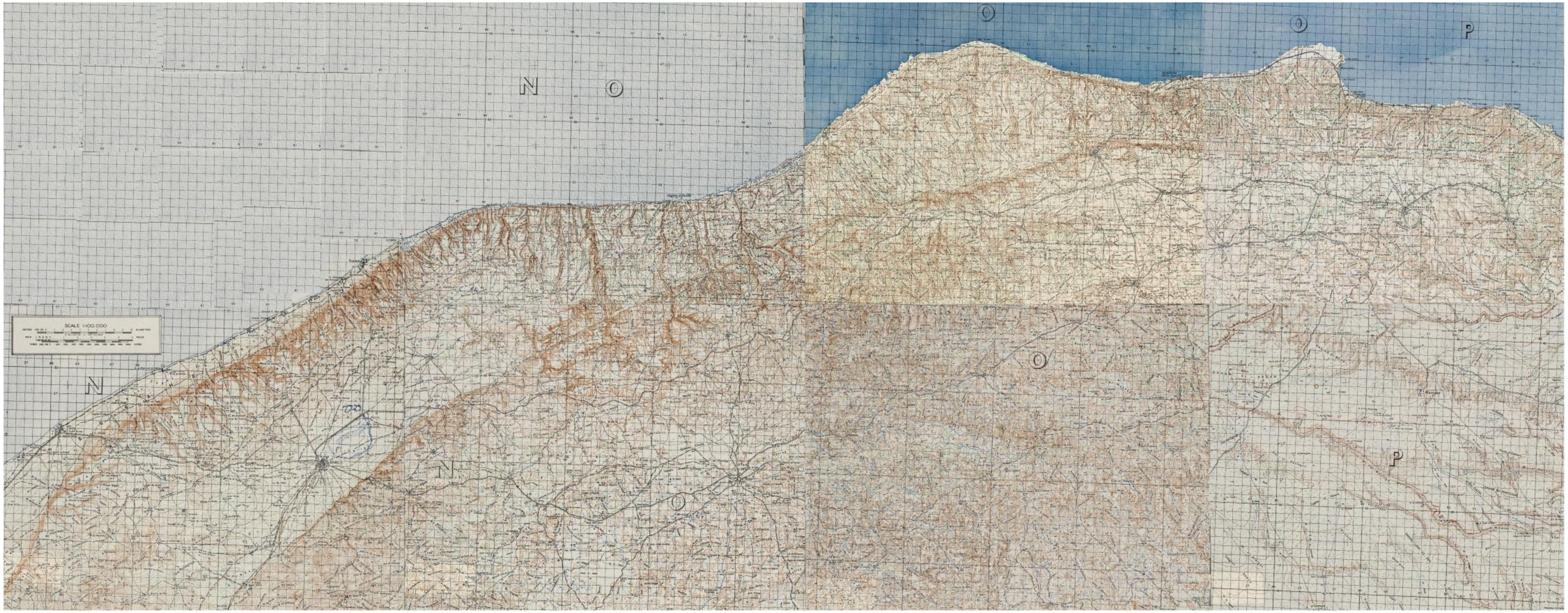


Figure 3-4: Map showing the topography of the survey area. This map was assembled from the map service sheets (1-7) of the American Army 1941.

3.4.3 Topographical study

The landscape and topographical features of an archaeological site can play a key role in our attempts to reconstruct its history. Understanding the features of a particular region's landscape can help us to form ideas about the socio-economic aspects of its ancient inhabitants. In other words, the landscape can help us to understand the issues and challenges that early inhabitants encountered, how they interacted with their environment (Renfrew and Bahn 1991), and the factors which led them to construct a harbour at a given location.

For instance, the survey at ancient Portus was very successful due to applying this method (Keay et al. 2005): studying the topography of Portus enabled researchers to provide a framework for both their geophysical and surface surveys (Keay et al. 2005).

For this thesis, studying the landscapes of the harbours and their surroundings has allowed me to better understand the geographical and physical nature of these places (Fig 3-5). The topographical features suggested to me, along with the other archaeological remains, possible reasons why ancient people chose these specific areas for their harbours (see Chapters Four and Five).

To an extent, this method (see section 3.4.5.11 below) also allowed me to produce a typology of harbours that could in turn be linked to an interpretive framework. This is the case whether these harbours were natural shelters to protect vessels from the wind, were designed to serve as small stations for supplying water and food to shipping, or they had a wider role in trade and commerce using the surplus of the surrounding arable land (see Chapter 6).

3.4.4 Google Earth imagery

In recent years most archaeological surveys have made use of satellite imagery. This allows surveys to capture large areas of the landscape in great detail, in order to analyse and extract valuable archaeological data through the recognition of archaeological sites and ancient routes. These maps can also be used for topographical studies.

The Department of Archaeology and History of Art at the University of Siena tested the use of satellite imagery in combination with fieldwork surveys. They analysed satellite imagery of two regions in Italy with a combined area of around 470 sq. km.

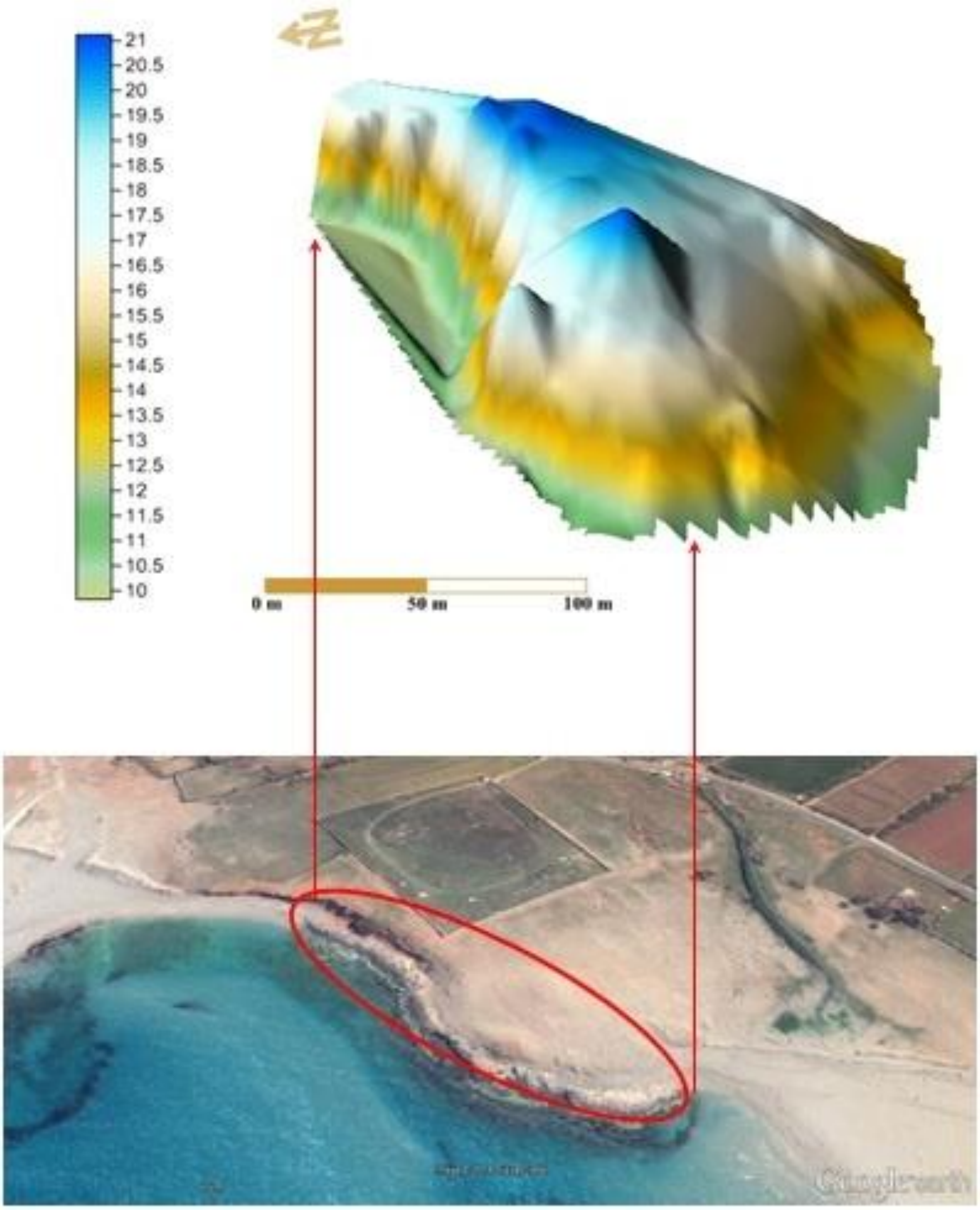


Figure 3-5: Figure 3-6: 3D modelling of part of the topography of Aptouchou (el-Hanya)

The Department identified more than 80 potential archaeological features. However, the field survey confirmed the existence of only 59% of these identified features on the ground (Campana 2002), demonstrating the importance of combining the two methods.

David Mattingly’s team has also used satellite imagery in Fazzan in south-west Libya to locate and identify sites (Mattingly and Sterry 2013) .

Based on these previous successes with satellite imagery, I decided to use satellite images (via Google Earth Imagery) of the target areas in this project. My aim in doing so was to assess the quantity of archaeological features in order to interpret the archaeological patterns and select the best locations for field surveys and transects.

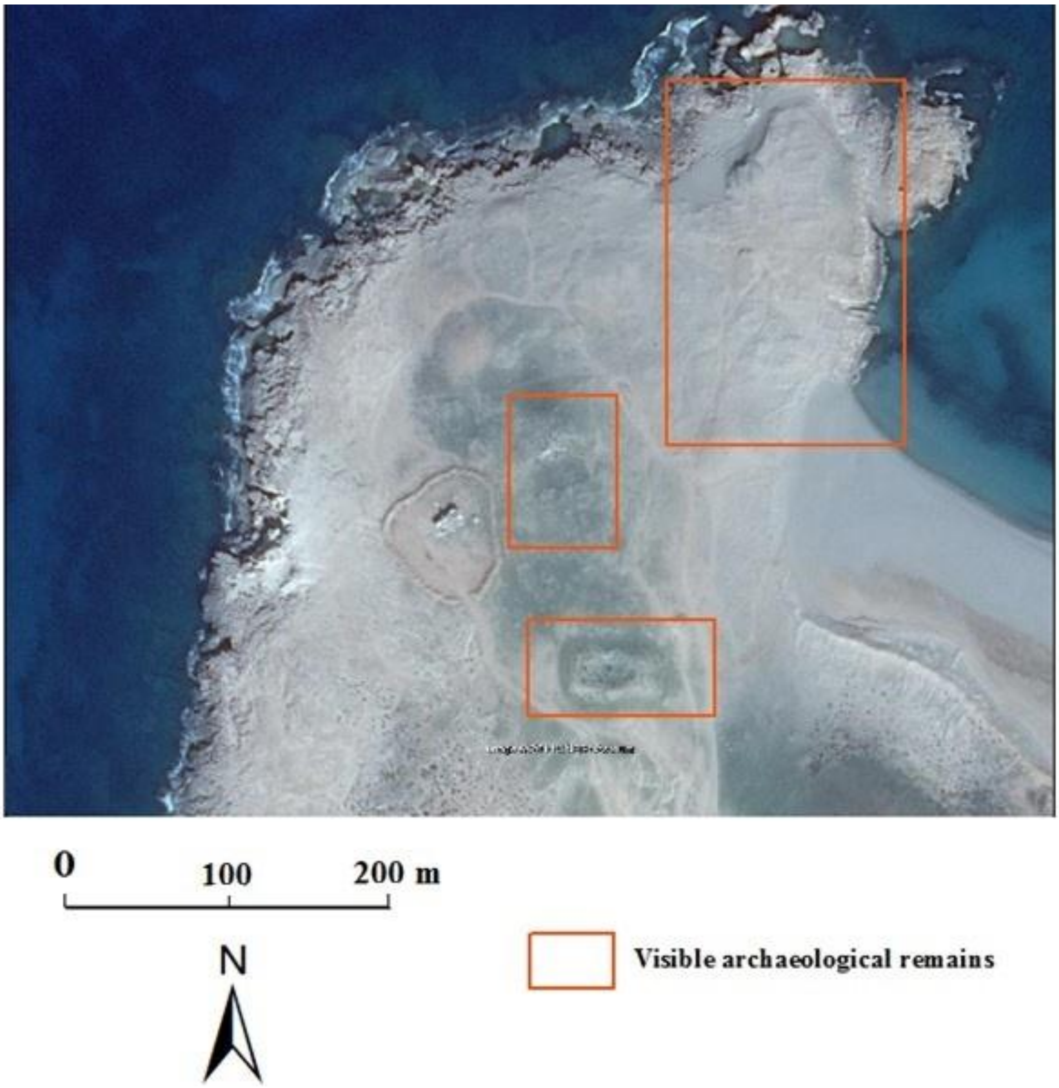


Figure 3-6: Google Earth imagery shows the visible remains at the ancient site of Phycus (el-Hamama)

A large area of coastline exceeding 200 km in length was examined using Google Earth imagery. The areas were analysed based on a series of criteria such as the location of the sites, for instance the presence of natural bays that would have been suitable as harbours or natural anchorage, and previously known sites such as Phycus.

The satellite image above (Fig 3-6) shows that it is possible to identify archaeological remains and even the foundations of buildings, and also to analyse the archaeological features in relation to the topography of this region. Several important sites were identified in this way, thus proving the validity of the method.

In order to systematically analyse the imagery of the target area, I established a framework for obtaining the maximum level of information. First, I determined the geographical limits. These changed from site to site depending on the nature of the area. For instance, a number of bays lie to the east and west of Phycus, leading me to enlarge the study area there in order to raise the chances of detecting possible archaeological remains that might have been scattered in and around these bays.

As soon as the limits of the target area were determined, the aerial imagery or the targeted area was divided into rectangular blocks about 300 m wide. This width was chosen to enable ground features to be spotted with good resolution. The lengths of the blocks varied from one block to another according to the distance between the shore (in the north) and the foot of the hills (in the south). The maximum length is about 2 km, and the minimum about 0.80 km. Each block was given a specific code, and potential sites another code. The block code contains three letters followed by a number. The first two letters refer to the region or site name. This is followed by the letter B, being the abbreviation of 'block'. Finally, the number following the letters refers to the block number within the imagery or the site.

For instance, the aerial imagery (Google Earth) Number 1 examined the region of Phycus. An area six km long was analysed using this imagery. The promontory of Phycus was the baseline, and I extended the area 3 km to the east and another 3 km to the west of the promontory. The area targeted for aerial analysis was divided into 20 blocks (PHB1-20). The width of each block is about 300 m (Fig. 3-7 and 3-8).

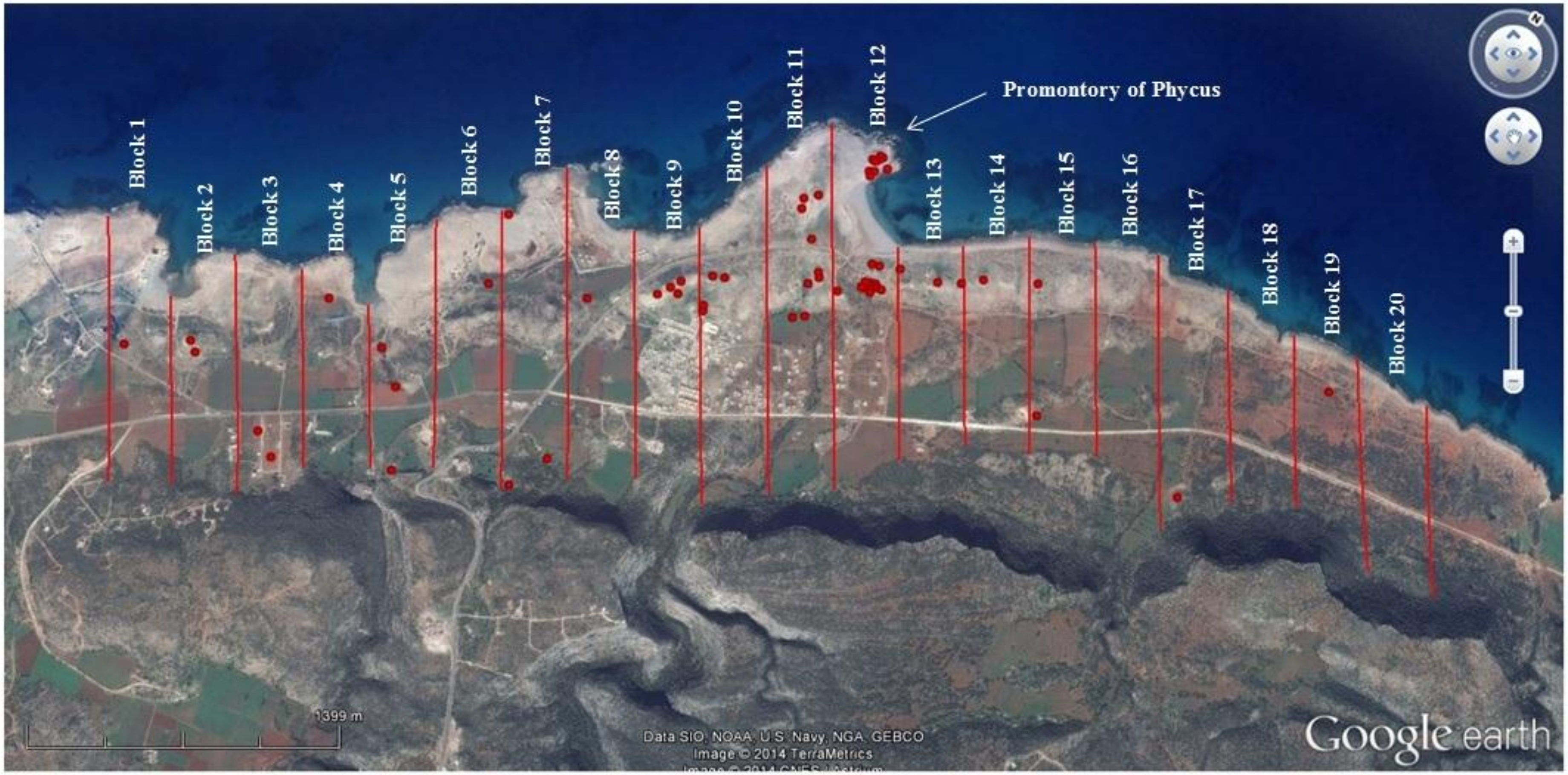


Figure 3-7: The aerial imagery (Google Earth) number 1 and the location of the blocks examined.

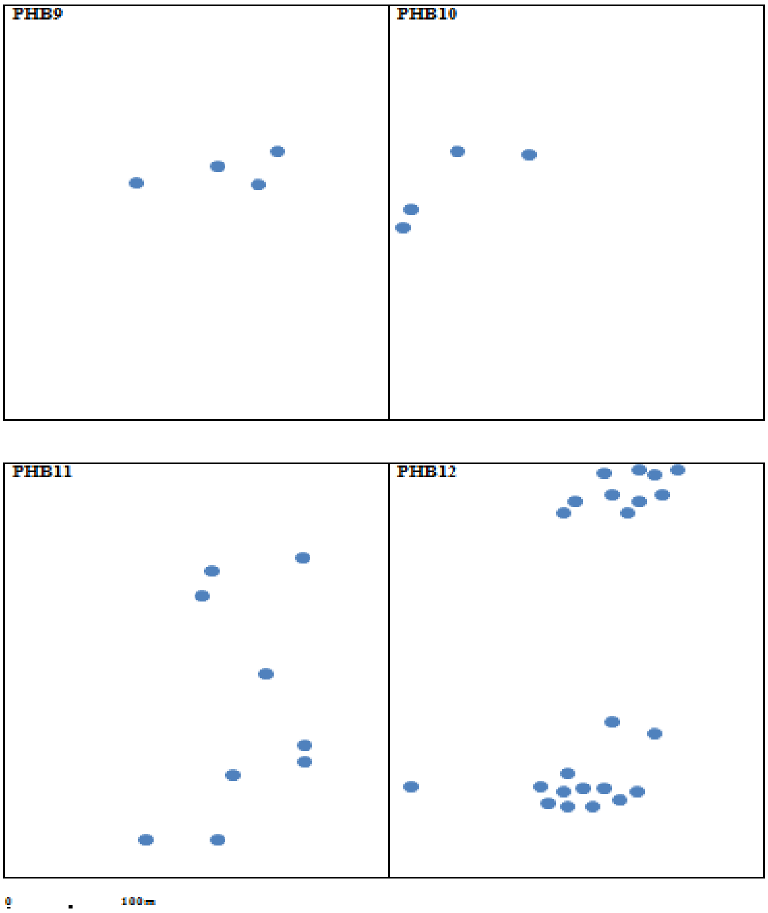


Figure 3-8: The density of potential archaeological remains in Blocks PHB9, PHB10, PHB11 and PHB12 through analysis of aerial imagery in the Phycus region

The individual examination of each block provided the SCSC survey team with valuable initial information. The preliminary results of the analysis this imagery identified around 66 probable sites (Table 3-1). In addition, preliminary trends about the possible density of the archaeological remains and the site boundaries were established (Fig 3-9). For example, an accumulation of possible sites can be identified between blocks PHB10 to PHB15, with a considerable density in blocks PHB11 and PHB12 which have nine sites and twenty-four sites respectively (see Figure 3-8).

Indeed, the analysis of Google Earth imagery is not always as successful as it was in the Phycus region. For instance, in the Ras et-Tin region the images did not produce good data compared to the information gathered on the ground. The assessment survey of the area confirmed that intensive archaeological remains are scattered around the site, but the density of vegetation and the poor resolution of the images affected their identification.

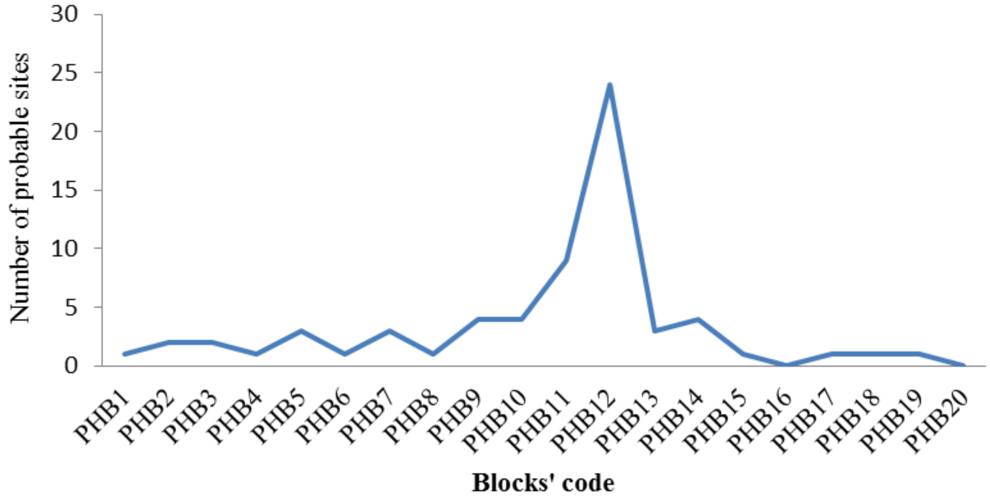


Figure 3-9: The density of potential sites through analysis of aerial imagery in the Phycus region

Aerial Imagery 1 (Phycus' region)

Block code	Site code	Site identification		Location	Site type	Comment
		YES	NO			
PHB1	PHB1S1		√			No access
PHB2	PHB2S1	√		Um_Elnaml	Villa ?	buildin with presses
	PHB2S2	√		Um_Elnaml	Quarry	
PHB3	PHB3S1		√			No access
	PHB3S2		√			No access
PHB4	PHB4S1		√			No access
PHB5	PHB5S1		√			No access
	PHB5S2		√			No access
	PHB5S3		√			No access
PHB6	PHB6S1		√			No access
PHB7	PHB7S1	√		Phycus	Channel/ Quarry	
	PHB7S2		√			No access
	PHB7S3		√			No access
PHB8	PHB8S1		√			No access
PHB9	PHB9S1	√		Phycus	Building	
	PHB9S2	√		Phycus	Building	
	PHB9S3	√		Phycus	Building	
	PHB9S4	√		Phycus	Channel? Street?	Not clear
PHB10	PHB10S1	√		Phycus	Tombs	
	PHB10S2	√		Phycus	Tombs	
	PHB10S3	√		Phycus	Tombs	
	PHB10S4	√		Phycus	Building	

Aerial Imagery 1 (Phycus' region)						
Block code	Site code	Site identification		Location	Site type	Comment
		YES	NO			
PHB11	PHB11S1	√		Phycus	Fort	
	PHB11S2		√	Phycus		Not clear
	PHB11S3		√	Phycus		Not clear
	PHB11S4	√		Phycus	Building	with set of vats
	PHB11S5	√		Phycus	Tombs	
	PHB11S6	√		Phycus	Tombs	
	PHB11S7	√		Phycus	Tombs	
	PHB11S8		√	Phycus		No access
	PHB11S9		√	Phycus		No access
PHB12	PHB12S1	√		Phycus	Building's foundation	
	PHB12S2	√		Phycus	Building's foundation	
	PHB12S3	√		Phycus	Building's foundation	
	PHB12S4	√		Phycus	Building's foundation	
	PHB12S5	√		Phycus	Building's foundation	
	PHB12S6	√		Phycus	Building's foundation	
	PHB12S7	√		Phycus	Building's foundation	
	PHB12S8	√		Phycus	Building's foundation	
	PHB12S9	√		Phycus	Building's foundation	
	PHB12S10	√		Phycus	Building's foundation	
	PHB12S11	√		Phycus	Building's remain	
	PHB12S12	√		Phycus	Building's remain	
	PHB12S13	√		Phycus	Tomb / Quarry	
	PHB12S14	√		Phycus	Tomb / Quarry	
	PHB12S15	√		Phycus	Tomb / Quarry	
	PHB12S16	√		Phycus	Tomb / Quarry	
	PHB12S17	√		Phycus	Tomb / Quarry	
	PHB12S18	√		Phycus	Tomb / Quarry	
	PHB12S19	√		Phycus	Tomb / Quarry	
	PHB12S20	√		Phycus	Tomb / Quarry	
	PHB12S21	√		Phycus	Tomb / Quarry	
	PHB12S22	√		Phycus	Tomb / Quarry	
	PHB12S23	√		Phycus	Building	
	PHB12S24	√		Phycus	Quarry	
PHB13	PHB13S1		√	Phycus		No access
	PHB13S2	√		Phycus	Tombs /Quarry	
	PHB13S3	√		Phycus	Tombs	

Aerial Imagery 1 (Phycus' region)						
Block code	Site code	Site identification		Location	Site type	Comment
		YES	NO			
PHB14	PHB14S1	√		Phycus	Tombs	
	PHB14S2	√		Phycus	Tombs	
	PHB14S3	√		Phycus	Tombs	
	PHB14S4	√		Phycus	Tombs	
PHB15	PHB15S1	√		Phycus	Fort	
PHB16	PHB16S1					
PHB17	PHB17S1		√	Phycus		No access
PHB18	PHB18S1		√			No access
PHB19	PHB19S1		√			No access
PHB20	Nothing					

Table 3-1: Potential sites identified by analysing aerial imagery taken over Phycus

3.4.5 Surface survey

3.4.5.1 Introduction

Many surveys have been conducted in the Mediterranean using many different archaeological techniques (Barker and Lloyd 1991; Francovich et al. 1999; Tartaron 2003). Archaeological surveyors have developed several effective methods for studying the historical sites and settlements in the Mediterranean (Attema and Schörner 2012; Barker 1991; Lolos et al. 2007; Mattingly 1992; 1999; Schaar 1983; Stone et al. 2011b). Generally, archaeological surveys use a set of techniques that have been deployed in order to attain a wider understanding of the regional survey (Schiffer et al. 1978). Although these methods are varied, the most widely used are the extensive and intensive survey.

Good examples in the Mediterranean include the Canadian major factor was, conducted in the Paphos District in Cyprus. This project successfully used extensive and intensive survey methods to identify the boundaries of the Iron Age Kingdom of Paphos. The survey recognised 102 historical sites (Rupp 1983; 323). Similarly, the survey of the West-Central Sardinia Project, which aimed to reconstruct the development of the Sardinian countryside during the Roman period, is a good example of how extensive surveys can be employed to record Roman archaeological remains (Dyson et al. 1992).

Archaeological surveys have been carried out along the coast of North Africa since the 1980s. Among these successful projects is the Leptiminus Archaeological Project, which aimed to reconstruct the history of this large and economically diverse Roman harbour town in Tunisia (Ben Lazreg and Mattingly 1992; Stirling et al. 2001; Stone et al. 2011a). The team applied various field techniques, among them extensive and intensive survey methods, to collect the materials which would enable them to understand the ancient role of this coastal town (Mattingly 1992; Stone et al. 2011b). The Island of Jerba project meanwhile aimed to investigate the material cultural and history of Jerba in Tunisia (Fentress et al. 2009a). A variety of field walking methods were also used here to gather all available data related to the project's aims (Fentress et al. 2009b).

For this project (the SCSC survey), following the initial data collection and processing of the aerial imagery, I set an agenda for the field survey. Firstly, I aimed to verify and assess the reliability of the aerial data (see section 3.2) and to determine suitable areas for my field survey (3.4.5.2). The next stage involved both extensive (section 3.4.5.3) and intensive (3.4.5.4) surveys of the selected areas to assess the archaeological materials scattered along this section of coast. The survey methods used are discussed within each survey section.

3.4.5.2 Assessment survey

Any survey area relies on several criteria to control the effectiveness and success of the survey. Visibility, accessibility and previous knowledge of the site's archaeological features all play a key role in the design of any survey (Schiffer et al. 1978). Attaining a baseline of information about the broad target area of a survey can help a researcher to choose the most appropriate location to apply further survey methods, such as extensive and intensive surveys. In this way reliable information about the archaeological materials can be acquired (Schiffer et al. 1978). Consequently, the SCSC field survey employs pilot or assessment survey techniques to investigate the area between the ancient sites of Taucheira in the west to Ras-Eltin in the east, which is about 260 km wide.

An assessment survey was required for a number of reasons. One of the most important was that I needed to familiarise myself with the target area in order to help my team understand the archaeological features, materials and parameters of the sites, as well as to be able to choose the most appropriate area for further detailed investigation. Additionally, the assessment survey technique is useful for an initial examination of the results of the aerial imagery study and for choosing how to progress to the next stage of survey.

The area was too large to survey effectively within the time and resources available to a PhD project. I thus restricted myself to the sites of which I had some previous knowledge, whether through the literature review or aerial analysis. For instance, the field survey confirmed about 47 sites (Fig 3-10) that were identified by analysing the aerial images of Phycus (see above); some of them are large sites with associated features such as site PHB11S4. However, there are a number of sites that could not be identified for accessibility reasons (some were located within private farms, while others lay outside of the SCSC transects (see section 3.4.5.6), which were mostly concentrated along the shore and its immediate vicinity. In addition, some of the areas have been bulldozed to build new houses. The SCSC survey team therefore documented new sites on the ground through field walking that could not be detected via the Google Earth imagery (see Chapter 4 and gazetteer/Chapter 9). Twelve sites were visited, starting from ancient Taucheira (Tocra) in the west to Cherronesus (Ras et-Tin) in the east (Fig. 3-11 and Table 3-2). At this stage, sites were briefly recorded in terms of getting an initial understanding of the density of the archaeological remains and topographical features. Waypoints and photos were taken. A recording sheet was designed specifically for this stage, with the site name and waypoint, alone with a brief description of its geography and remains.

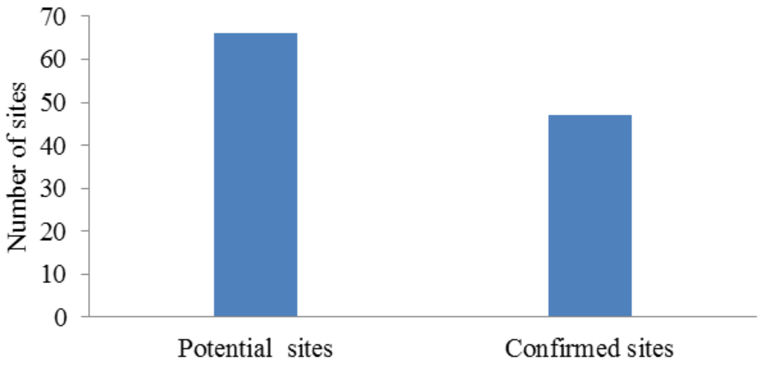


Figure 3-10: The number of potential sites in comparison with the number of confirmed sites

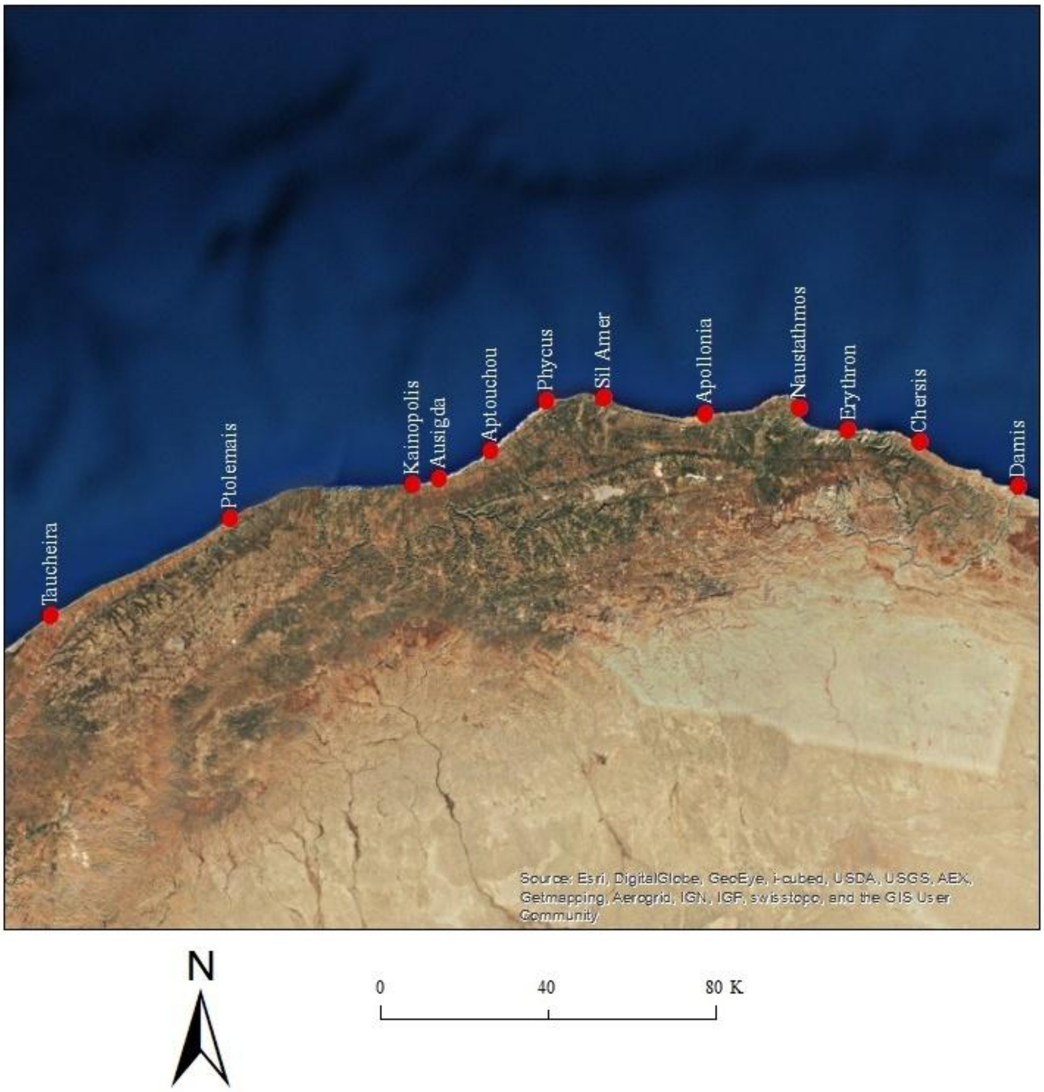


Figure 3-11: Sites visited during the assessment survey

The assessment survey produced many significant results. These include:

a) Helping to obtain a better understanding of the region in terms of its geographical and archaeological patterns.

b) Assisting in providing a large framework of references for the following extensive survey.

c) The data collected from this work was valuable in the next stage of analysis, which investigated the different patterns of socio-economic behaviour at the harbour sites in Cyrenaica (see Chapters 4-6).

d) It helped me to choose the area located between the ancient site of Kainopolis (el-Agla) and ancient Apollonia (Susa) for further investigation using extensive and intensive surveys.

Site	
Ancient name	Modern name
Cherronesus	Ras et-Tin
Darnis	Derna
Chersis	Karsa
Erythron	Lathrun
Naustathmos	Ras El- Hilal
Apollonia	Susa
?	Sil Amer
Phycus	Zawiet el-Hamama
Aptouchou	Zawiet Hanya
Kainopolis	el-Agla
Ptolemais	Tolmeta
Taucheira	Tocra

Table 3-2: Sites visited during the assessment survey

3.4.5.3 Extensive survey

The extensive survey aimed to locate and examine as many sites as possible (Fossey 1983). It also aimed to further our knowledge of the distribution of ancient sites that were inhabited in various ancient periods (Simpson 1983). The extensive method can assist in this by covering a large area, allowing a provisional picture of a region to be obtained. This in turn allows the most worthwhile archaeological sites and centres for intensive survey and excavation to be identified (Fossey 1983: 18).

As a result of my assessment survey, I selected an area of 50 km (Fig. 3-12) located on the lower escarpment of al-Jabal al-Akhdar for an extensive survey. This area was selected for three main reasons.

a) Its significant location. The area connects two major harbours in Cyrenaica, which are Apollonia in the east and Ptolemais in the west, and neighbours the most fertile land (middle plateau- el-Usita) in Cyrenaica.
b) The large number of archaeological remains scattered along the shore of this strip.

c) The large-scale damage and destruction that has occurred in the area caused by natural and human factors. This requires rapid documentation and plans for long-term protection.

The extensive survey started from the east of ancient Apollonia and ended at el-Agla (for the sampling and walking strategies used, (see sections 3.4.5.5-9). Fourteen sites were recorded, some of them for the first time (Table 3-3). The known sites include Phycus (Zawiet el-Hamama), Aptouchou (Zawiet el-Hanya), Ausigda (Gergerummah) and Kainopolis (el-Agla). Although there is some documentation for these sites, these tend to be brief references to some of their archaeological remains. For this reason, I decided to conduct an intensive survey on a number of these sites alongside three of the new sites I discovered. This would allow me to investigate wider aspects relating to socio-economic patterns in detail.

The extensive survey started from the west of ancient Apollonia and ended at el-Agla (for the sampling and walking strategies used, see sections 3.4.5.5-9). These methods enabled me to add a number of new sites to my previous list (Tables 3-2 and 3-3). Seven new sites were recorded, a number seemingly documented for the first time. However, previously only a few sites were known along this coastal strip of al-Jabal al-Akhdar (see Chapter 2), namely Phycus (Zawiet el-Hamama), Aptouchou (Zawiet el-Hanya), Ausigda (Gergerummah) and Kainopolis (el-Agla). Although, there is some documentation for these sites, these are merely brief references to some of their archaeological remains.

The advantage of using extensive surveys is their effectiveness in constructing a clear picture of Cyrenaica’s coastal sites. Moreover, this method has been helpful for understanding the geographical distribution of these sites, as well as their relationship to one another and their hinterland (see chapter 5). The results have enabled me to evaluate the archaeological features that are still visible on the shore. The extensive survey has primarily produced qualitative data about the location and general character of the sites.

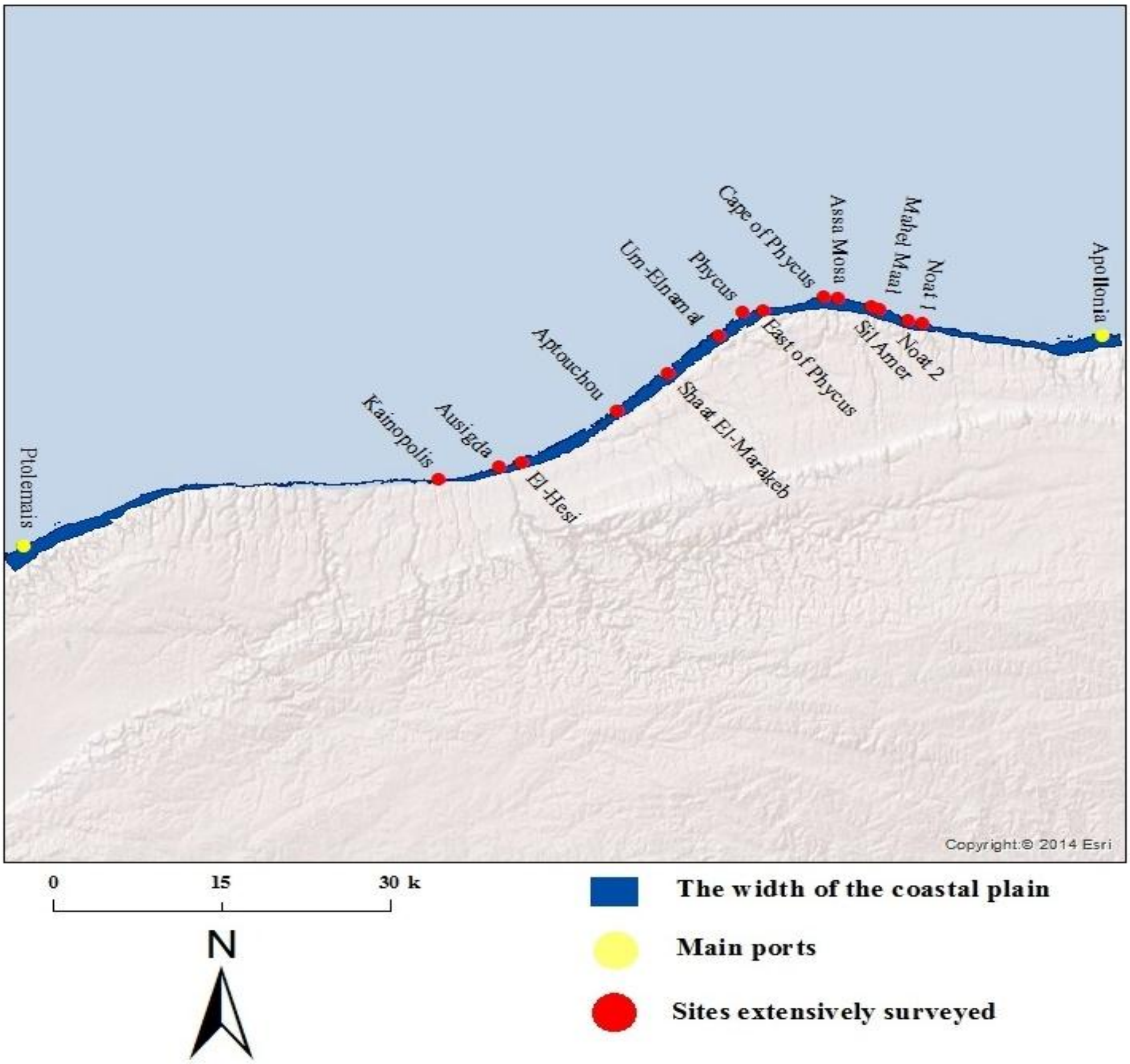


Figure 3-12: The area that was surveyed extensively

Site	
Ancient name	Modern name
?	Noat 1
?	Noat 2
?	Mahel Mael
?	Sil Amer
?	Assa Mousa
Cape of Phycus	el-Mamluh
?	East of Phycus
Phycus	Zawiet el-Hamama
?	Um-Elnamal
?	Elbest
?	Shaat el-Marakeb
Aptouchou	el-Hanya
?	el-Hesi
Kainopolis	el- Agla

Table 3-3: Sites identified by the extensive survey

3.4.5.4 Intensive survey

Over the past few decades, intensive surveys have dominated fieldwork activity in the Mediterranean basin (Barker 1991; Caraher et al. 2006; Lolos et al. 2007). Various factors including time, money, team size and the area's geographical nature can determine the survey method and the scale of intensive methods used at a site (Cherry 1983:380; Simpson 1983:47).

Within the context of my PhD project, it was impractical to survey a large number of sites or a wider area, so I decided to carefully select a few key sites for intensive surveys within my target area (Fig 3-13). This method in particular played a vital part in my archaeological work, as it allowed me to reconstruct the social and economic activity around the harbour areas. The principal goal of these intensive surveys was to produce high-quality data in order to build a clearer quantitative picture of the socio-economic activity along the Cyrenaican coast. The collected pottery sherds (see section 3.4.5.8) provided important insights into the area's commercial and industrial activities (Fig 3-14) (see Chapters Five and Seven), and valuable information about the chronology, function and relationship of sites to each other and the model Cyrenaican coastal sites (see Chapter 6).

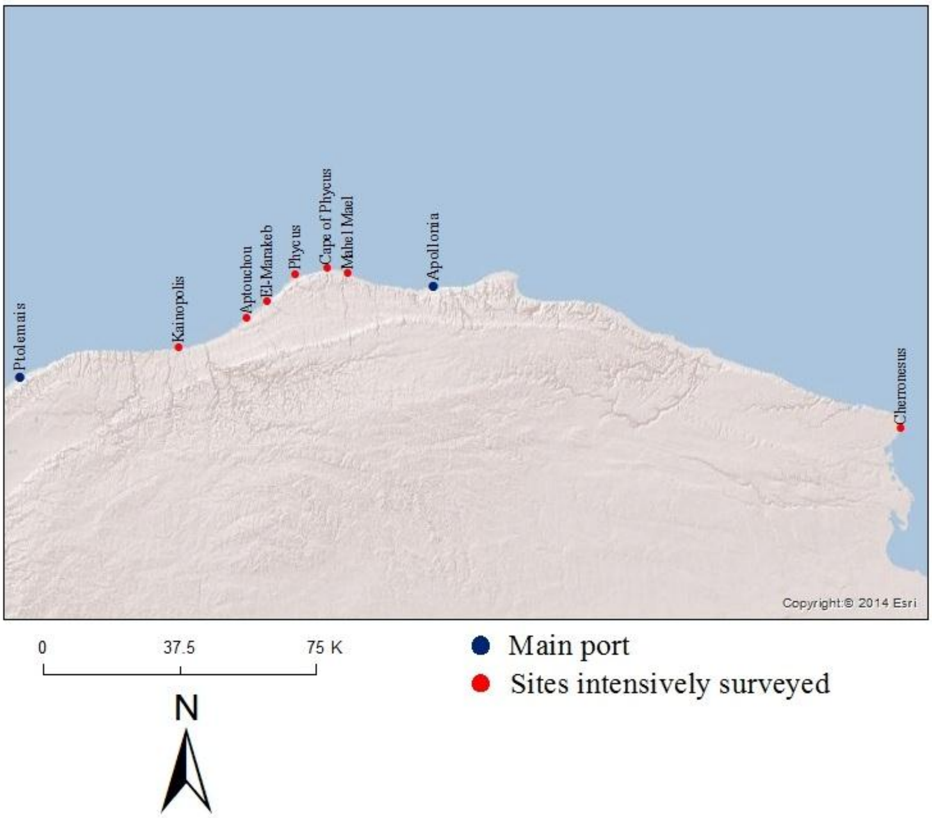


Figure 3-13: The sites intensively surveyed

Site		No. Sub-sites
Ancient Name	Modern Name	
Cherronesus	Ras et-Tin	5
?	Mahel Mael	4
Cape of Phycus	el-Mamluh	6
Phycus	Zawiet el-Hamama	53
?	Shaat el-Marakeb	8
Aptouchou	Zawiet el-Hanya	13
Kainopolis	el- Agla	15

Table 3-4: The sites intensively surveyed

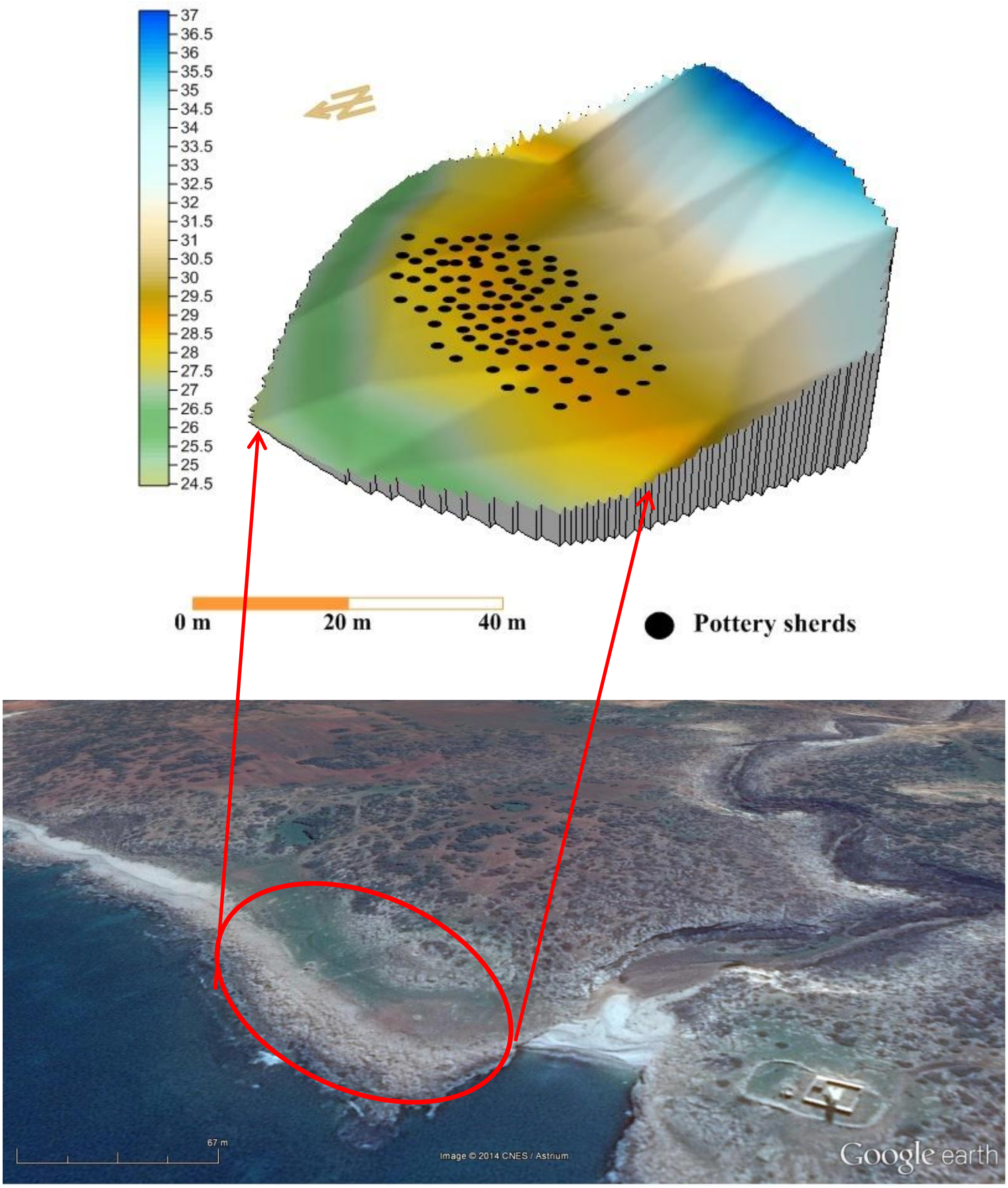


Figure 3-14: 3D modelling of part of the topography of el-Mamluh and the high density of pottery sherds at the site (the pottery sherds were randomly distributed, and not based on geo-referenced points)

Seven sites were chosen for intensive investigation (Fig 3-13). The sites were selected as a consequence of the valuable preliminary data produced through the extensive survey. The archaeological remains of these sites seemed to present different economic patterns. The intensive survey documented more than 104 sub-sites within the main sites (Table 3-4). (For pottery density and materials collected from these sites see below). Cherronesus (Ras et-Tin), located about 120 km to the east of Apollonia, was also intensively surveyed. This site was chosen for its location, which provided comparable data about Cyrenaican coastal sites.

3.4.5.5 Sampling strategies (sampling sector)

To obtain balanced but broad information about an archaeological site, suitable sampling strategies need to be employed (Plog et al. 1978:394). The most important considerations are the geographical location, visibility and accessibility of the site, and the available time and aims of the survey (Molyneaux 2005). However, the normal goal of a sampling strategy is to investigate every part of the landscape as far as possible in an equal way, or at least in a way so that the results from different parts of the landscape can be compared, rather than just concentrating on the most accessible parts of it (Barker 1991:3).

There are many and various types of sampling strategy, but these can be broadly classified into two main types: Non Probabilistic Sampling (judgemental) and Probabilistic Sampling. The former is useful in known sites that were recorded or known by local people or previous reconnaissance, and also helps to assess whether a new area will be suitable for an intensive survey.

Non-probabilistic and probabilistic methods have both played a major role in my survey work. The extensive survey relied on non-probabilistic samples in order to record basic data about as many site locations as possible. On the other hand, the intensive survey used probabilistic sampling (stratified systematic unaligned) to record systematic and comparable data about a subset of coastal sites. Once the locations, quantities and value of these archaeological remains were identified, probabilistic methods were employed on selected sites to gather more details about each individual site.

3.4.5.6 Unit sampling strategy

The next step involved locating the sampling units. This required a choice to be made about which specific part of the sampling sector to survey. Choosing suitable sampling units, called transects or quadrants, can facilitate the recording of the archaeological remains and artefacts visible on the surface (Tartaron 2003:29).

The project surveying the ancient Mayan site of Pacbitun in western Belize combined both the transect and quadrant methods (Healy et al. 2007:26). Four transects were made in the eastern and western parts of Pacbitun. Each of the four transects was 1000 metres long and 300 metres wide. The transect methods were very effective and revealed that there were over 200 mounds scattered in the area. A quadrant survey was used to cover the areas located between the four transects. The aim of the quadrant survey was to test the accuracy of the transect results (Healy et al. 2007:22).

Another effective use of this method can be seen in the Jerba Island Project. Systematic intervals of transects were placed across the island of Jerba. The transects were initially about 1 km wide, although they were later modified to be 600 m wide, and were distributed at 4 km intervals. This method allowed the surveyors to cover 20% of the island. They were thus able to obtain a reasonable idea about the density of the sites and population changes over the time (Fentress et al. 2009b).

On the other hand, the Leptiminus Project used linear transects to obtain quantitative data relating to the density of the different cultural materials found at the site. Because the site of Leptiminus was dominated by cultivated fields, each field was individually surveyed. The number of transects depended on the size of the field. This method allowed the survey team to cover about 20% of the targeted area (Stone et al. 2011b).

For this project, the sites visited during the extensive survey were divided into several grid zones according to the geographical features of the site. This allowed me to investigate each sub-area separately, which was useful for locating archaeological features and finds, and for determining where the site's boundaries fell. This division also allowed me to assess the whole site in a comparable way, and suggested where best to set up transects in the second stage of the intensive survey.

Meanwhile, my intensive survey used linear transects that were systematically distributed across each zone to achieve coverage of approximately 10-20%. Each zone had three to four transects, and each transect was 50 m wide. The space between each transect was set at three times the width of the transect. The advantage of a transect survey is that it provides a balanced picture of socio-economic patterns across the whole site and the distribution and density of the ancient inhabitants within the site's limits. Transect surveys are designed to produce a quantifiable assemblage of pottery and other artefacts from the selected site, which will hopefully shed light on the site's boundaries, as well as site activity and its chronological differentiation (growth and change over time).

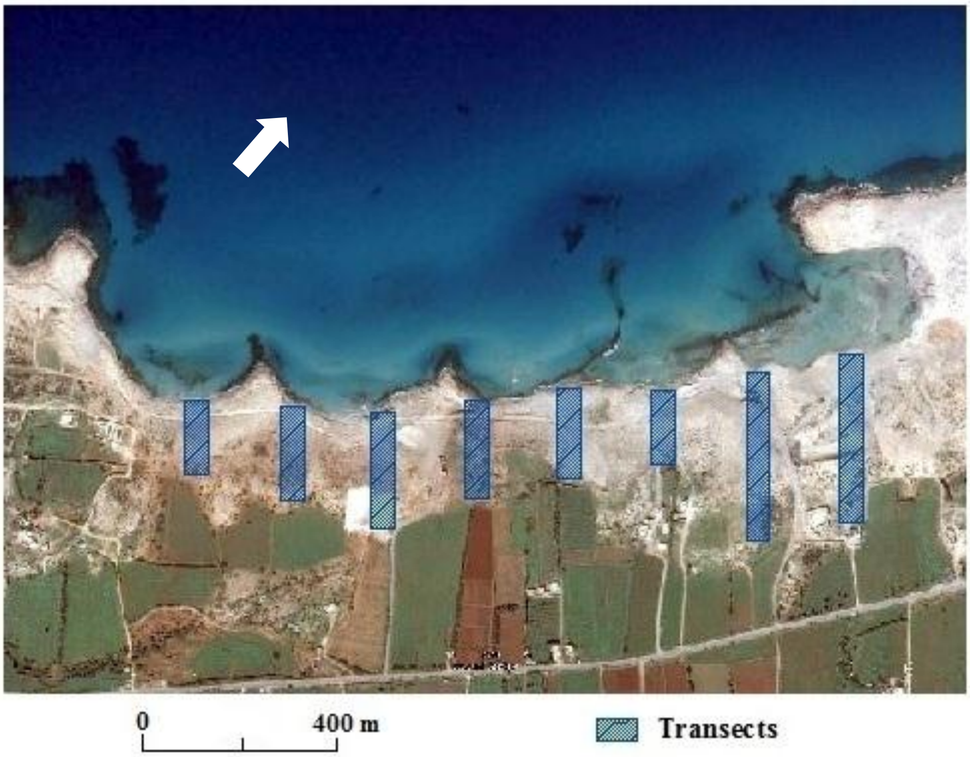


Figure 3-15: Transect distributions at the ancient site of Shaat el-Marakeb

The region chosen for the intensive survey, Shaat el-Marakeb covers an area of 50 ha. Eight transects were measured out, each 50 m wide and spaced at 150 m intervals. The transects were of unequal length (Table 3-5) as they were controlled by the distance between the shoreline to the north-east and the fields to the south-east (Fig 3-15). The transects had to stop at the field boundaries because I was unable to obtain permission to access the fields. However, by calculating the length of the transects and multiplying their width (length x width), 9.375 ha out of the 50 ha at Shaat el-Marakeb were selected for the intensive survey (for the total walked area see below).

Shaat el-Marakeb's transects

Transect No	Transect Length	Transect width
1	150	50
2	200	
3	250	
4	200	
5	175	
6	150	
7	375	
8	375	

Table 3-5: The length and width of the transects placed at Shaat el-Marakeb

3.4.5.7 Walking strategies

The surface surveys provided a valuable opportunity to collect ceramics, marble fragments and other finds. They also provided a further opportunity to record the visible remains on the surface (Keay et al. 2005:67). There are two fundamental strategies for surface collection: systematic and unsystematic (Renfrew and Bahn 1991).

Recent archaeological surveys tend to use a systematic approach in order to obtain reliable data and a clear idea of the character, range and density of the surface materials (Slim et al. 2004; Stone et al. 2011b). The Portus and Leptiminus surveys are among the best examples of this (Keay et al. 2005; Mattingly 1992; Stone et al. 2011a). Another example is the Sikyon survey project (2004-2004). The surveyors used 20 m by 20 m squares which were traversed by five-person teams spaced 4 m apart (Lolos et al. 2007:279).

The Jerba Island Project also used systematic line walking. The walkers were spaced at 20 m intervals in an attempt to cover around 20% of the total area of the transect (Fentress et al. 2009b). The surveyors at Leptiminus using the linear transect method spaced them at 10 m intervals, with the aim of covering 20% of the area of each transect (Stone et al. 2011b).

This study used systematic linear walking in order to achieve the best results. Each transect to be surveyed has been divided into five linear sections. The space between each line was approximately 10 m. Five surveyors walked systematically in the linear space (the walkers covered 20% of the ground within the survey unit) covering 2 m wide sections. For example, transect number one (150 m in length and 50 m in width) at Shaat el-Marakeb (see above), was surveyed by five walkers who each covered a 2 m wide area. This transect, which measures 7500 m^2 in total, thus had a coverage of 1500 m^2 (20% of the total area). In the end, 1.875 ha (20%) out of the total area of 50 ha of Shaat el-Marakeb was intensively surveyed.

3.4.5.8 Collecting materials

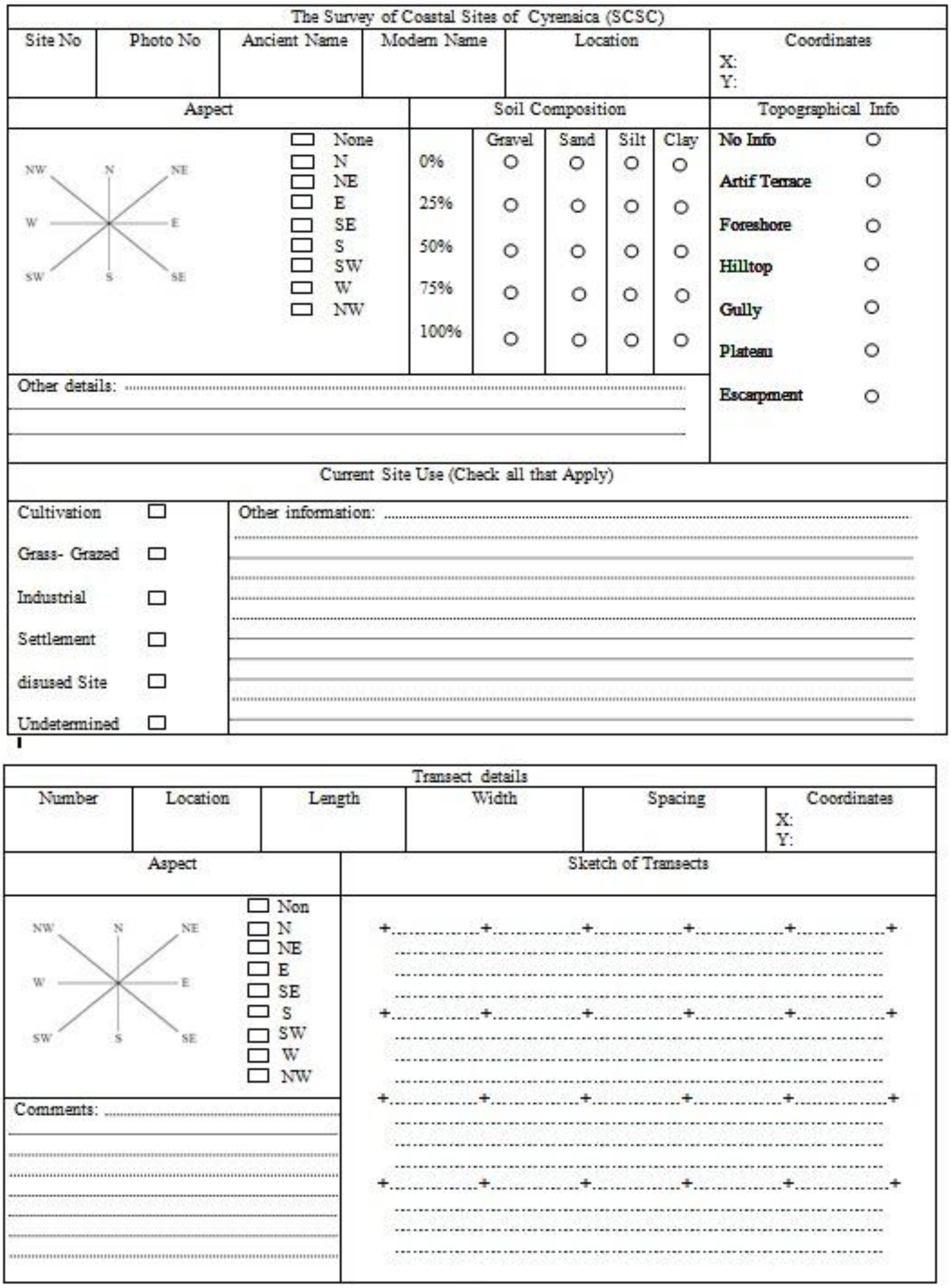
The main purpose of the surface survey was to collect a wide range of materials from the surface in order to expand our knowledge of the chronology of the sites (see Chapter 6) and the region's economic, trade and production activities (see Chapters Five and Seven). The data collected and the mapping of the visible features provided me with a new baseline of information about the sites. The record sheets (Fig. 3-16) were used to facilitate the collection of materials in the field. Over 900 pottery sherds (Figs. 3-17, 3-18, 3-19 and Table 3-6) were collected during this survey project. 72% of the sherds were collected in the intensive survey, while 4% and 24% of the sherds were gathered in the assessment and extensive surveys respectively.

During the assessment survey, pottery was collected from four of the twelve sites visited. These sites were Cherronesus (Ras et-Tin), Phycus (Zawiet el-Hamama), Aptouchou (Zawiet Hanya) and Kainopolis (el-Agla). The majority of sherds were collected from Phycus (35%) and Aptouchou (33%) (Table 3-7).

However, the percentage of collected pottery sherds increased in the extensive survey, and pottery was collected from 14 sites. The highest proportion of sherds came from the Cape of Phycus (el-Mamluh), with 30% of the total. 22% of the pottery sherds were found at Cherronesus (Ras et-Tin), while 15% were collected at Phycus. The sherds collected at the other 11 sites combined made up 37% of the total, with the proportion collected from each site ranging from 9% to 1%.

Intensive surveys typically produce large quantities of pottery. My intensive survey of seven sites yielded more than half of the total number of pottery sherds collected during the entire field survey. The pottery sherds gathered from the Cape of Phycus (el-Mamluh) make up 30% of the total pottery collected during the intensive survey. This was followed by Phycus (Zawiet el-Hamama), with 21% of the total collected pottery.

On the other hand, less than 20% of the total pottery was found at Cherronesus (Ras et-Tin), and the other sites produced less than 15% each.



The Survey of Coastal Sites of Cyrenaica (SCSC)					
Site No	Photo No	Ancient Name	Modern Name	Location	Coordinates X: Y:

Aspect	Soil Composition					Topographical Info	
☐ None		Gravel	Sand	Silt	Clay	No Info	○
☐ N ☐ NE	0%	○	○	○	○	Artif Terrace	○
☐ E ☐ SE	25%	○	○	○	○	Foreshore	○
☐ S ☐ SW	50%	○	○	○	○	Hilltop	○
☐ W ☐ NW	75%	○	○	○	○	Gully	○
	100%	○	○	○	○	Plateau	○
Other details:						Escarpment	○

Current Site Use (Check all that Apply)		
Cultivation	☐	Other information:
Grass- Grazed	☐	
Industrial	☐	
Settlement	☐	
disused Site	☐	
Undetermined	☐	

Transect details					
Number	Location	Length	Width	Spacing	Coordinates X: Y:

Aspect	Sketch of Transects
☐ Non ☐ N ☐ NE ☐ E ☐ SE ☐ S ☐ SW ☐ W ☐ NW	
Comments:	

Site Materials (Check all that Apply)

Type	Quantity	Zone	Tran. Number	Coordinates	Comments
☐ Pottery					
☐ Pot wasters					
☐ Plaster					
☐ Duab					
☐ Slag					
☐ Brick					
☐ Terracotta					
☐ Marble					
☐.Tesserae (Mosaic)					
☐ Tile					
☐ Sculpture					
☐ Carving					
☐ Metal					
☐ Cobblestone					
☐ Building rubble					
☐ Cut / dressed stone					
☐ Non-local stone					
☐ Vaulting tubes					
☐ Quern Frags					
☐ Struck flint/ chert					
☐ Shell dump					
☐ Animal bone					
☐ Fish bone					
☐ Human bone					
☐ Seeds/ pits					
☐ Coins					
☐ Glass					
☐ Inscription					
☐ Pottery stamps					
☐ Ostracon					
☐ Graffito					
☐ Other					

Other Comments: ....

....

....

Surface Finds

Type	Number	Weight	Average Size of Finds			comments:
			Tile	Amphora	Pottery	
Pottery shards :			☐ <2 cm	☐ < 2 cm	☐ < 2 cm	
Amphora shards:			☐ 2-5 cm	☐ 2-5 cm	☐ 2-5 cm	
Tile Frags:			☐ 5-10 cm	☐ 5-10 cm	☐ 5-10 cm	
			☐ >10 cm	☐ >10 cm	☐ > 10 cm	

Photos			
Photo No	Description	Photo No	Description
Comments:			

Recognized Chronological Period				
☐Prehistoric	☐ Archaic	☐Roman	☐Ottoman	
☐Bronze Age	☐Classical	☐Byzantine	☐ Italian	☐ undetermined
☐Iron Age	☐ Hellenistic	☐Islamic	☐ Modern	
Comments:				

Structural Remains				
Type	Zone	Photo No	Coordinates	
Condition of Site				
☐ Poor	☐ Moderate	☐ Good	☐ Excellent	☐ Undetermined
Amount of Risk				
☐ High	☐ Medium	☐ Low	☐ Undetermined	
Date:			Started Time :	
Day:			Ended Time:	
Weather Condition:			Signature:	

Figure 3-16: The record sheets used for the fieldwork survey

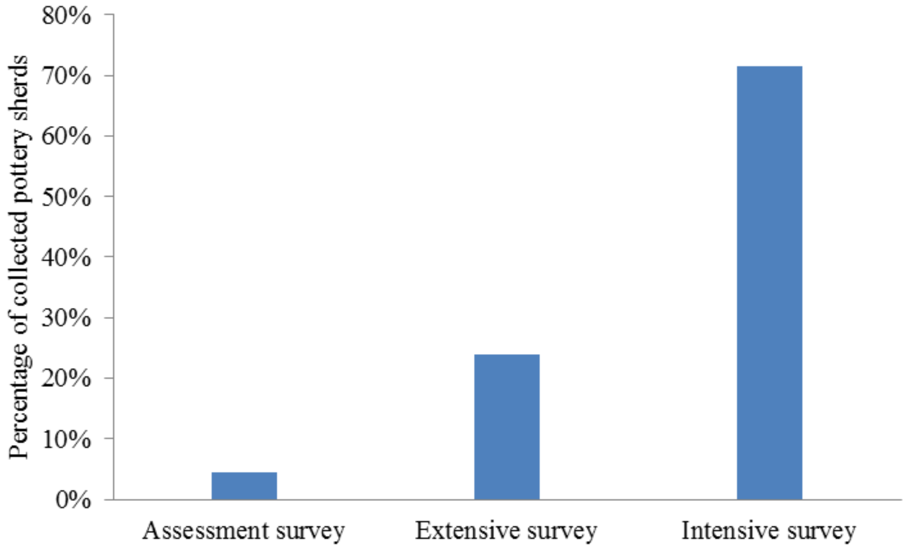


Figure 3-17: Percentage of total pottery sherds collected during the field survey

SCSC Survey

Survey type	Sherd No
Assessment survey	43
Extensive survey	230
Intensive survey	649

Table 3-6: Number of pottery sherds gathered during each individual survey

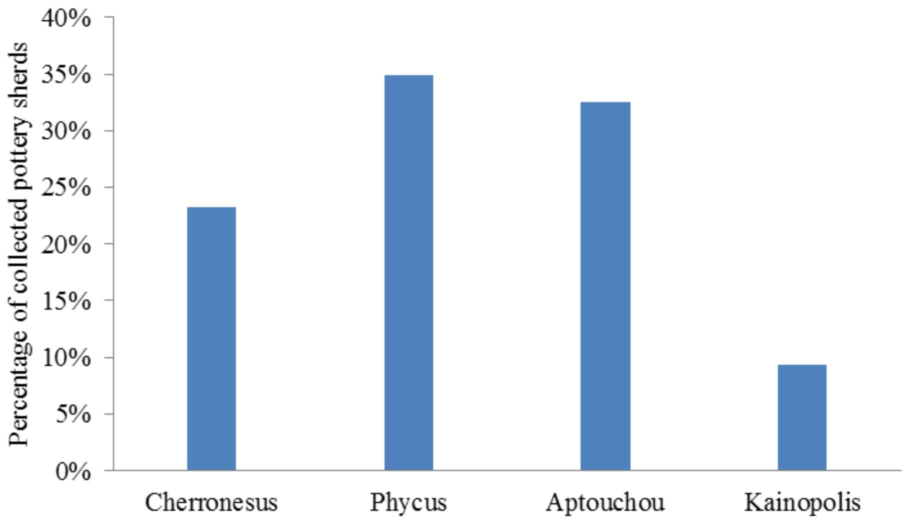


Figure 3-18: Percentage of collected pottery sherds collected in the assessment survey

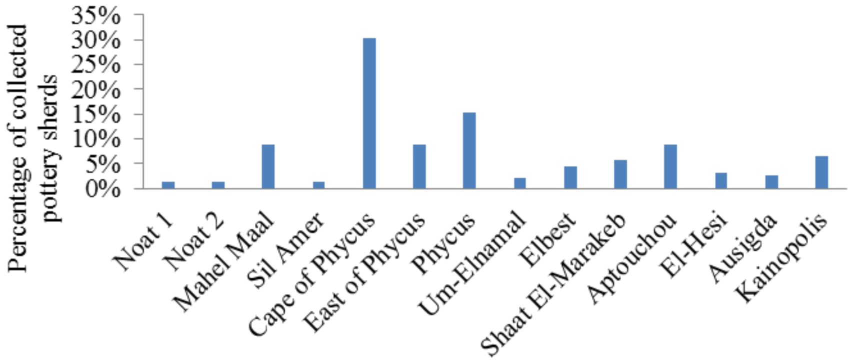


Figure 3-19: Percentage of collected pottery sherds collected in the extensive survey

Site		SCSC Survey type					
Modern Name	Ancient Name	AS	No. CS	ES	No. CS	IS	No. CS
Ras et-Tin	Cherronesus	√	10	√	50	√	112
Derna	Darnis	√					
Karsa	Chersis	√					
Lathrun	Erythron	√					
Ras El- Hilal	Naustathmos	√					
Susa	Apollonia	√					
Noat 1	?			√	3	√	
Noat 2	?			√	3		
Mahel Maal	?			√	20	√	78
Sil Amer	?			√	3		
Assa Mosa	?			√			
el-Mamluh	Cape of Phycus			√	50	√	164
East of Phycus	?			√	20		
Zawiet el-Hamama	Phycus	√	15	√	35	√	120
Um-Elnamal	?			√	5		
Elbest	?			√	10		
Shaat el-Marakeb	?			√	13	√	80
Hanya	Aptouchou	√	14	√	20	√	60
el-Hesi	?			√	7		
Gergerummah	Ausigda	√		√	6		
el- Agla	Kainopolis	√	4	√	15	√	35
Ptolemais	Tolmeta	√					
Taucheira	Tocra	√					

Table 3-7: The number of pottery sherds collected in each individual surveyed site (AS = assessment survey; No. CS = number of collected sherds; ES = extensive survey; IS = intensive survey).

3.4.5.9 Pottery procedures

The pottery sherds were systematically collected and recorded. First, each transect had individually labelled bags for its own materials. The label contained information (Fig. 3-20) about the site, transect, type of material, name of collector, and date collected.

At the end of the survey, sherds from every site were washed, counted, and classified according to their shape and type (see Chapters Six and Seven). Diagnostic sherds were photographed from different angles (Fig 3-21). For example, ten bags of pottery were collected from two linear transects (A and B) (Table 3-8) at the Cape of Phycus (el-Mamluh). Bags A1 to A5 contained about 79 pottery sherds collected from transect A. Bags B1 to B5, on the other hand, contained 85 sherds from transect B.

Site No:
Waypoint No:
Transect No:
Sample type:
Bag No:
Collector's name:
Date:

Figure 3-20: Details of the bag labels

The next step was drawing the most important sherds. Small samples of the pottery were also taken for fabric and further analysis. The samples were glued onto a sheet with details of the sample, including the site and transect codes and the bag and photo numbers (Fig. 3-22). Furthermore, the records of each sample were written on the back of the sherds from which the sample was taken. Finally, the pottery materials were re-bagged with their previous label and stored in boxes.

Cape of Phycus (el-Mamluh)

Bag No	site Code	Transect code	Material type	Material count					
				Body	Base	Hand	Hand with rim	Rim	Total Sherds
1	AMCS	A	Pottery	3	3	2	0	0	8
2	AMCS	A	Pottery	2	2	5	0	1	6
3	AMCS	A	Pottery	7	5	9	5	4	30
4	AMCS	A	Pottery	7	5	1	2	5	20
5	AMCS	A	Pottery	2	2	7	4	0	15
1	AMCS	B	Pottery	3	4	7	5	3	22
2	AMCS	B	Pottery	5	0	5	0	1	11
3	AMCS	B	Pottery	9	1	4	1	1	16
4	AMCS	B	Pottery	9	4	3	1	5	22
5	AMCS	B	Pottery	3	2	5	1	3	14

Table 3-8: Pottery collected from transects A and B at the Cape of Phycus (el-Mamluh)

Figure 3-21: One of the amphora sherds gathered from the Cape of Phycus (el-Mamluh)

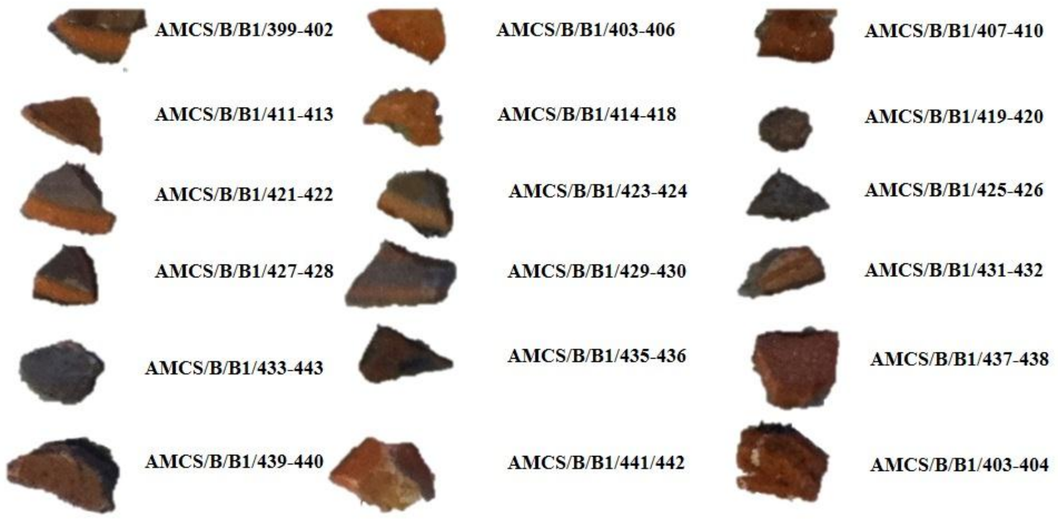


Figure 3-22: Examples of pottery samples collected from the Cape of Phycus (el-Mamluh)

3.4.5.10 Access database

At the end of each working day, all information and data regarding the materials and features collected, recorded and documented in various ways, such as on forms, labels and in log books, were entered into an Access database created for this study. There were five main forms used in the database. One was designed for general information, such as site codes, ancient and modern names, coordinates, and information about the topography, soil, and condition of the sites (Fig 3-23). The second form was related to the transect details and materials collected within the sites, as well as information about any issues with visibility, accessibility, or other related problems (Fig 3-24). The third form collected descriptions of the photographs (Fig 3-25). The fourth form recorded the waypoints (Fig 3-26). The fifth form recorded the sub-sites within the main site (Fig 3-27).

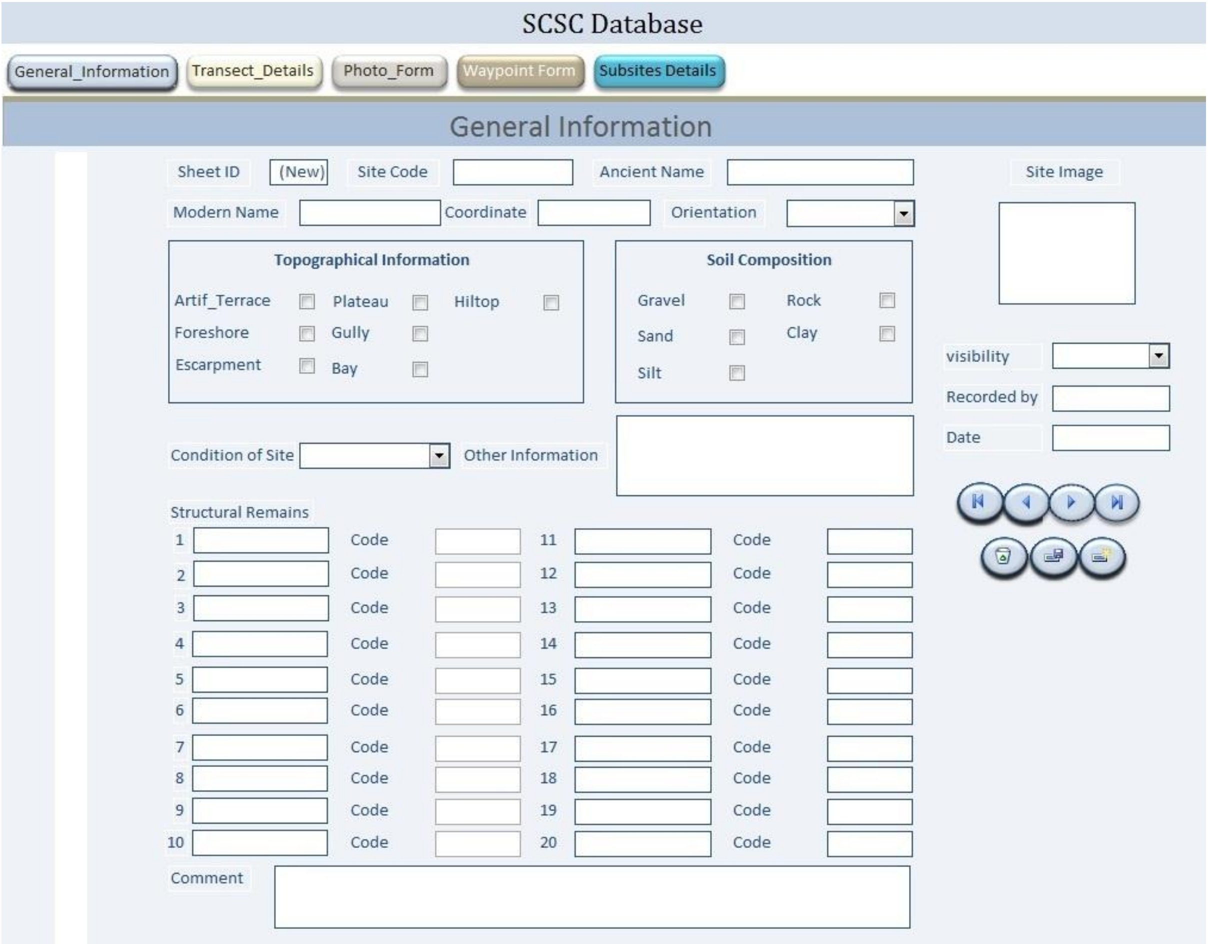


Figure 3-23: The first form of the SCSC Access database, which recorded general information.

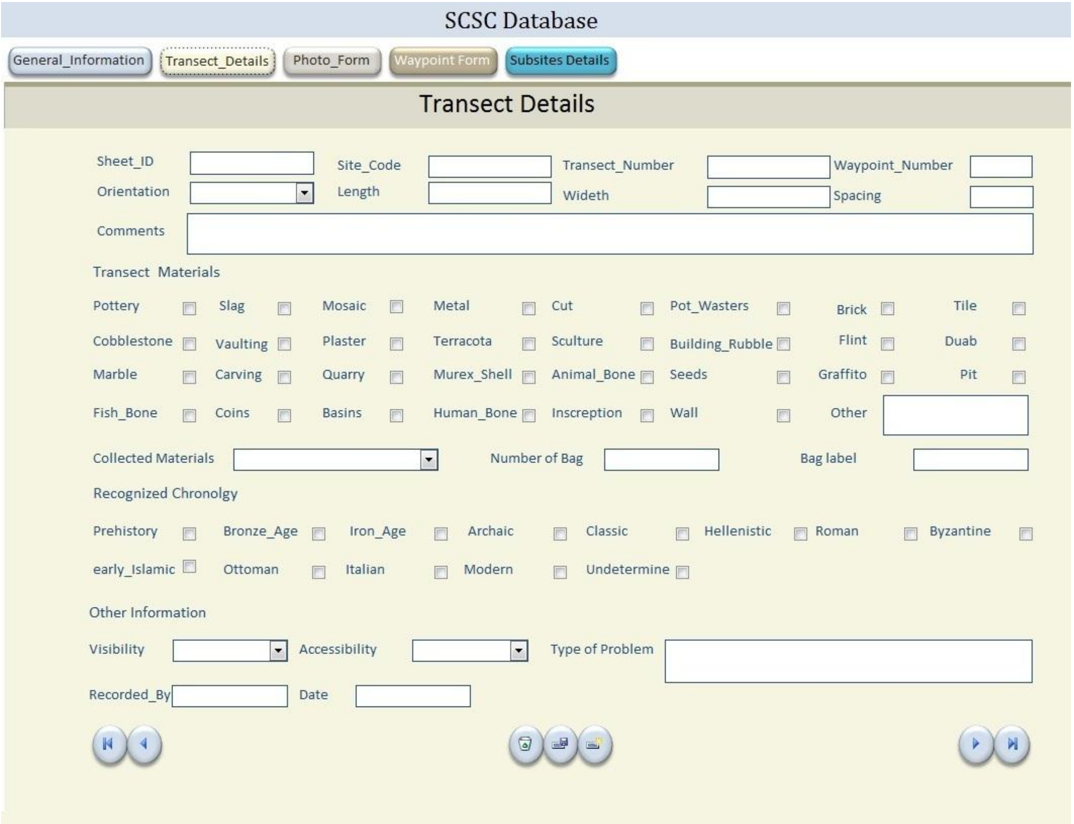


Figure 3-24: The second form of the SCSC Access database, which recorded the transect sections.

Figure 3-25: The third form of the SCSC Access database, which recorded photographic information.

Figure 3-26: The fourth form of the SCSC Access database, which recorded waypoints.

Figure 3-27: The fifth form of the SCSC Access database, which recorded the sub-site records.

3.4.5.11 Mapping and computing software

During the intensive field survey, sites were measured whether they were a whole site or a sub-site. More than 3900 points were taken using a Leica Total Station to produce accurate and high-quality topographical maps and sketches. More than 38 sub-sites along the coast in my study area were mapped and drawn for the first time (see Chapter 4). Some of these sites measured more than 2000 m^2, such as sites PHCS1, PHCS18 and AMCS2. The Total Station played a major role in the analysis of the topographical features of the sites (see Fig. 3-5).

Computing programs including Adobe Illustrator, AutoCad, AutoLand and ArcGIS were also used for tracing and digitising pottery sketches, drawing buildings and making topographical and counter maps. All the information relating to the Cyrenaican harbours have been recorded, entered into database and analysed in a GIS. This includes both topographical features and archaeological remains (*e.g.* pottery, artefacts and structural remains).

3.4.5.12 Site definition

The simplest definition of an archaeological site is a location with signs of past human activity (Stone et al. 2011b). The size and complexity of archaeological remains vary (King 1978; Plog et al. 1978; Stone et al. 2011b) from small areas with few pottery sherds to large urban settlements and cities.

I decided to use the term ‘site’ to refer to the archaeological remains I identified during my field survey. This definition includes big settlements such as Phycus and Aptouchou, buildings within the main settlements, isolated archaeological features (*e.g.* small buildings or basins) and accumulations of pottery sherds. Each main site was given a code with four letters. The first two letters refer to the first letter of the name of the area or region, followed by two letters referring to the two first letters of my study code (SCSC). For instance, the code given to the region of Phycus is ‘PHSC’. However, the sites identified within the area had another digital number added to the previous code. For example, the main code of Phycus is PHSC, and the sites identified within the area of Phycus were referred to as PHSC1, PHSC2, and so on.

3.5 Limitations of the Survey

A number of conditions affected the field survey, reducing the probability of discovery in several ways. These factors include accessibility, visibility, time, and team efficiency. 'Accessibility' refers to extent to which the entire study area can be accessed and examined during the field survey (Schiffer et al. 1978).

Some parts of my study area were affected by accessibility issues. For example, some areas could not be surveyed because it was the season for hunting immigrant falcons from the north of the Mediterranean. Local people use the coastal areas as a hunting ground to ambush the falcons crossing the Mediterranean basins from the north to the south. The hunters prevent surveyors reaching these areas, which blocked access in some cases.

Another issue was that landowners sometimes refuse to allow the public access to their land. In a few cases visibility was difficult, particularly along the edges of the coast. A spell of bad weather and strong waves also affected recording along some parts of the coastline.

The 2011 revolution was a major issue. I had planned to carry out field seasons in 2011 and 2012. Unfortunately, as the revolution began in early 2011, the fieldwork had to be cancelled that year and finished the following year in a smaller area. Another unforeseen issue was that the team needed more training than anticipated.

3.6 Conclusion

The field survey and the data that has been collected form the core of many of the arguments I will make in the following chapters. Recording and mapping the sites and buildings are discussed in Chapters Four and Six. Also, pottery identified during my field survey forms a major element in the analysis of pottery production in Cyrenaica (Chapter 4) and trade and connectivity between my area of study and other parts of the Mediterranean (Chapter 7). In general, the field survey methods constituted the backbone of this study and helped to identify and address a number of the major issues that this project set out to investigate.

The next chapter will present a detailed study of the sites that I surveyed and recorded during my fieldwork. It will discuss the main sites and every sub-site, and analyse their distribution and descriptions. .

Chapter 4: Structural Evidence for Harbour Sites

4.1 General Introduction

This chapter presents examples of some of the results from the sites and sub-sites recorded during the fieldwork. It also looks more closely at the features of those sites in order to compare coastal and rural structures and settlements. This chapter is divided into three main parts. The first part (4.2) illustrates a number of the principal and general elements of the sites and sub-sites identified during the field survey.

The second part (4.3) builds on the descriptive study of the archaeological remains recorded during the extensive and intensive surveys (see site gazetteer/Chapter 9 for a full description). This part examines the construction techniques and building methods used within the surveyed sites, in particular the types of stone and masonry used in the recorded buildings and features. The materials and methods used by ancient masons are also discussed.

The third part (4.4) discusses the similarities and differences between rural and coastal settlements. The general features of the rural sites are analysed in terms of the types of stone and masonry used in construction and their differences and similarities to the materials used in the coastal settlements. The sizes of the rural and coastal settlements are also compared. The conclusion addresses the initial questions about the character of the coastal and rural settlements within the study area.

4.2 Key Examples of SCSC Survey Results

4.2.1 Introduction

Readers should be aware that this section is a simple presentation of the principal results of the survey (SCSC). For full details and discussion of the recorded sites and sub-sites within the survey area, see part II (site gazetteer/Chapter 9).

The survey has successfully identified and recorded a large amount of data from the surveyed sites, which demonstrates the scale of the activity which took place along this coast (see Chapter 3 for the methodology). It is worth noting that the data generated from this survey has changed our previous ideas about this coastline in terms of the capacity and size of some sites. The data produced from Phycus, for instance, highlights that the site was not merely a small coastal settlement or secondary harbour, as was long believed. It actually appears to have been a major harbour along the Cyrenaican coast and to have played a significant role in the region's economy, especially in the late Roman period (see Chapters Five and Six). The sites are presented in this section according to the density of the recorded archaeological remains, not by their geographical location.

4.2.2 Phycus (Zawiet el-Hamama)

Phycus seems to have been an important site for a number of reasons. It is located between two major Cyrenaican ports (Apollonia to the east and Ptolemais to the west), while its size suggests that it was not a small village or settlement. The huge density of archaeological remains also confirm that the site had an important role in ancient times. Despite this, it has received little attention from scholars.

Only the eastern headland of the promontory has been visited and discussed by scholars (Flemming 1965; 1971; Jones and Little 1971a; Laronde 1987; Roques 1975; 1999; Tusa 2010; 2011). The field survey endeavoured to document as many sub-sites as possible (Fig. 4-1). More than 50 sub-sites (PHSC1-54) were recorded and documented for the first time (see gazetteer section/Chapter 9, pages 390-418).

The field survey indicates that Phycus occupied a huge territory, and its remains were not confined only to the headland of the promontory area (see Figure 5-34). The site seems to extend about 3 km from the south-west to the north-east and 1.5 km from the shoreline in the north-west to the foot of the middle plateau (el-Usita) in the south-east.

The site can be divided into three general zones. The first includes the shore area and the headland of the promontory area. This area includes many of the archaeological remains (PHSC1-20) of ancient Phycus, including four industrial areas (PHSC1, PHSC4, PHSC12, PHSC18), two churches (PHSC8 and PHSC14), a watchtower (PHSC17) and a number of other buildings (Figs. 4-2).

The second zone lies directly to the south-east of the shoreline and promontory. It is a set of relatively small rocky hills or Alua, known locally as Aluet El-Lib. This zone is approximately 2 km long from the south-west to the north-east, and is approximately 200 m wide.

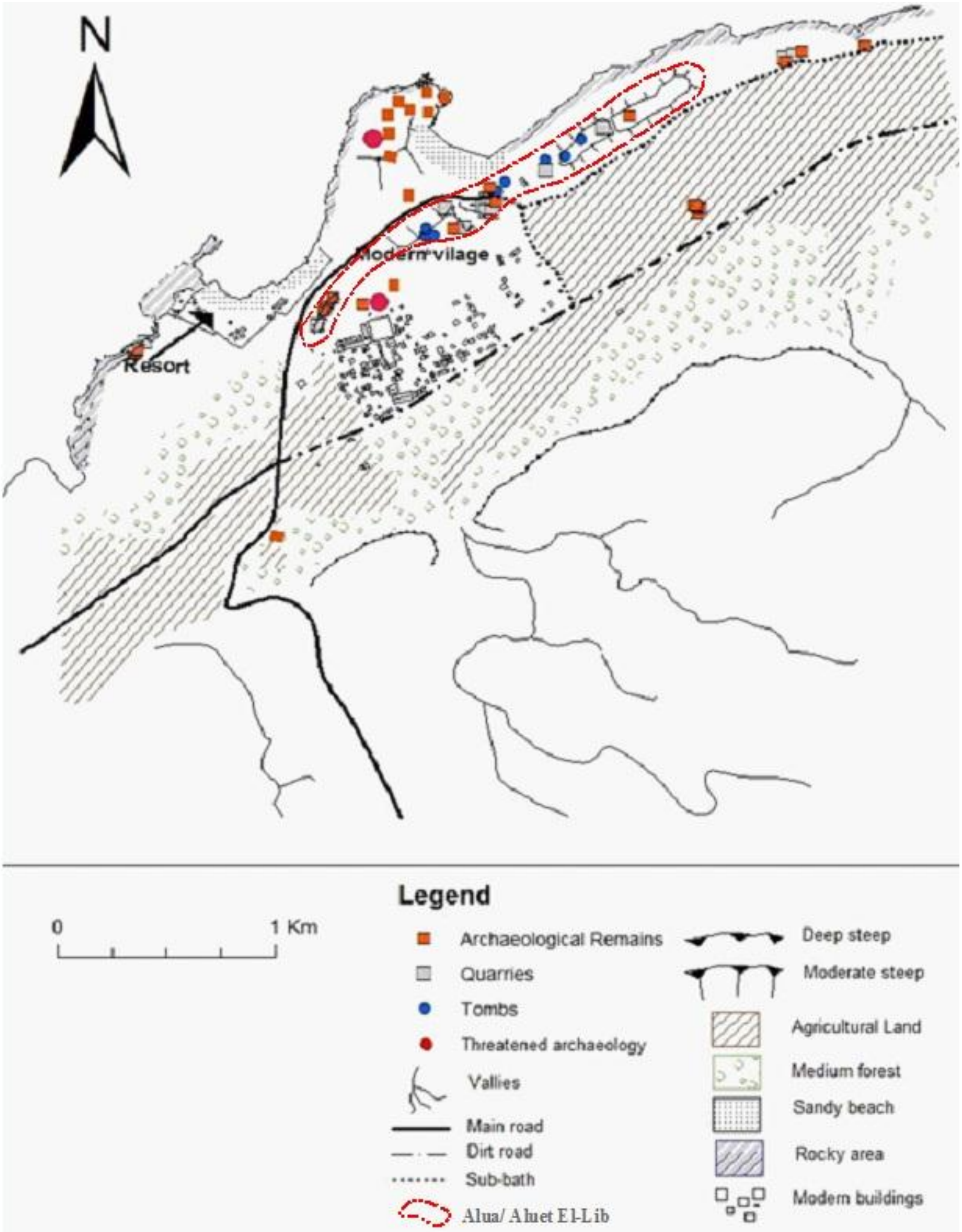


Figure 4-1: The distribution of archaeological remains at the ancient site of Phycus.

The distance between this hill (Alua) and the shoreline zone varies from one area to another. For instance, the north-eastern part of this zone is about 40 m from the shoreline, whilst the middle section is about 500 m from the promontory area. The zone narrows again in the south-west, where it is 150 m from the sea. Aluet el-Lib has 20 sub-sites (PHSC21-54).

The third zone is located directly behind this hill (Alua). It is a flat area which measures approximately 600 m from the hill (Alua) to the foot of the middle plateau (el-Usita), and about 2 km from the south-west to the north-east. The area is distinguished largely by its fertility, and preserves a number of archaeological remains (PHSC-55-58). The significant quantity of industrial archaeological remains recorded at Phycus (PHSC1, PHSC4, PHSC12, PHSC18, PHSC48, PHSC56) highlights the scale of the productive activity which took place in the region (see Chapter 5 for more discussion about productive activity).

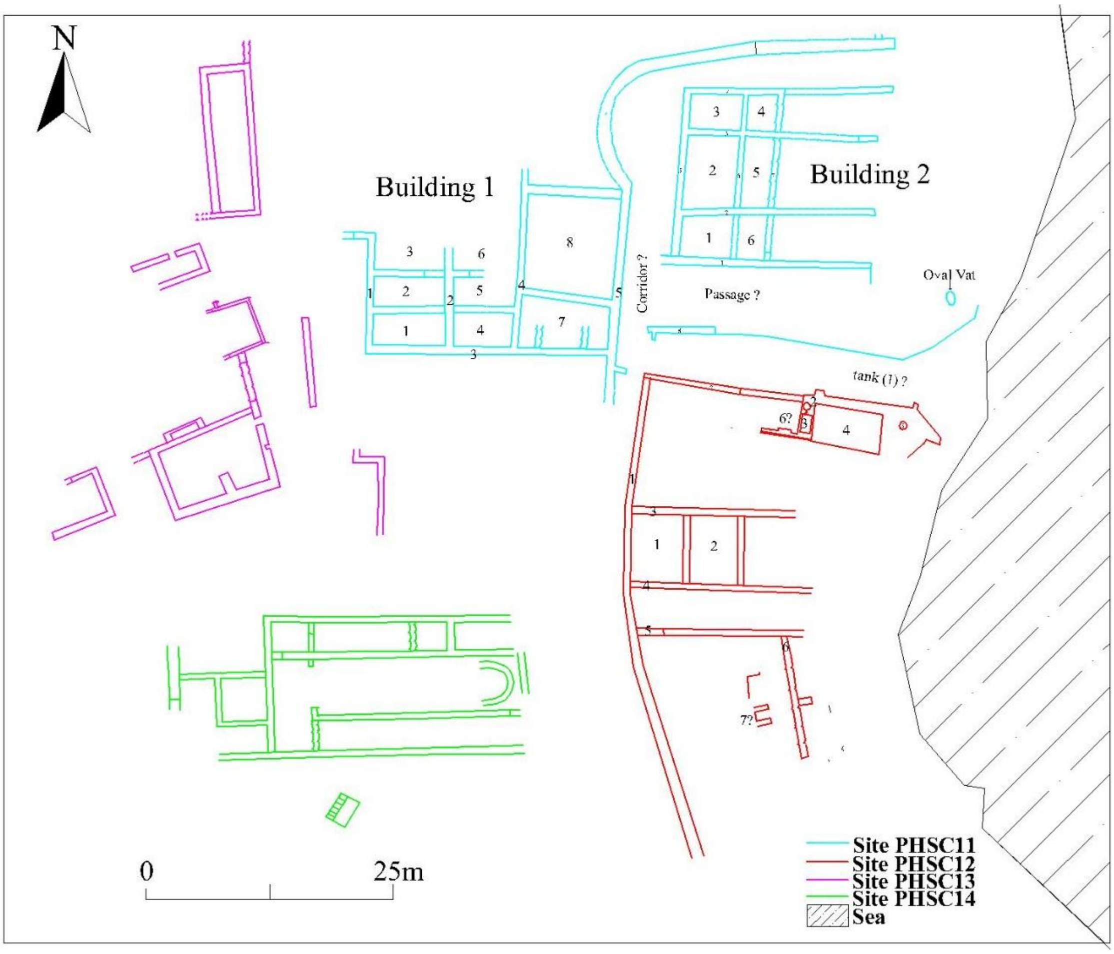


Figure 4-2: The distribution of sites PHSC11, PHSC12, PHSC13 and PHSC14.

4.2.3 Aptouchou (el-Hanya)

Aptouchou (APSC) also occupies a very large area, with remains scattered in the middle of the modern village and along the coast and south-west of the shore and village. It seems that the industrial area lay along the harbour area, with the bulk of the remains appearing to be related to workshops and industrial activity. The necropolis was positioned to the south-west and south-east of the port, and the initial fieldwork suggested that the site extends to the south-east. However, the SCSC survey concentrated on the bay area and recorded and documented about 14 sub-sites (see gazetteer section/Chapter 9, pages 436-450).

These remains are distributed in four main loci (A1, A2, A3 and A4) (see Figure 9-102, Chapter 9/gazetteer section). The first area lies to the north-east of bay 1. Unfortunately, this area (site APSC1) was bulldozed and two military buildings now occupy the space. The only pieces of archaeological evidence to be seen in this area were the huge quantities of pottery sherds that can be seen all over the ground.

The second area overlooks the bay and is occupied by a small hill, which reaches its highest point on the northern side (seaward side/cliff area). The hilltop decreases gradually to the east, south and west. The area has a number of archaeological remains (sites APSC3-9/11).

It is notable that seven industrial sub-sites were recorded (APSC4, APSC7, APSC8, APSC9, APSC12, APSC13, APSC14) at which more than twenty vats and three kilns were found (see Chapter 5). The outlines of a number of buildings were also recorded and mapped (Figs. 4-3, 4-4, 4-5 and 4-6).

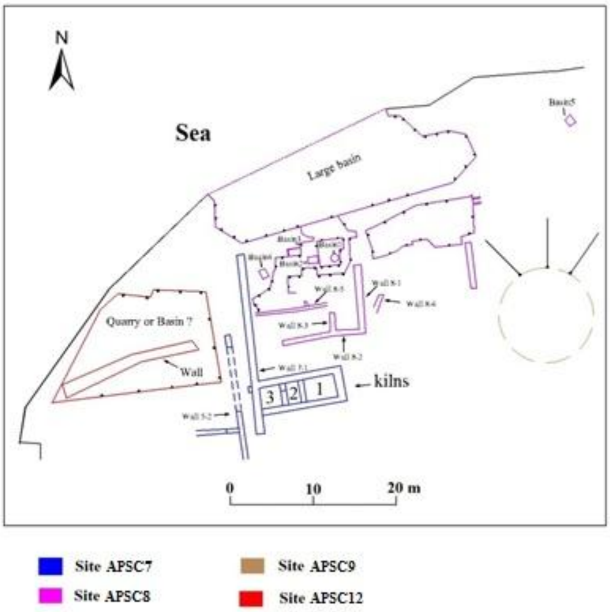


Figure 4-3: Sites APSC7, APSC8, APSC9 and APSC12.

Figure 4-4: Two of the vats found at APSC14.

Figure 4-5: General view to the north-east side of Aptouchou.

Figure 4-6: Part of a mosaic found at APSC10 at Aptouchou.

4.2.4 Kainopolis (el- Agla)

I conducted assessment, extensive, and intensive surveys at this site during the three stages of the fieldwork (SCSC). During this work 15 sub-sites were recorded and documented (gazetteer section/Chapter 9, pages 451-470).

The sites documented at ancient Kainopolis (el-Agla) were located in three main areas. These were the foreshore region, the hilltop region, and the foothills (Fig. 4-7 and 4-8). The first area has an industrial nature, as large quantities of industrialised evidence were scattered along the shore plain (see Chapter 5). The coastal plain of Kainopolis (el-Agla) which appears to be Cyrenaica’s narrowest coastal sector (see section 3.2 in Chapter 3) with a width of only 150 m, seven sub-sites were recorded here (KASC1-7).

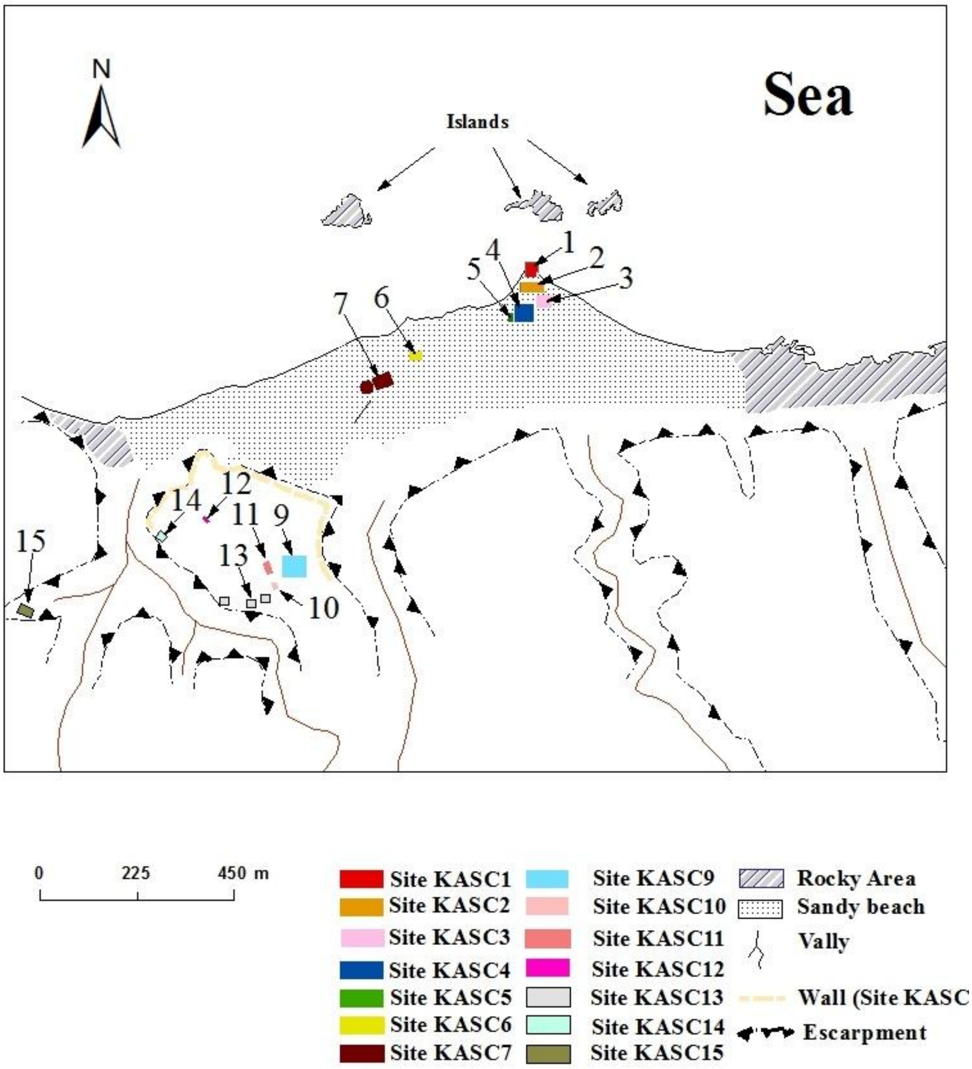


Figure 4-7: The distribution of sites at Kainopolis (el-Agla).

The second area is at the top of the hill, which rises approximately 30 m above sea level. This region seems to have had a civilian character. There were seven sub-sites in this part of Kainopolis (KASC8-14), including a church (KASC9) and a watchtower (KASC14) (Figs. 4-9 and 4-10).

The third area was the foothills, which lie 200 m away to the west of the opposite slope of the hilltop and about 600 m south-west of the shoreline remains. KASC15 seems to have served as a necropolis, as a number of tombs were recorded in this area (Fig. 4-11).

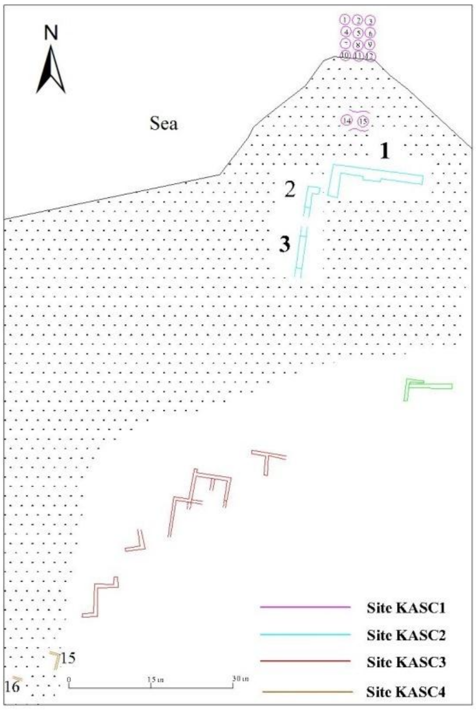


Figure 4-8: Plan shows the distribution of sites KASC1, KASC2, KASC3 and KASC4.

Figure 4-9: The church (KASC9) within Kainopolis. Looking north-west.

Figure 4-10: The watchtower (KASC14) within Kainopolis. Looking south-east.

Figure 4-11: Part of the tombs within KASC15 at Kainopolis. Looking south-east.

4.2.5 Cherronesus (Ras et-Tin)

The SCSC survey documented 13 sub-sites (CHSC1-13) (Fig. 4-12) within Cherronesus (see Chapter 9, pages 347-358). A number of building were recorded within these sites, including two sub-sites (sites CHSC2 and CHSC5) that indicate the presence of industrial activity. For instance, clear evidence of large-scale purple dye processing was found at sub-site CHSC5 (Fig. 4-13), while the second sub-site (CHSC2) might represent a ceramics production.

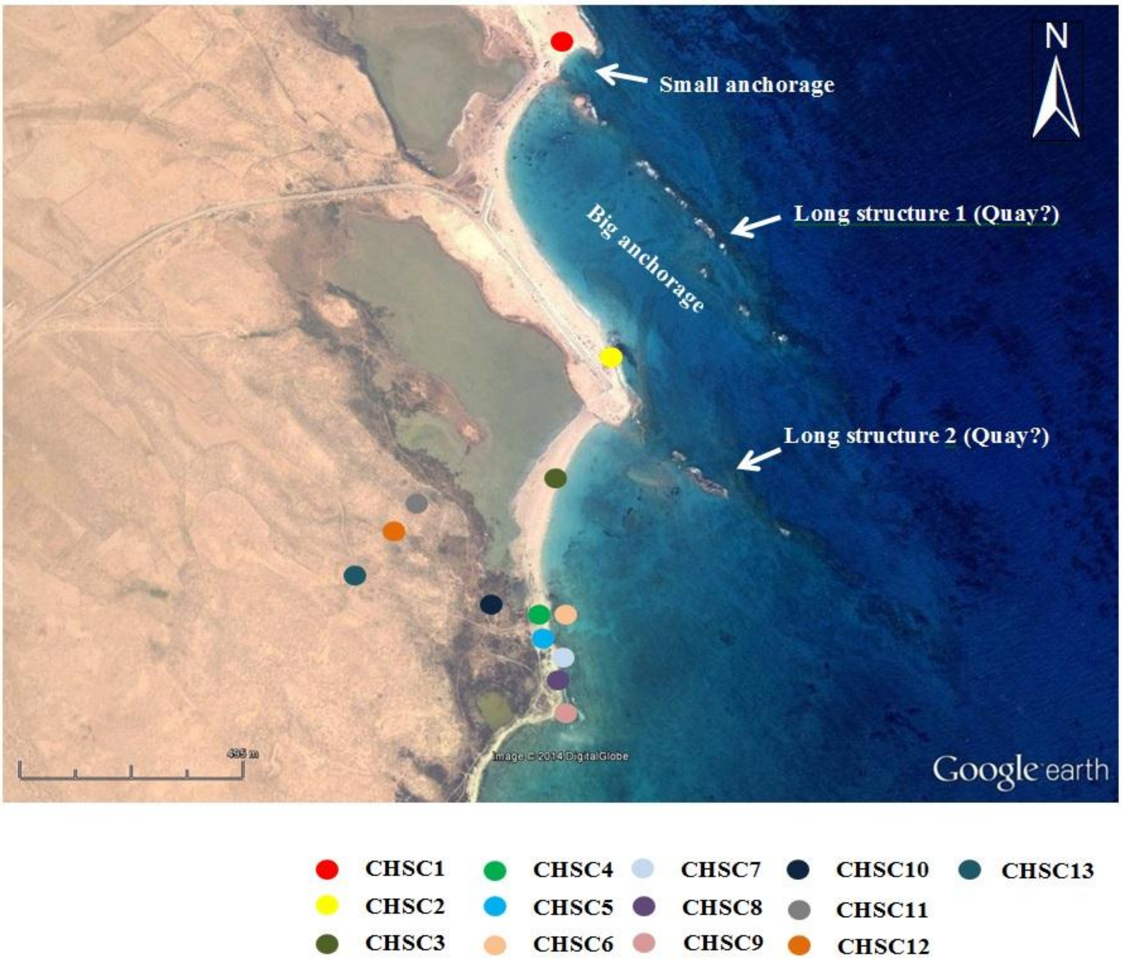


Figure 4-12: The Cherronesus (Ras et-Tin) sub-sites.

Figure 4-13: Accumulation of murex shells for purple dye production linked to sub-site CHSC5 within Cherronesus (Ras et-Tin). Southern view.

4.2.6 The Cape of Phycus (el-Mamluh)

This site lies about 7 km to the east of Phycus and about 25 km to the west of Apollonia. The archaeological remains of the Cape of Phycus occupy an area of about 1 km^2. It should be mentioned that this study is the first time this site's significant archaeological remains have been recorded and documented (see gazetteer section/Chapter 9, pages 382-390).

The archaeological remains seem to be distributed in two main areas, which are separated naturally by a valley connected to the sea (Fig. 4-14). The first area can in turn be divided into two sub-areas. The first of these is the shore area, which is occupied by three main sites (CPSC1, CPSC2 and CPSC3). This sub-area's shore zone is approximately 84 m wide, more than half of which is formed of soil suitable for agriculture. The remaining part is a rocky area which lies directly south of the shoreline. The second sub-area lies about 80 m from the shoreline. It is a relatively small, high hill, which rises approximately 15 m above sea level. The hill slopes gently towards the north, where sites CPSC1 and CPSC2 are located**.** The north-west of the top edge of this hill is dominated by site CPSC4.

Meanwhile, the second area has the same character as the first. It can be divided into two zones: a rocky shore area, and an upper area consisting of a small high hill. Site CPSC5 occupies the latter area, while sites CPSC6 and CPSC7 are located in the shore area. The most important sites within the Cape of Phycus seem to be sites CPSC2 and CPSC2 (Fig. 4-15). The former consists of a set of vats believed to be related to fish production, while the latter is thought to be a ceramics workshop assigned to amphora production (see Chapter 5)

Figure 4-14: Distribution of sub-sites within the Cape of Phycus.

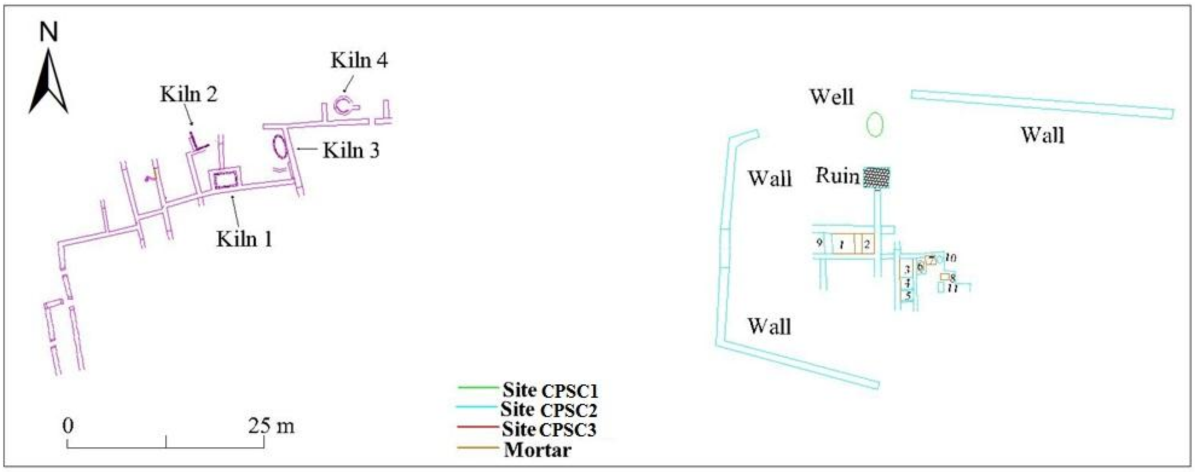


Figure 4-15: Map of sub-sites CPSC2 and CPSC3.

4.2.7 Mahel Mael

This site is located approximately 13 km to the west of Apollonia. The archaeological remains that were recorded comprised four main sub-sites (MMSC1, MMSC2, MMSC3 and MMSC4) scattered around an area of 3000 m^2, a few meters from the sea (Fig. 4-16). At a distance of 50 m to the east of this site is a valley running from the south towards the sea which is connected to a small sheltered anchorage (?). This is 11 m wide and 63 m long on the eastern side, and 27 m long on the western side (see gazetteer section/Chapter 9, pages 372-375). A number of interesting features were recorded, including a set of pottery kilns (MMSC1) (see Chapter 5). A set of walls also appear sporadically, which suggests that the site of Mahel Mael continued further to the east towards the valley. Generally, the site seemed to have been involved mainly in ceramic production.

Figure 4-16: The distribution of sub-sites within Mahel Mael.

4.2.8 Noat 1

The site of Noat 1 lies 16 km to the west of Apollonia (Susa). Eight sub-sites distributed within four zones were recorded within the main site of Noat 1 (see gazetteer section/Chapter 9, pages 358-367). Notable features recorded at the site include 38 vats, and some elements of a press such as crushing stones and a counterweight (Figs. 4-17, 4-18 and 4-19). This site seems to have been a large productive unit, probably involved in mass production of wine (see Chapter 5).

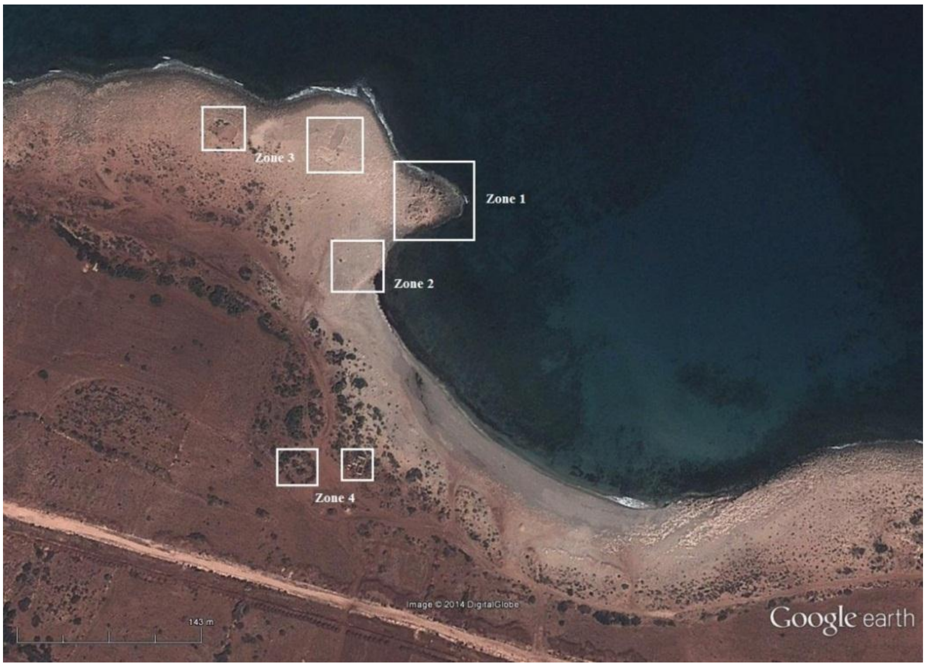


Figure 4-17: Distribution of sub-sites at Noat 1.

Figure 4-18: Section B within site NOTSC1. View to the south.

Figure 4-19: Section C within site NOTSC1. View to the north-east.

4.2.9 Noat 2

A short distance (1.2 km) to the west of site of Noat 1, there is another site which was designated Noat 2. The site is relatively small (see gazetteer section/Chapter 9, pages 367-371) and consists of four sub-sites (NOSC1-4). The most important part of the site seems to be NOSC1 (Fig. 4-20). This has a set of parallel circular vats which appeared to be involved in the tanning process (see Chapter 5).

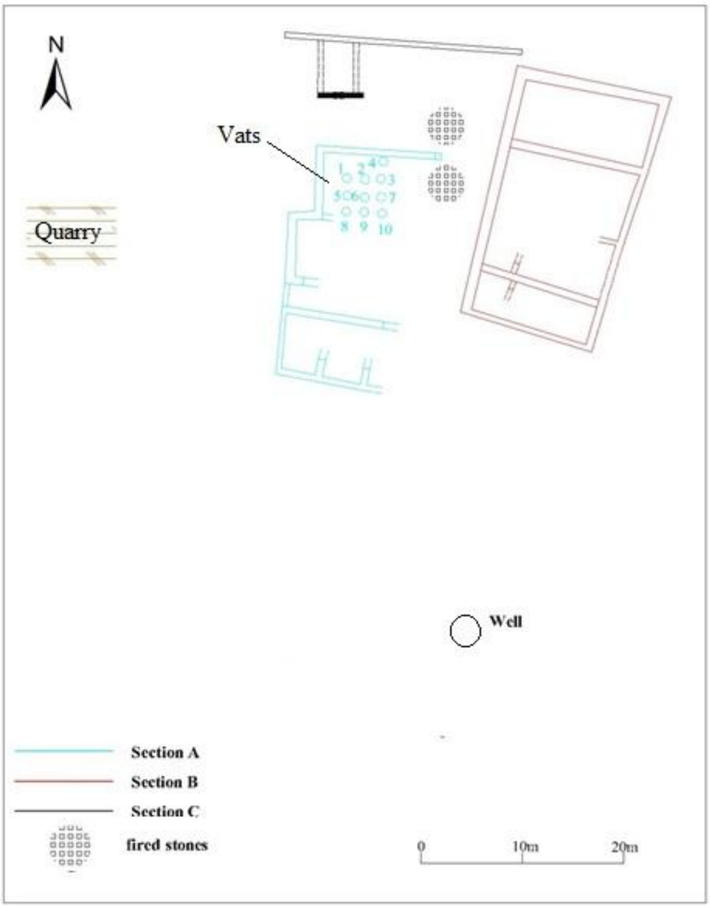


Figure 4-20: Sub-site NOCS1 within site Noat 2.

4.2.10 Sil Amer

This site lies 700 m to the west of Mahel Mael. It is a single fort or watchtower (SASC1) which lies at the edge of a valley. It overlooks the sea from both the north and east (Fig. 4-21). The shore of the bay is the entrance to Sil Amer valley. There is also a notable group of vats (SASC2) located to the north-east on a lower part of the slope (see gazetteer section/Chapter 9, pages 375-379, and Chapter Seven for more discussion of this site).

Figure 4-21: The site of Sil Amer.

4.2.11 Assa Mousa

This is a small site, lying about 3 km to the west of Sil Amer and 25 to the west of Apollonia. Its only notable features were a set of six circular rock-cut vats and a collapsed cave (Fig. 4-22). However, these archaeological remains are located to the north-west of a long cut anchorage suitable for small fishing ships (gazetteer section/Chapter 9, pages 379-382).

Figure 4-22: The location of the vats within Assa Mousa.

4.2.12 Shaat el-Marakeb

This site is located 5 km to the north-east of the ancient site of Aptouchou (APSC), and about 8 km to the south-west of the coast of Phycus (PHSC). This is one of the sites recorded for the first time by the SCSC survey. A number of visible sub-sites and archaeological remains were located in its vicinity. Seven sub-sites were documented during the survey (gazetteer section/Chapter 9, pages 429-436).

The site is situated on a small and rocky hill known locally as Aluet el-Marakeb. It is surrounded to the south, south-east and south-west by fertile land suitable for agriculture. It overlooks a small bay that could have been used for mooring small boats. A huge amount of pottery sherds were distributed all around the site, indicating the presence of human activity on a massive scale. The site can be divided into eight sub-sites (Figs. 4-23, 4-24 and 4-25) all around Alowet El-Marakeb, to a distance of 378 m from west to the east and 66 m from north to south.

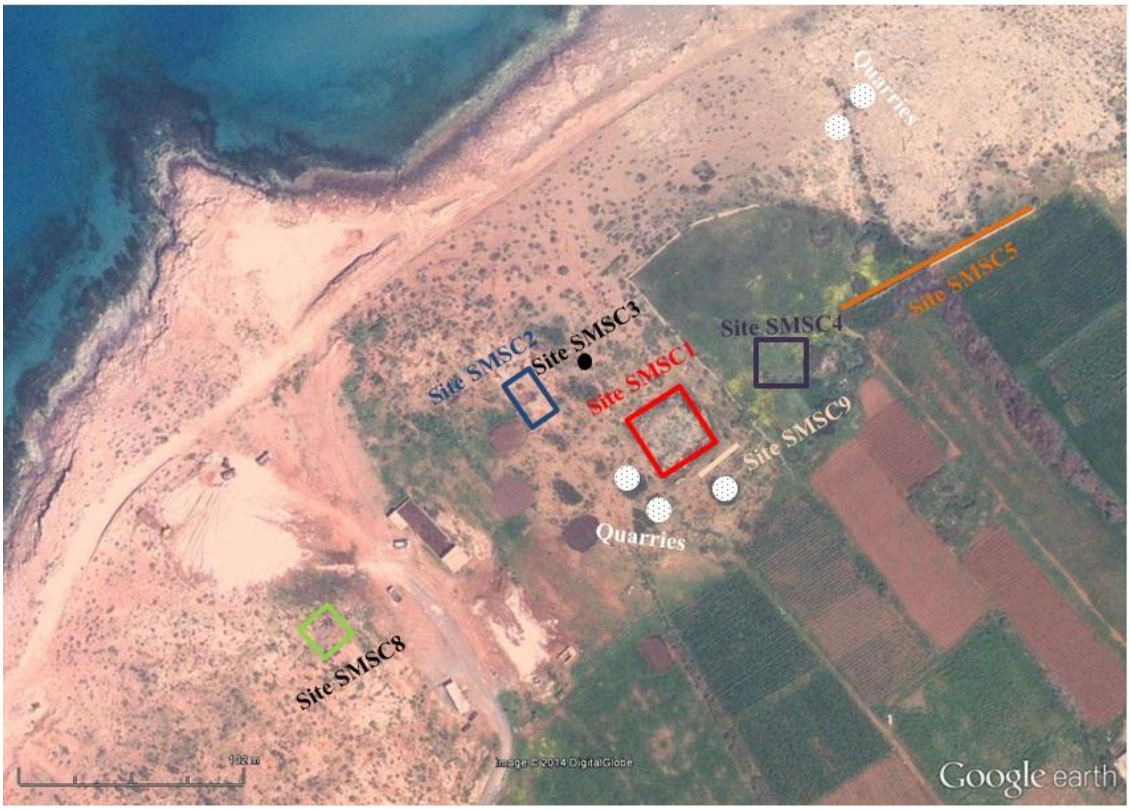


Figure 4-23: Distribution of sub-sites within Shaat el-Marakeb.

Figure 4-24: The dam (SMSC5) within Shaat el-Marakeb. Looking south-east.

Figure 4-25: General view to the back of SMSC1. Looking the south.

4.2.13 El-Shmariah

This site is located 100 m to the west of the el-Shmariah resort (Maseef el-Shmariah) and 1 km south-west of ancient Phycus. The site seems to have formed the western border of ancient Phycus. The archaeological remains of this site have never been recorded before now. Unfortunately, as a result of illegal sand mining, the site has been bulldozed. Only three sub-sites can now be detected (see gazetteer section/Chapter 9, pages 418-420).

The three recorded sub-sites (ESSC1-3) are located in a rocky area near to the sea. The first site (ESSC1) is a wall which lies about 30 m to the south-east of the sea. Meanwhile sites ESSC2 (a passage?) and ESSC3 (a quarry) lie 20 m to the south-east of the sea and a few meters to the north-east of site ESCS1.

4.2.14 Aluet Um-Elnamel

This site is suitable for agricultural activity and lies 3 km to the west of Phycus, and has two rocky areas (A and B) overlooking a bay. These areas rise about 22 m and 18 m respectively above sea level. The SCSC survey team made a brief visit to the site and recorded four sub-sites (AUSC1, AUSC2, AUSC3 and AUSC4) (gazetteer section/Chapter 9, pages 441-445).

Site AUSC1 is situated on the top of the first eminence (A), which overlooks the sea from the north-west side. A square building was preserved in this area, although only its external outline could be traced. The second site (AUSC2) lies a few metres to the north-west of site AUSC1, on the slope of the rocky eminence. The site seems to have traces of press elements, such as the two counterweights which can be seen at the site

(Fig. 4-26). The third site AUSC3 lies 25 m to the south-east of site AUSC1, while the fourth site is located in the area between the two eminences.

Figure 4-26: One of the counterweight found at AUSC2.

4.2.15 South-West of Um-Elnamel

This site lies 3.9 km to the south-west of Phycus, and 1 km to the south-west of Aluet Um-Elnamel. It is located approximately 800 m to the south-east of the sea. The site SUSC1 lies 40 m to the south of the modern road connecting the villages of Zawiet el-Hamama and Zawiet el-Hanya, at a distance of 2.6 km from the main junction of Zawiet el-Hamama.

The site has a strange feature: a 112 m long and 1.1 m wide channel cut into the rock. Its depth is unknown as it was full of soil. The channel runs for 20 m from the top of the eminence in the north-east before turning 180 degrees on itself and continuing parallel for another 13 m. It then heads off at a 75-degree angle for 41 m, then once again turns through 180 degrees and runs parallel for 38 m. The overall shape of the channel is similar to a bent paperclip (see Figs. 4-27a and b). Unfortunately, the vicinity of the channel could not be examined as it lies within the yard of a modern house. There is a pen at the start of the channel.

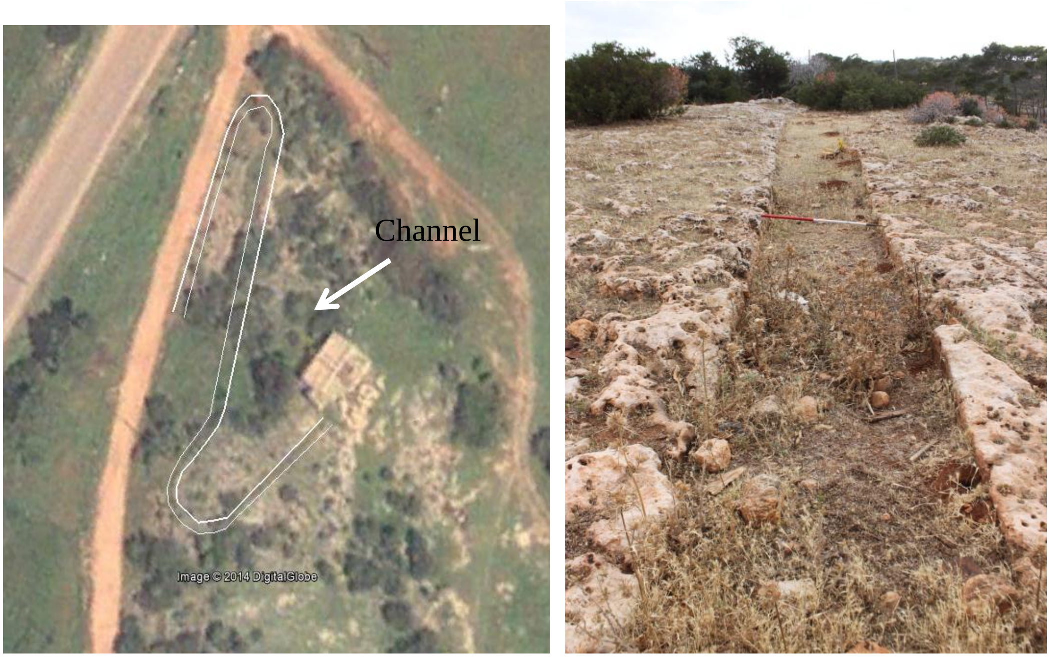


Figure 4-27 (a and b): The channel cut into the rock (site SUSC1).

4.2.16 **el-Best**

This site lies 6.7 km to the south-west of Phycus, and seems to be a single building (EBSC1) as no other archaeological remains have been observed in its vicinity. The site overlooks the sea from the north side, and at the back has fertile land suitable for agriculture (Fig. 4-28 and 4-29). In these ways it is similar to neighbouring sites (UESC, SUSC and SMSC).

Figure 4-28: An arched door inside the building at El-Best.

Figure 4-29: Part of an olive millstone at El-Best.

4.3 Construction Techniques and Building Materials

4.3.1 Introduction

Ancient masons clearly used a range of methods and techniques to build the walls recorded and documented in the study area. The essential building materials were stone blocks extracted from nearby quarries, which varied from undressed stone rubble to large dressed blocks.

Five types of wall construction were noted. Some types occur at all the surveyed sites, while others have been recorded at only one or two sites (Table 4-1 and Fig. 4-30). It is important to note that this discussion about building techniques and materials is based on field survey observations. They are thus preliminary data which needs to be expanded in the future by further study and excavation.

The main criterion applied by the SCSC team in deciding when to record the construction techniques used in walls was that at least two courses of stones should be preserved. However, it should be mentioned that the walls recorded represent only a small percentage of the total extant wall lines that were visible on the ground. This process provided me with a rough idea about the techniques adopted by the ancient builders within the survey area.

	Sites									
Wall construction	Noat 1	Noat 2	Mahel Mael	Sil Amer	Cape of Phycus	El-Shmariah	Phycus	El-Marakeb	Aptouchou	Kainopolis
Ashlar	√						√	√	√	√
Random uncoursed					√				√	√
Random coursed		√			√		√		√	√
Regular square coursed		√	√	√		√	√	√	√	√
Chequer-work									√	

Table 4-1: Types of construction technique recorded at each site.

The largest areas of wall and thus the most reliable information regarding building techniques came from the ancient site of Aptouchou (el- Hanya) (Fig. 4-30). The main reason for this is that erosion had exposed large expanses of wall, especially in the cliff area. These remains often stand up to 2 m in height. Preservation was good, which allowed me to record wall construction in greater detail.

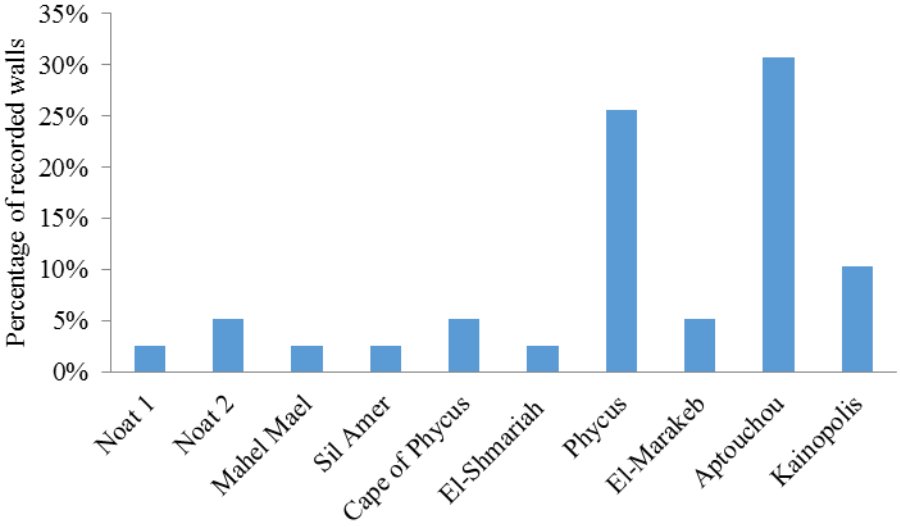


Figure 4-30: Percentage of constructions recorded at each site (Number of walls = 39).

On the other hand, the exposed remains are subject to a process of continuous erosion due to wind and wave action. The varying quantities of walls documented at each site also reflects their relative size, with one exception being the ancient site of Phycus (el-Hamama). This site is larger than Aptouchou (el- Hanya), but unlike Aptouchou most of its remains are covered by sand.

4.3.2 Types of masonry

4.3.2.1 Ashlar construction

The ashlar technique was widely used in Cyrenaica (Fig. 4-31), although it is difficult to give a precise date for the introduction of this technique. It seems that it originated in the pre-Hellenistic and Hellenistic periods, as blocks have been found incorporated into the walls of buildings dating from these periods (Table 4-2).

Ashlar construction techniques were recorded at the ancient site of Euesperides (Wilson et al. 2001; 2002; 2003). Although some of the uncovered walls incorporated this technique it appears that it was used on a small scale, and some of the blocks were re-used materials taken from other places and building. At Berenice, ashlar blocks were used in construction as wall or upper foundations. For instance, a wall of nine courses was found which was built mainly of ashlar stones (Lloyd 1977). As in Euesperides, the use of ashlar blocks seems to have been uncommon there. Most of the blocks were recycled materials brought from other buildings. The more commonly used materials for upper wall construction were mud-bricks (Lloyd 1977; Wilson et al. 2001). Ashlar blocks were used in the town walls and towers at the ancient site of Taucheira, some 50 km to the east of Berenice. Some of the ashlar walls survive for more than 8 courses (Smith and Crow 1998). The University of Benghazi's excavations have revealed that ashlar blocks were used in the construction of some domestic walls, such as room IV (Buzaian 2000). Nevertheless, ashlar blocks were incorporated within walls predominantly built with other stone materials.

On the other hand, ashlar blocks were used on a larger scale in Ptolemais. For instance, in a domestic house the apse in (R65) was built of ashlar blocks which are still in situ. *S*ome of the walls within the courtyard (R51) were also built using this method, a number of which preserve eight courses of ashlars (Stępniowski and Maciałowicz 2011). Further inland at Balagrae (modern el-Beida), two parallel walls built of ashlars are still in situ. One of these walls survives for five courses, which also incorporated other architectural materials in its construction (Buzaian and Bentaher 2002). In Cyrene, ashlars were widely used in different parts of the city. For example, they can be seen clearly in the apse of the basilica located to the north of the Roman forum (Walker 2002). Additionally, this construction technique has been recorded in different parts of Cyrenaica. The recent survey carried out in the Cyrene hinterlands by Emrage revealed that the external walls of a considerable number of fortifications and farmsteads were constructed using this method (Emrage forthcoming). Similar ashlar construction methods were used in the building of some of the *qsur* identified by the Libyan Valleys Archaeological Survey in Tripolitania (Mattingly and Barker 1996).

Site	Ashlar wall	Ashlar position	
		Foundation	U-foundation
Euesperides	√	?	√
Berenice	√		√
Taucheira	√	?	√
Ptolemais	√		√
Kainopolis	√		√
El-Marakeb	√		√
Aptouchou	√		√
Phycus	√		√
Balagrae	√		√
Cyrene	√		√

Table 4-2: Examples of Cyrenaican sites with ashlar walls.

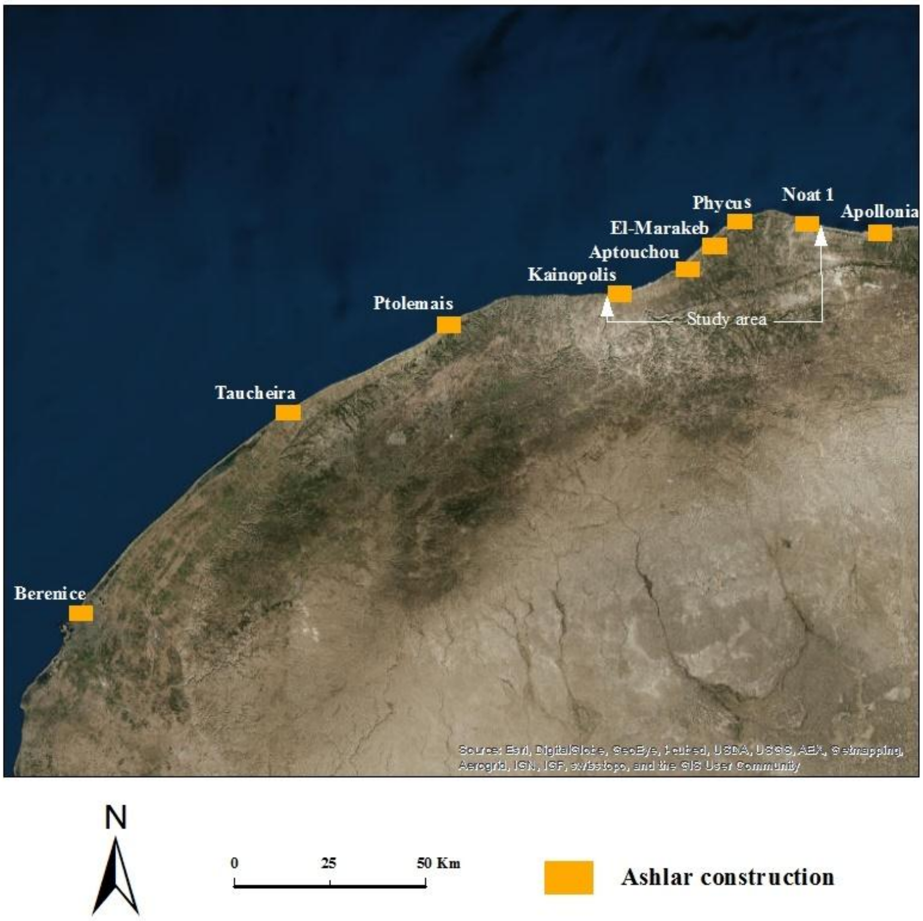


Figure 4-31: Sites along the Cyrenaican coast with ashlar walls.

In the field survey carried out by SCSC, nine sub-sites produced evidence of the use of ashlars in wall construction. These sites fall within four main areas: el- Agla, el-Hanya, Shaat el-Marakeb, el-Hamama and Noat 1. The general ashlar construction style consisted of large rectangular masonry blocks laid horizontally and placed firmly on top of each other without any signs of bonding materials. However, there was one exception which shall be discussed later.

Site KASC9 at Kainopolis (el-Agla) provides evidence that ashlar blocks were used to build the internal walls of the church, as is apparent at the semi-circular apse. Four courses of ashlars were laid horizontally. The first three courses of blocks were of similar sizes, being large square blocks, but the fourth course consisted of long, shallow rectangular blocks (Fig. 4-32). At the site of Aptouchou (el-Hanya), ashlar was identified in different walls within sites APSC7, APSC8 and APSC10. Two walls (7-1 and 7-2) at site AHSC7 were built using ashlar blocks. They seem to have formed a corridor leading to the sea. Wall 7-1 consisted of four courses rising above the sand, which appears to have formed part of an upper foundation. Wall 7-2 consisted of five courses which can be partially traced as a consequence of sand accumulation. The heavy blocks were placed horizontally (Fig. 4-33). Wall 8-1 in site APSC8 was built of two layers of blocks, and its external face was built of large heavy sand stone ashlars laid horizontally. The southern side of the wall was covered by an accumulation of sand. Five courses of ashlars stand approximately 1.7 m above ground level (Fig. 4-34).

At the top of the exposed cliff at site APSC10, a wall can be traced which seems to have built of large heavy ashlar blocks. Only three courses could be identified, which appear to have been built in the upper foundation and covered by soil. Some blocks in the upper course of the wall seem to have shifted as a result of the collapse of the superstructure (Fig. 4-35).

Figure 4-32: Ashlar blocks in the semi-circular apse at site KASC9. Looking west.

Figure 4-33: Ashlar blocks used to build walls 7-1 and 7-2 at site APSC7. Looking east.

At the ancient site of Shaat el-Marakeb (SMSC), ashlars were found on site SMSC5. This was a dam which consisted of 12 courses of both long and short ashlar blocks. These blocks were laid horizontally and alternately (Fig. 4-36). At the ancient site of Phycus (PHSC) three sites were identified which used ashlar blocks in wall construction. These walls were recorded at sites PHSC5, PHSC11 and PHSC45.

Figure 4-34: Ashlar blocks in the external side of wall 8-1 at site APSC8. Looking north-west.

Figure 4-35: Three blocks of ashlar within site APSC10.

Figure 4-36: Ashlars used in the building of the dam within site SMSC5 at the ancient site of Shaat el-Marakeb. Looking south-east.

Parts of the lower courses of two walls on the down slope of site PHSC5 were exposed. These overlook the headland of the promontory and the sea, and used large blocks of limestone ashlars. Moreover, the external walls of building 2 within site PHSC11 consisted of two courses of large ashlar blocks laid horizontally. The wall survives to a height of 0.5 m and appears to have been built of sandstone blocks (Fig. 4-37). The walls of site PHSC45 also appear to have been constructed using ashlar blocks, though only one course of the large rectangular blocks placed on the exposed bedrock has survived.

Figure 4-37: Two courses of wall (1) within site PHSC11 at the ancient site of Phycus. Looking west.

4.3.2.2 Random uncoursed construction

This type of construction has been recorded at a number of different coastal sites in Cyrenaica (Fig. 4-38). Walls built of differently-sized blocks, including re-used materials without any attempt at coursing, were recorded at a number of ancient sites in Cyrenaica such as Berenice (Benghazi), Taucheira (Tocra), and Ptolemais (Tolmeta) (Buzaian 2000; Lloyd 1977; Stępniowski and Maciałowicz 2011). This type of construction lacks aesthetical features and walls were built in a less monumental fashion, mainly uncoursed. Four sites using this technique have been documented within the survey area.

The bulk of the random uncoursed walls that have been identified used rough and unshaped pieces of differently-sized limestone. At the ancient site of Kainopolis the enclosure that surrounded the hill top area was built of rough unshaped limestone blocks laid on top of each other without any attempt at coursing, especially on the western side (Fig. 4-39). However, the eastern side seems to have been built using large rectangular limestone blocks, which suggests that the western part was added or rebuilt in a later period. The random uncoursed method was apparently used on a wider scale, especially at site APSC10 on the cliff overlooking the bay at the ancient site of Aptouchou (el-Hanya). Small and medium unshaped and rough pieces of limestone were laid and placed randomly on top of each other (Fig. 4-40). The height of the surviving walls ranges from 0.25 m to 1 m. There is a possible enclosure wall in CPSC4 at the ancient site of el-Mamluh. It is 1.2 m high and built of unshaped and rough limestone pieces laid without coursing (Fig. 4-41).

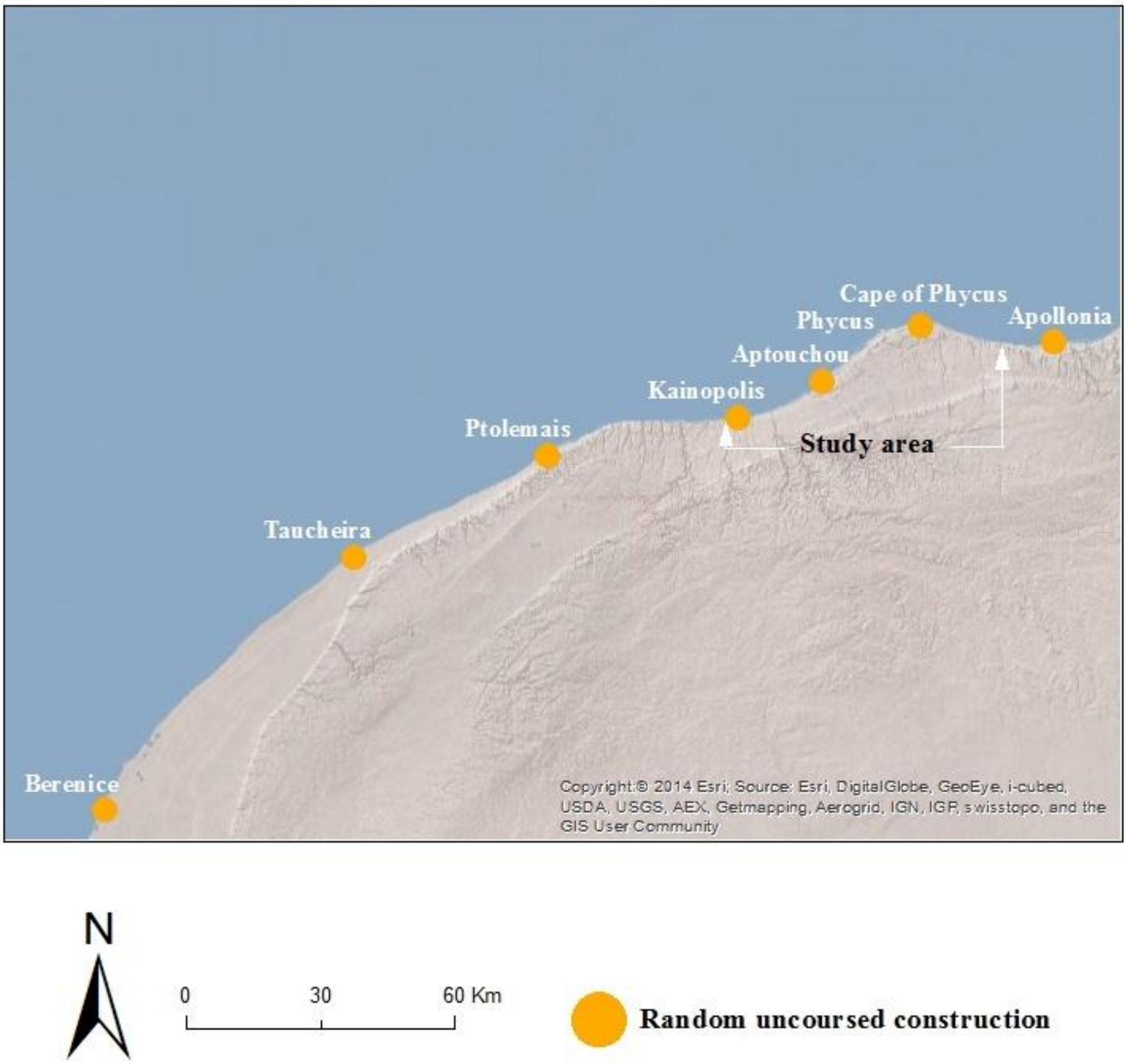


Figure 4-38: Sites along the Cyrenaican coast that have random uncoursed walls.

Figure 4-39: Part of the western side of the enclosure at the top of the hill at Kainopolis.

Figure 4-40: One of the walls of site AHCS10-2 at Aptouchou.

Figure 4-41: Wall of site CPSC4 at the site of the Cape of Phycus.

4.3.2.3 Random coursed construction

This technique is similar to the method above, but with more regular courses. The ancient masons used any type of stone materials that were available. However, the majority of stones used were small and medium pieces of limestone, although large blocks were used occasionally. Random coursed walls have been recorded at a number of places in Cyrenaica (Fig. 4-42), including Berenice, Taucheira, Ptolemais and other sites (Buzaian 2000; Lloyd 1977; Stępniowski and Maciałowicz 2011). According to the SCSC survey, the random coursed technique seems to have been applied mainly in the internal walls of rooms, basins and revetments. At site KASC14 in Kainopolis (el-Agla), a wall survives which reaches a height of 1.2 m. The wall consists of six courses which were built of pieces of squared blocks and unshaped medium limestone pieces (Fig. 4-43). At site APSC10 within ancient Aptouchou (el-Hanya), there is a wall containing 12 rough and unshaped limestone blocks and a number of square blocks placed in courses. The lowest six courses were uneven and built using rough stones of different sizes and shapes, while the three upper courses were built of square and rectangular blocks set in a regular arrangement (Fig. 4-44).

A wall at Phycus (el-Hamama) (site PHSC13) also appears to apply this method. However, the builders here used rectangular sandstone blocks which varied in dimensions. At the ancient site of the Cap of Phycus (el-Mamluh) within site CPSC1, an internal wall of a basin was found which was built using small limestone blocks of different shapes and sizes. Only three courses of this wall still remain (Fig. 4-45).

Another example can be found at the ancient site of Noat 2 (site NOSC1). Small unshaped limestone blocks of different sizes were used to build a terrace wall in section C (Fig. 4-46). The stones used in all these walls were laid in courses using random blocks and stones.

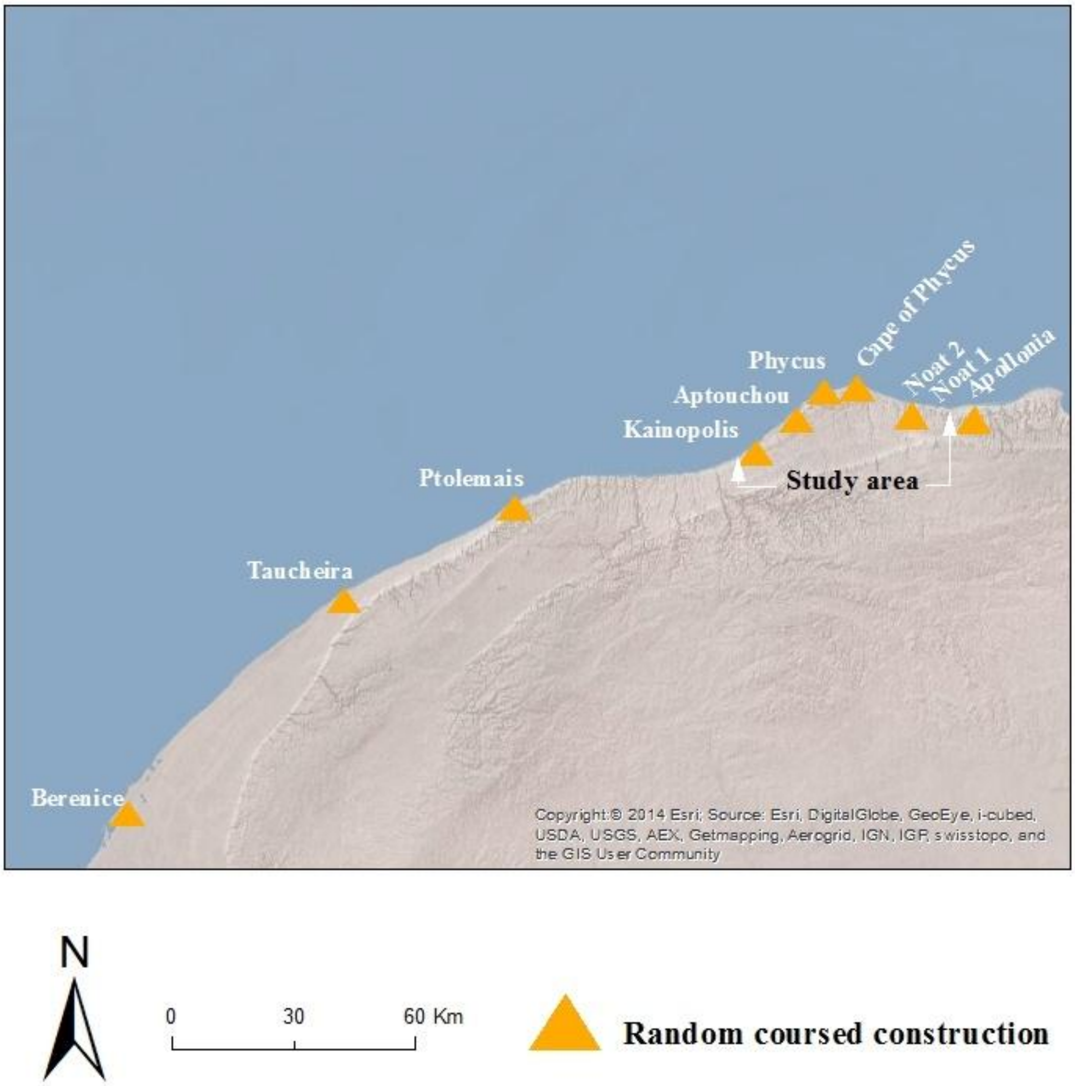


Figure 4-42: Sites along the Cyrenaican coast that have random coursed walls.

Figure 4-43: The northern wall of site KASC14 at Kainopolis. Looking south.

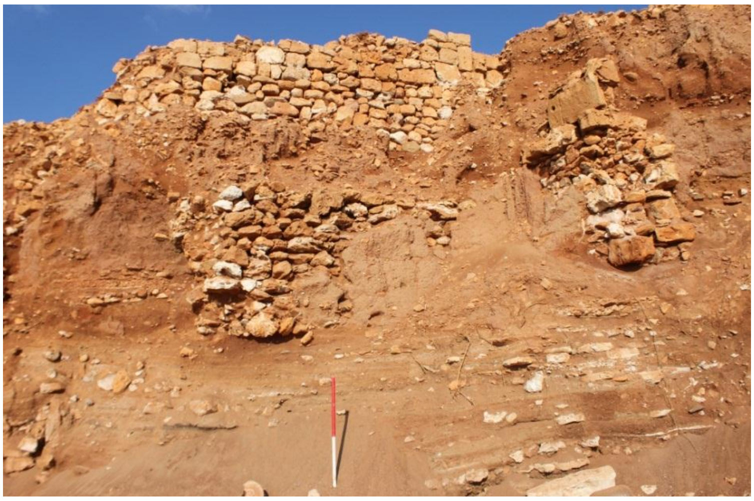


Figure 4-44: One of walls of site APSC10-6 at Aptouchou. Looking south-east.

Figure 4-45: The eastern internal wall of basin (6) in AMCS1 at the ancient site of el-Mamluh. Looking east.

Figure 4-46: The terrace internal wall of rooms 1 and 2 in section B in NOCS1 at the ancient site of Noat 2. Looking south.

4.3.2.4 Regular square-coursed construction

In this type of wall construction, the ancient builders attempted to build walls using well-dressed large and medium blocks. This technique utilised selected, re-used material which was often neatly shaped square and rectangular stones, placed in courses as far as was possible.

This method of wall construction has been documented at many sites in Cyrenaica (Fig. 4-47) (Buzaian 2000; Buzaian and Bentaher 2002; Lloyd 1977; Smith and Crow 1998; Stępniowski and Maciałowicz 2011; Walker 2002). Both limestone and sandstone blocks were used. This technique is the most common method documented along the coast of the survey area. Most of the walls recorded were built using regular courses with neat faces. Many of the buildings at Kainopolis (el-Agla) were constructed using this technique. For instance, three regular courses within site KASC2 were built of well-dressed facing stones of varying dimensions. The surviving wall is up to 1 m high and 26 m in length (Fig. 4-48). The western external wall of the church (site KASC9), of which up to eight courses survive, was constructed using this method (Fig. 4-49). To build this wall two courses of rectangular blocks were placed horizontally on top of each other, followed by an interval course of large heavy rectangular or square blocks, and so on.

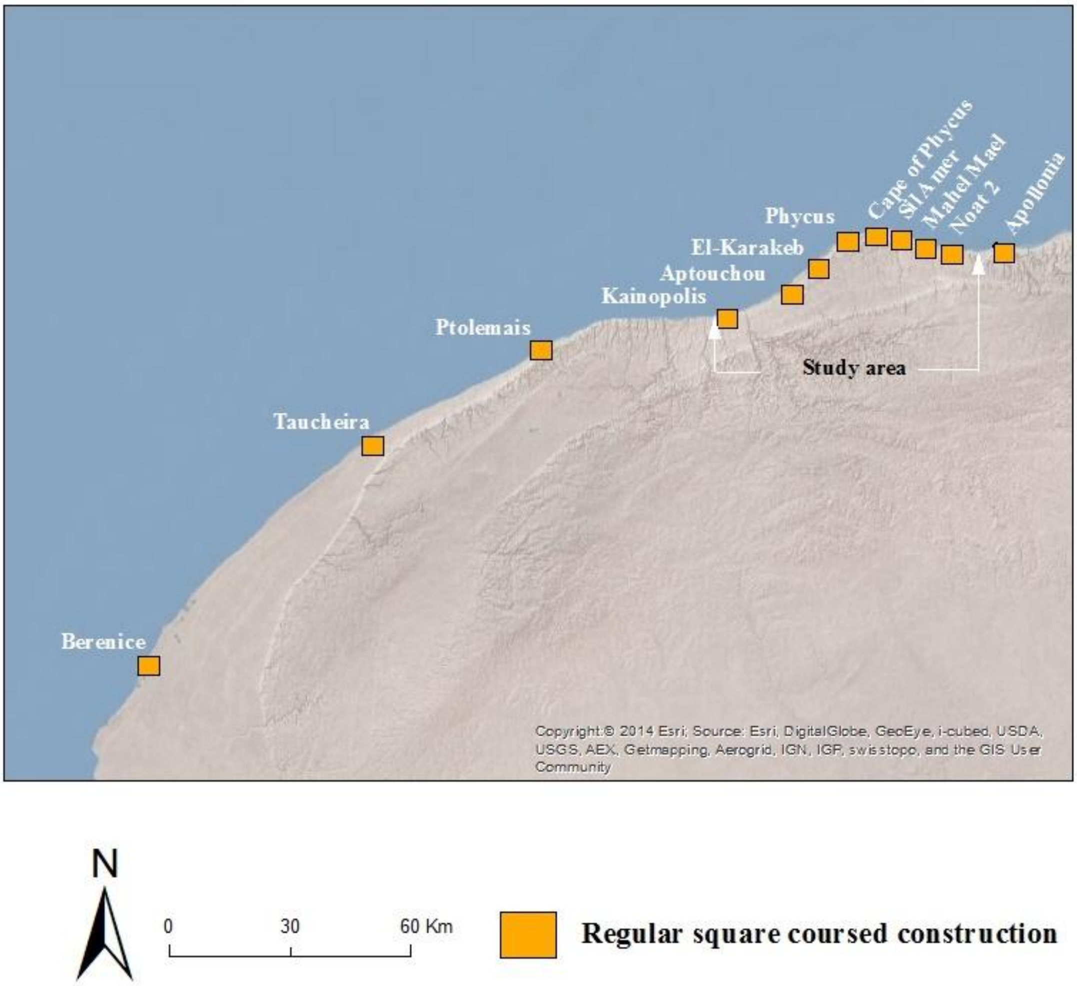


Figure 4-47: Sites along the coast of Cyrenaica with regular coursed walls.

At site APSC4 in Aptouchou (el-Hanya), a 0.3 m high wall was found which had been built using this technique. This wall consisted of two courses of medium-sized square and rectangular sand stones laid horizontally on top of each other (Fig. 4-50). Another wall at site APSC5 consisted of four courses of limestone blocks of different sizes and shapes laid over each other.

Figure 4-48: Wall 1 at site KASC2 at Kainopolis. Looking south.

Another 6 m long wall (1) at site APSC8 used a two-faced construction. The internal wall was in poor condition and had collapsed in the middle. It seems to have consisted of 23 courses of small and medium shaped and worked stones with a preserved height of 5 m. Only six courses of stones survived at the north end of this wall (Fig. 4-51). It is worth mentioning that the internal part of this wall seems to be similar to the south-western wall of room 74, discovered recently at Ptolemais (Polish Mission 2011).

Another example from site APSC10 preserves a door with two square pillars in situ. The width of the door was approximately 0.5 m, while the pillars were approximately 1.70 m high. The section of wall adjacent to the pillar consisted of five regular courses of large, heavy square and rectangular blocks attached to the pillar (Fig. 4-52). The wall that lay to the south above the cistern consisted of regular courses of well-worked medium stones (Fig. 4-53). Site APSC10 has another example of a regular coursed wall, with 13 surviving courses. This consists of about 10 rough courses of unworked pieces of limestone. On top of this foundation were laid three courses of well-worked large sandstone blocks. However, the other 13 rough courses form the socle wall. Rough courses sometimes also appear in the exposed section on top of courses of smooth blocks. It seems that this technique was used at Shaat el-Marakeb, as it can be seen in the external wall of the rectangular building (site SMSC1). This wall survives with five regular courses of large limestone blocks of varied dimensions laid horizontally on top of each other.

Figure 4-49: The western external wall of the church at Kainopolis. Looking east.

Figure 4-50: Wall at site APSC5. Looking east.

Figure 4-51: The internal wall 1 within site APSC8. Looking south-east.

Northern wall 3 at site PHSC2 consisted of regular courses of large rectangular blocks laid horizontally up to 1 m high (Fig. 4-54). The external southern wall of site PHSC3 was also built using regular courses of large heavy sandstone blocks of varied dimensions (Fig. 4-55). The surviving height of this wall is approximately 1.5 m. The internal wall of this building seems to have been built using the same construction methods, and consists of nine regular courses of smooth rectangular blocks. The blocks making up the internal walls are smaller than those in the external walls. Despite severe damage to most sections of both the internal and external walls at site PHSC47, it appears from some of the surviving parts that they were built using regular courses of large, rectangular faced blocks.

Figure 4-52: The wall and door at site APSC10-7 The view to south-east.

Figure 4-53: The wall that lies to the south above the cistern at site APSC10-10. Looking south.

Figure 4-54: The northern wall at site PHSC2 at Phycus. Looking south.

Figure 4-55: Part of the internal wall of PHSC3 at Phycus. Looking south-east.

A different style of regular coursed construction can be found at site PHSC58, where a nearly 1 m long wall was found which contained two regular courses of rough and unworked limestone blocks. The angles in which the stones were laid in this wall seem to be different to the above examples. Instead of stones or blocks being placed in horizontal courses, they were laid at an angle of *c*.40˚ (Fig. 4-56). Another two regular coursed wall (site ESSC1) constructions lie to the north-west of Phycus in an area called el-Shmaria.

Figure 4-56: Part of the wall at site PHSC53 at ancient Phycus. Looking south.

Figure 4-57: Part of the external wall of site SASC1 at Sil Amer. Looking south.

The courses were built of large rectangular well-dressed blocks. The lowest course consisted of two large rectangular blocks placed adjacently and longitudinally, while the blocks of the upper course were laid cross-ways. At Sil Amer, a good example of the regular coursed construction method can be seen in the walls of the fortification (SASC1). Some parts of these walls survive in good condition, especially on the northern and western sides. The northern wall preserves eight courses of large worked rectangular blocks laid horizontally, and rises to a height of 2 m (Fig. 4-57). At Mahel Mael (MMSC1), there are traces of a wall consisting of three regular courses of unworked limestone blocks of varied size. At Noat 2 there is a trace of a coursed wall in section B of site NOSC1 which seems to have been built with regular courses.

4.3.2.5 Chequer-work construction

This construction technique involves packing small stones or rubble between large and heavy blocks (Fig. 4-58). The large blocks are laid horizontally and placed on top of each other in a lattice (Adam 1994: 119). In the survey area there is one wall which seems to have been built using a similar technique. A 0.9 m high wall was found at site AHSC10 in Aptouchou (el-Hanya) which has just one course and appears to have been built using chequer-work construction methods (Fig. 4-59).

Figure 4-58: Chequer-work construction at the ancient site of Bolsena, Italy (Adam 1994: 119).

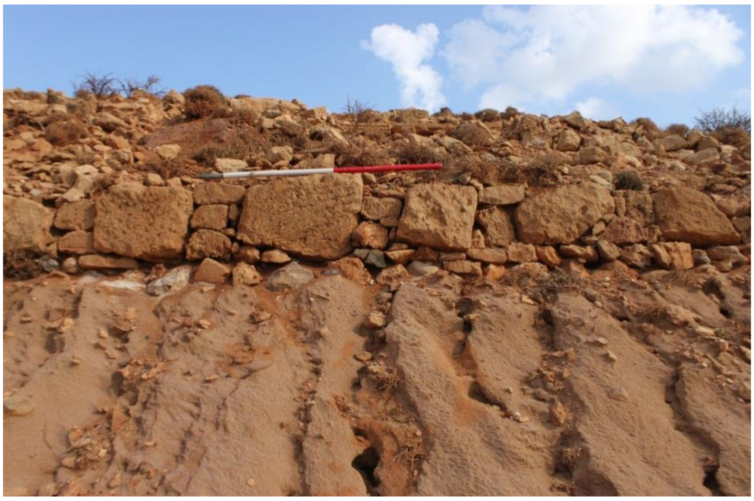


Figure 4-59: This wall at site AHCS10-2 in el-Hanya seems to use chequer-work construction methods. Looking south.

4.3.3 Bonding methods

Two major types of wall bonding were found among the sites within the surveyed area. The first consists of essentially unbonded unit blocks laid horizontally in courses on top of each other without using mortar. This type can be divided into two further sub-categories: type 1a and type 1b. Type 1a used large and heavy blocks, while type 1b used small and medium rough limestone pieces. The clearest examples of type 1a were recorded in sites such as Kainopolis (el-Agla), Aptouchou (el-Hanya), and Phycus (el-Hamama). Evidence of this technique has been recorded at a number of other sites in Cyrenaica, including Ptolemais, Taucheira, Cyrene, Belgrea and Appolonia. Type 1b, on the other hand, has only been seen at Kainopolis.

A second construction method using a bonding method was widely used in Cyrenaica. This technique was generally applied in two parallel walls (external and internal) built of small and medium stones, and the core of the wall was then filled with a mixture of stone chippings and mud or mortar. This type was further divided into three categories during the SCSC fieldwork recording based on the nature of the wall's core (Table 4-3 and Fig. 4-60). In type 2a walls, the space between the external and internal walls is filled with small pieces of rubble mixed with dark brown mortar, which seems to have contained granules of limestone or shells. Only two examples of this mortar have been documented in wall construction within the survey area. One is at sub-site KASC3 within ancient Kainopolis, and another is at sub-site ESSC1 within el-Shmariah.

Type 2b consists of a wall fill and bonding of small rubble mixed with mud. This was the most common type in the survey area, and has also been reported at many different sites throughout Cyrenaica (Buzaian 2000; 2009; Lloyd 1977; Wilson et al. 2001). The external faces of many walls were built using well-dressed square stones, while the internal faces were often less well finished. Many examples of these methods can be found in many different parts of Cyrenaica, including Berenice (Lloyd 1977), Euesperides (Bennett et al. 2000; Wilson et al. 2002; 2003), Tocra (Buzaian 2000) and Lamulda (Buzaian 2009). Type 2c involves the use of small and medium limestone pieces mixed with a grey poor-quality mortar. This type could be seen in wall 1 at site PHSC3 at Phycus, which was built of rough small and medium limestone pieces mixed with grey harsh to poor quality mortar. Another example can be seen in wall 8-1 at site APSC8 at Aptouchou (el-Hanya) (Figs. 4-61 and 4-62). The external wall face was built of large and heavy square and rectangular blocks, while the internal face was constructed using medium well-shaped stones, with the infill also consisting of rough small stones mixed with grey mortar.

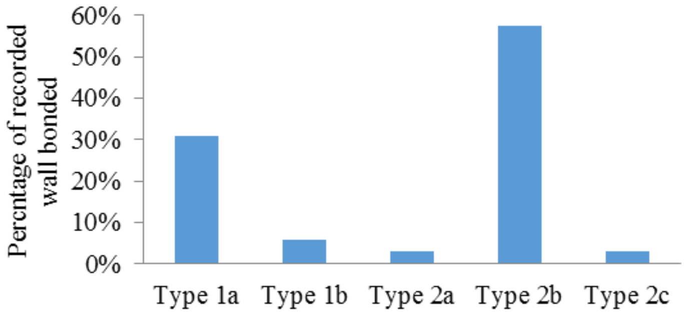


Figure 4-60: Types of recorded bonding within the survey area.

Figure 4-61: Bonding method of wall 1 within site PHSC3 at Phycus. Looking north-east.

Figure 4-62: Bonding method of wall 8-1. Looking south within site APSC8 at Aptouchou. Looking north-east.

Site Name	Site sub-code	Bonded type				
		Type 1a	Type 1b	Type 2a	Type 2b	Type 2c
Noat 1	NOTSC1	√				
Noat 2	NOSC1	√			√	
Mahel Mael	MMSC1				√	
Sil Amer	SASC1				√	
Cape of Phycus	CPSC1				√	
	CPSC2				√	
	CPSC3	√				
Phycus	PHSC2	√				
	PHSC3					√
	PHSC4				√	
	PHSC5	√				
	PHSC6				√	
	PHSC7				√	
	PHSC8				√	
	PHSC10				√	
	PHSC11	√			√	
	PHSC12	√			√	
	PHSC13	√			√	
	PHSC14				√	
	PHSC15				√	
	PHSC17	√			√	
	PHSC44A	√				
	PHSC45	√			√	
	PHSC46	√				
	PHSC50	√				
El-Shmariah	ESSC1			√		

Site Name	Site sub-code	Bonded type				
		Type 1a	Type 1b	type2a	Type 2b	Type 2c
	SMSC1	√				
	SMSC2				√	
El-marakeb	SMSC4				√	
	SMSC5	√				
	SMSC8				?	
	APSC3				√	
	APSC4		√			
	APSC5				√	
	APSC6	√			√	
	APSC7	√			√	
Aptouchou	APSC8-1					√
	APSC10-1		√		√	
	APSC10-2	√				
	APSC10-3		√		√	
	APSC10-4	√				
	APSC10-5	√			√	
	APSC10-6		√			
	APSC10-7	√				
	APSC10-8	√				
Aptouchou	APSC10-9				√	
	APSC10-10	√			√	
	APSC11				√	
	KASC3			√		
	KASC4				√	
	KASC5				√	
	KASC7				√	
	KASC8				√	
Kainopolis	KASC9	√				
	KASC10				√	
	KASC11				√	
	KASC12				?	
	KASC13				?	
	KASC14	√			√	

Table 4-3: The bonding types recorded within the survey area.

4.3.4 Conclusion

The construction techniques and building materials recorded along the sites within the survey area are varied and different. The ancient masons seem to have used any available materials to construct their buildings. However, from the above descriptions it seems that at most recorded sites regular square and rectangular coursed construction dominated. This accounts for more than 50% of the total documented buildings. Ashlar constructions make up another 20%, while random uncoursed and coursed methods are present in about 10% and 13% of buildings respectively (Fig. 4-63).

It is remarkable that walls built of ashlar and regular square/rectangular coursed construction techniques seem to be better preserved than walls constructed using other methods. This may be a consequence of the size of the blocks and the accuracy of construction of these types of walls. It could be argued that these two techniques might be used in more prestigious or public buildings, as can be seen in the internal apse of site KASC9, and at site PHSC11 which may have been a warehouse. The other methods seem to have been used mainly at ordinary sites and less accessible settlements.

The main types of stone used were limestone and sandstone blocks, although limestone blocks dominated. The stones used range in size from small pieces of rock to large blocks (Table 4-4).

		Stone type		Stone size				Shape of stone	
Site	Sub-site	Limestone	Sandstone	Small	Medium	Large	Large/Heavy	Fair	Rough
Noat 1	NOTSC1	√				√	√	√	
Noat 2	NOCS1	√				√	√	√	
Noat 2	NOSC2	√		√	√				√
Mahel Mael	MMSC1	√		√	√			√	√
Sil Amer	SASC1	√				√	√	√	
Cape of Phycus	CACS1	√		√	√			√	√
Phycus	PHSC2	√	√			√	√	√	
	PHSC3-1	√	√			√	√	√	
	PHSC3-2	√	√			√		√	
	PHSC6	√	√			√	√	√	
	PHSC10		√	√	√				√
	PHSC13	√				√	√	√	
	PHSC16	√				√	√	√	
	PHSC44a	√				√	√	√	
	PHSC44c	√				√	√	√	
	PHSC53	√			√				√
El-Shmariah	ESSC1	√				√	√	√	
Shaat-El-Marakeb	SMSC1	√			√	√		√	
	SMSC5	√				√	√	√	

Site	Sub-site	Stone type		Stone size				Shape of stone	
		Limestone	Sandstone	Small	Medium	Large	Large/Heavy	Fair	Rough
	APSC4	√			√			√	
	APSC5	√			√	√		√	
	APSC7-1		√			√	√	√	
	APSC7-2		√			√	√	√	
	APSC8-1-1		√				√	√	
	APSC8-1-2	√		√	√	√		√	
	APSC10-1	√		√	√				√
Aptouchou	APSC10-2	√		√	√				√
	APSC10-3	√		√	√	√		√	√
	APSC10-4	√			√	√		√	
	APSC10-5	√		√	√	√	√	√	√
	APSC10-6	√			√	√		√	
	APSC10-7	√		√	√	√		√	
	APSC10-10	√				√	√	√	
	APSC10-10	√		√	√			√	
	KASC1	√		√	√				√
	KASC2	√	√		√	√	√	√	
Kainopolis	KASC3	√			√	√		√	
	KASC9	√				√	√	√	
	KASC14	√		√	√	√		√	

Table 4-4: The types and sizes of stones and quality of blocks of some sites within the survey area.

4.4 Similarities and Differences between the Rural and Coastal Settlements

4.4.1 Introduction

It would be useful to compare the coastal settlements surveyed with other sites in the rural landscape in order to obtain a greater understanding of their nature. Such a comparison would help to compensate for the fact that the study of the construction techniques and materials was at a preliminary survey level, even though the SCSC survey brought to light a great deal of new information regarding production and manufacturing activities in the survey area (see Chapter 5). Large-scale excavations are needed to reveal these details as well as to shed light on their chronological sequence and functions, and to determine how construction methods changed over time.

A comparison study therefore will contribute to our understanding of the similarities and differences between coastal and rural settlements. What affinities existed between rural and coastal sites? Were there significant differences in terms of size, functions, and building techniques and materials used? How did the settlements in the hinterland interact with those on the coast? Cyrenaica in general suffers from a lack of systematic study, survey and excavation. There are few publications and studies addressing the wider concepts of archaeology in the pre-desert, mountain and coastal areas.

Five rural settlements were used for an initial comparison with settlements within the survey area. This study relies on some basic short reports and notices that have addressed these hinterland sites. Four of these sites - Tribbi, Eblarad, Elbararem and Bratis - lie to the south-west of Cyrene in the Al-Kuf valley region. The fifth case study lies to the south-east of Cyrene centred at the small town of Lamluda.

4.4.2 Archaeological features of the rural settlements

The archaeological remains recorded at these settlements vary from site to site, although there is a degree of similarity. Their predominant feature is their agricultural character, along with some defensive features in many cases. Presses with their associated buildings, basins, houses, fortifications, towers, cisterns, wells and churches are the main features of the majority of these settlements (Abdussaid et al. 1984). In fact, there is no great difference between rural and coastal settlements in these patterns, although the sizes of sites in both regions differ. Table 4-5 shows the archaeological remains recorded in both the selected rural sites and those along the coastal strip of the survey area. In terms of the construction techniques used in rural settlements, there is no discernible difference in the use of stones and blocks compared to the coastal sites. The same is true of the type of bonding (see section 4.2). However, there is some divergence in the use of limestone blocks (Tables 4-7 and 4-67).

Site	Industrial Feature	Basin	Fortification	Church	Building	Cistern	Aqueduct	Well	Bath	Tomb
	Recorded features									
Lamluda	Press	20	1	2	√	√	?	?	1	√
Tribbi	Press	√?	?	1	√	√	?	√		√
Eblarad	Press	1	?		1	1	?	√		√
Elbararm	Press	√?	√?		√	√	√	√		√
Bratis	Press	√?	?	1	√	2	?	√		√

Table 4-5: The archaeological features recorded in the selected rural settlements.

Site	Industrial Feature	Basin	Fortification	Church	Building	Cistern	Aqueduct	Well	Bath	Tomb
	Recorded features									
Noat 1	Wine Press	40			√	?	√	√	?	
Noat 2	Tanning industry?	10			√	?	?		?	
Mahel Mael	Kiln				√	?	?		?	
Cape of Phycus	Kiln	11	1		√	?	?	1	?	
Phycus	Wine press/ Fish industry?/Lime Kiln/ Tanning and Fullo industry?	56	1	2	√	4	?	3	?	√
El-Marakeb					√	1	?	?	?	
Aptouchou	Fish industry?/kiln	20		?	√	1	?	1	?	√
Kainopolis	Fish industry?	17	1	2	√	?	?	1	?	√

Table 4-6: The archaeological features of some of the recorded sites within the survey area.

Site	Stone type		Stone size				Shape of stone	
	Limestone	Sandstone	Small	Medium	Large	Large and Heavy	Fair	Rough
Lamluda	√		√	√	√	√	√	√
Tribbi	√		√	√	√	√	√	√
Eblarad	√			√	√	?	?	?
Elbararm	√		√	√	√	?	√	√
Bratis	√		√	√	√	?	?	√

Table 4-7: The types and shapes of stones used for construction within the selected rural sites.

4.4.3 Size of settlements

As it has been mentioned in the chapter 3, the reader should be aware that the statistics presented in this chapter are only rough estimates and may be inaccurate. This is because the data sets produced from the field survey were usually small, and that therefore any statistic presentation (such as the percentage represented by each form) can only be provisional.

It is worth noting that the relative area of the rural and coastal settlements can give a rough indication of their functions. It seems that there is a direct correlation between a settlement's size and its productive capacity and activity (see Chapters Five, Six and Seven). Whenever a considerable number of productive installations have been recorded at a particular site, it is possible to speculate on the size of the settlement. Rationally, increasing the scale of production capacity must have led to a growing interest in further exploiting the land for cultivation, followed by the construction of more associated buildings and houses for labourers and officers, as well as places of worship and fortifications if necessary.

Supporting this point of view**,** the rural settlements in this case study that have an area of less than one hectare had a small amount of productive activity, while the sites with an area of two hectares or more were far more productive. For example Sirtet Eblarad, which lies 30 km to the west of Cyrene near the Wadi El-Kuf region, had only one press associated with other buildings and has a total area of less than one hectare (Abdussaid et al 1981). Another example called Sirit Tribbi was also located near to the El-Kuf valley, 30 km west of Cyrene. Three presses have been documented here, as well as basins, other buildings and a church (Abdussaid et al 1981). The size of this site is more than two hectares. The settlement of ancient Lamluda, located 30 km east of Cyrene, contained 60 presses and more than 20 basins (Wilson 2004; Buzaian 2009). Many other features, such as houses, fortifications, associated buildings and two churches have been recorded alongside the presses (Roques 1987; Ward-Perkins and Gooldchild 2003). This settlement appears to be the biggest rural settlement recorded in this region so far, as it measures 14 hectares. Compared to the coastal settlements, a number of differences emerge in terms of the size of the rural settlements. For example, the coastal area of Kainopolis (el-Agla) measured about five hectares, while the upper area, situated in the hills, occupies an area of 12 hectares. Aptouchou (el-Hanya) covered more than 4 hectares. However, the largest site within the surveyed zone seems to have been Phycus (el-Hamama), which had an area of 50 hectares. Although these three coastal settlements occupied a larger area than those in the hinterland, other sites along the coast of the survey area occupied less than 1 hectare. However, their function seems to have been confined to maintaining watchtowers, such as Al-Hesi and Sil Ameer (see Chapter 6), and other small buildings which might have been villas, such as at Shaat el-Marakeb (Fig. 4-64).

It seems that Ptolemais was the biggest site in the region. It occupied an area of more than 100 ha. This huge territory came about because the city was for centuries the capital of Cyrenaica and the headquarters of the patriarchate (Kraeling 1962). These two factors could have supported the expansion and growth of the city and enabled it to become one of the main emporia in Roman Cyrenaica (Laronde 1993). Although Apollonia was the most important port from the Hellenistic period and later became the seat of the governor, it had an area of just 12.5 ha. This made it many times smaller than Ptolemais, Taucheira and Phycus. Apollonia was also smaller than Lamluda.

The variety in the site’s sizes could reflect changing patterns in the ancient city, especially in the Roman and late Roman periods, in favour of small harbours. One example of this is Phycus, which seems to have expanded from a small site in the early period to a major harbour (see Chapters Two, Five, Six, and Seven). Figure 4-64 compares the size of a number of ports along the Cyrenaican coast and the inland site of

Lamluda. The area of Apollonia, Ptolemais and Taucheira shown here is that which lay inside the circuit wall. However, the area of Phycus and Aptouchou has been measured according to the density of archaeological remains recorded during the field survey. It is worth mentioning that there are other archaeological remains distributed beyond these presented areas, but they are more dispersed and some distance from the main areas.

4.5 General Conclusion

The main purpose of this chapter was to examine the construction techniques and building materials used in the surveyed area. It also aimed and to investigate whether coastal settlements were similar or different to rural sites in terms of their size, organisation, and building materials and techniques.

The analysis suggests that there were five types of building techniques used along the Cyrenaican coast: ashlar, random uncoursed, random coursed, regular coursed and Chequer-work constructions. However, it seems that these construction methods were widely used both along the Cyrenaican coast and in different parts of Cyrenaica. One exception is the use of limestone and sandstone blocks. Both materials seem to have been used for coastal buildings, while the inland buildings used only limestone blocks. This might be explained by the geological availability of these materials.

This chapter's analysis of coastal and rural sites extends our knowledge of the dynamic role of both types of settlement (see chapter 6). However, it can be argued that a major sector of development of these rural sites, harbours and harbours networks were reinforced by elites and businessmen who were looking forward to gain more profits through the investments in this economic system.

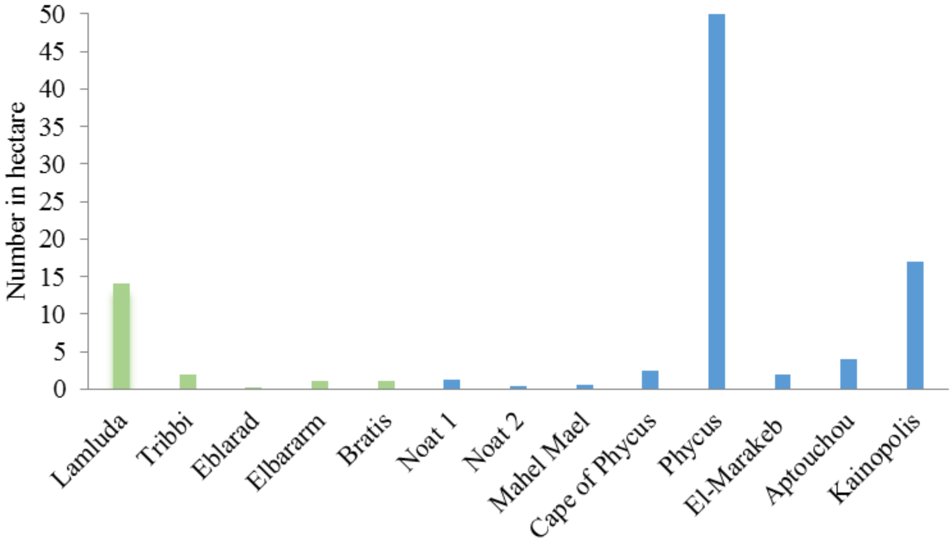


Figure 4-63: The area of five rural settlements and a number of of the coastal sites inside the survey area.

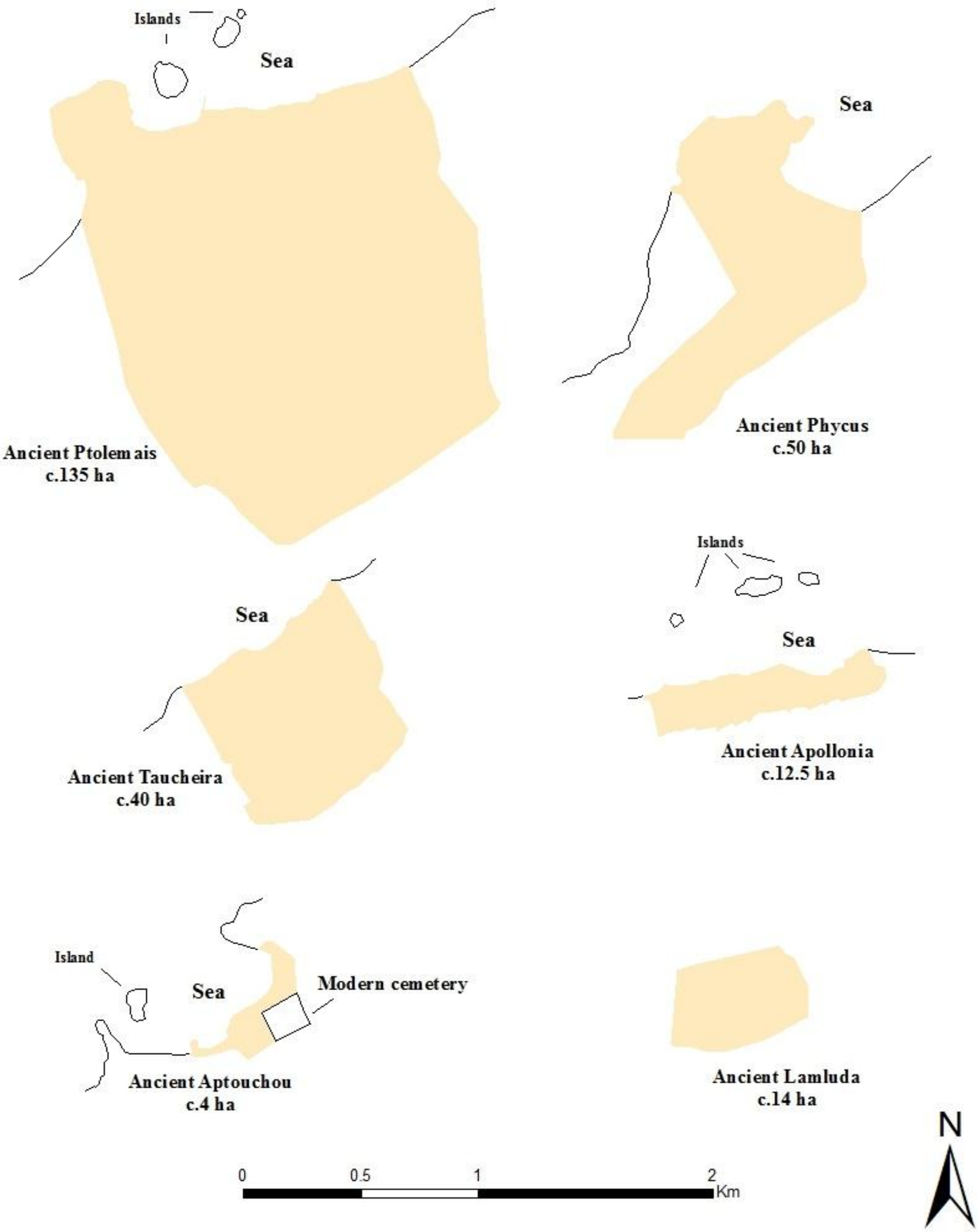


Figure 4-64: Size comparison of Ptolemais, Phycus, Taucheira, Apollonia, Aptouchou, and Lamluda.

Chapter 5: Production Activities along the Cyrenaican Coast

5.1 General Introduction

This chapter extends our knowledge about one of the least-known aspects of the classical history of Cyrenaica – its productive capacity. The presence of large-scale industrial activity in this region is debated by some archaeologists (Wilson 2004) due to the paucity of recorded archaeological evidence on the ground. For this reason, this chapter aims to make a valuable contribution to this subject and influence this discourse. The new data from this project's survey, alongside other sporadic information from different sites along the coast of Cyrenaica, are used to argue that production along the coast of Cyrenaica appears to have been larger than previously thought.

This chapter has five main sections following this introduction. The next (5.2) examines ceramic production along the Cyrenaican coast, and is supported by the data uncovered through the field survey. Section 5.3 analyses one of the more obscure industrial activities in ancient Cyrenaica, which is related to fish processing. Section 5.4 presents briefly the evidence of purple dye possessing found at Euesperides and Cherronesus, two of Cyrenaica's coastal sites. Also, it describes the data recorded within the study area about the fulling and tanning processes. Wine production is also discussed in this section. Finally, section 5.5 concludes the chapter with a summary of the new evidence and its significance for the archaeological record. However, it is important to note that the main focus of this chapter will be on pottery and fish processing, and other processes will be discussed only briefly.

5.2 Ceramic Production

5.2.1 Introduction

One of the first indications that pottery kiln sites existed in Cyrenaica (Fig. 5-1 and Table 5-1) emerged during the mid-twentieth century. In 1960, Wright found a pottery kiln by chance while investigating a set of tombs located to the east of a quarry outside the west gate of the ancient site of Taucheira (Tocra). He dated the site to the first century AD based on the analysis of pottery sherds recovered from the waste dump (Wright 1963). Riley (1976) later carried out excavation work at the kiln over a period of 14 days. Over 12,000 pottery sherds dating to the late second and third centuries AD were collected (Leitch 2010; Riley 1976; 1979b).

Between 1985 and 1992, further excavations were carried out inside the ancient wall of Tocra by the Department of Archaeology at the University of Benghazi. These excavations revealed two more kilns (Figs. 5-2 and 5-3), one of which was dated to the Roman period. The other was attributed to the Hellenistic period, based on an analysis of pottery sherds nearby and on its rectangular shape which differs from the common circular Roman kilns found in North Africa (Buzaian 2000).

A circular kiln was identified a few kilometres to the east of Taucheira (Tocra) at Hadrianopolis. A large quantity of pottery wasters were found near the kiln, which suggests that pottery production was an important activity in the area (Jones and Little 1971a). A further six kilns varying in size, shape and date were recorded at the ancient site of Berenice (60 km to the west of Tocra) during the excavation work carried out by a British-Libyan team (Lloyd 1977; Riley 1979a). Two kilns were dated to the Hellenistic period (Table 5-1 and Fig. 5-4), although our knowledge is limited on the exact type of ceramics that they were used to manufacture. However, the quantity of tile fragments found in the kilns strongly suggests that these were their main product.

However, the third kiln was attributed to the early and mid-Roman period. The high density of unfired pottery sherds in the area confirmed that this kiln was used in the production of pottery. The fourth kiln was dated back to the mid-third century AD, and was confirmed to be a lamp kiln as fragments of lamps were found around the site.

The fifth kiln was identified as a pottery kiln, although no further details could be provided due to severe damage to its structure. A sixth kiln also seems to have been dedicated to lamp production, and was also dated to the third century AD (Lloyd 1977).

In Ptolemais, 35 km east of Taucheira (Tocra), three rectangular pottery kilns have been identified (Fig. 5-5) (Nowakowski et al. 2011). These kilns date from the mid Roman period to the late Roman period. A pottery dump was discovered in an abandoned Roman bath at the ancient site of Latrun, located a further 132 km to the east of Ptolemais and about 25 km to the east of Apollonia. The hot rooms of the bath seem to have been abandoned at the end of the third century AD and used as a pottery dump for a kiln identified to the north of the site (Mazou and Capelli 2011). More than three-quarters of the amphorae at the dump were identified as mid-Roman Amphora 1. This new discovery raises questions about Cyrenaica's involvement in producing this type of amphorae and the scale of trade in the wine they contained.

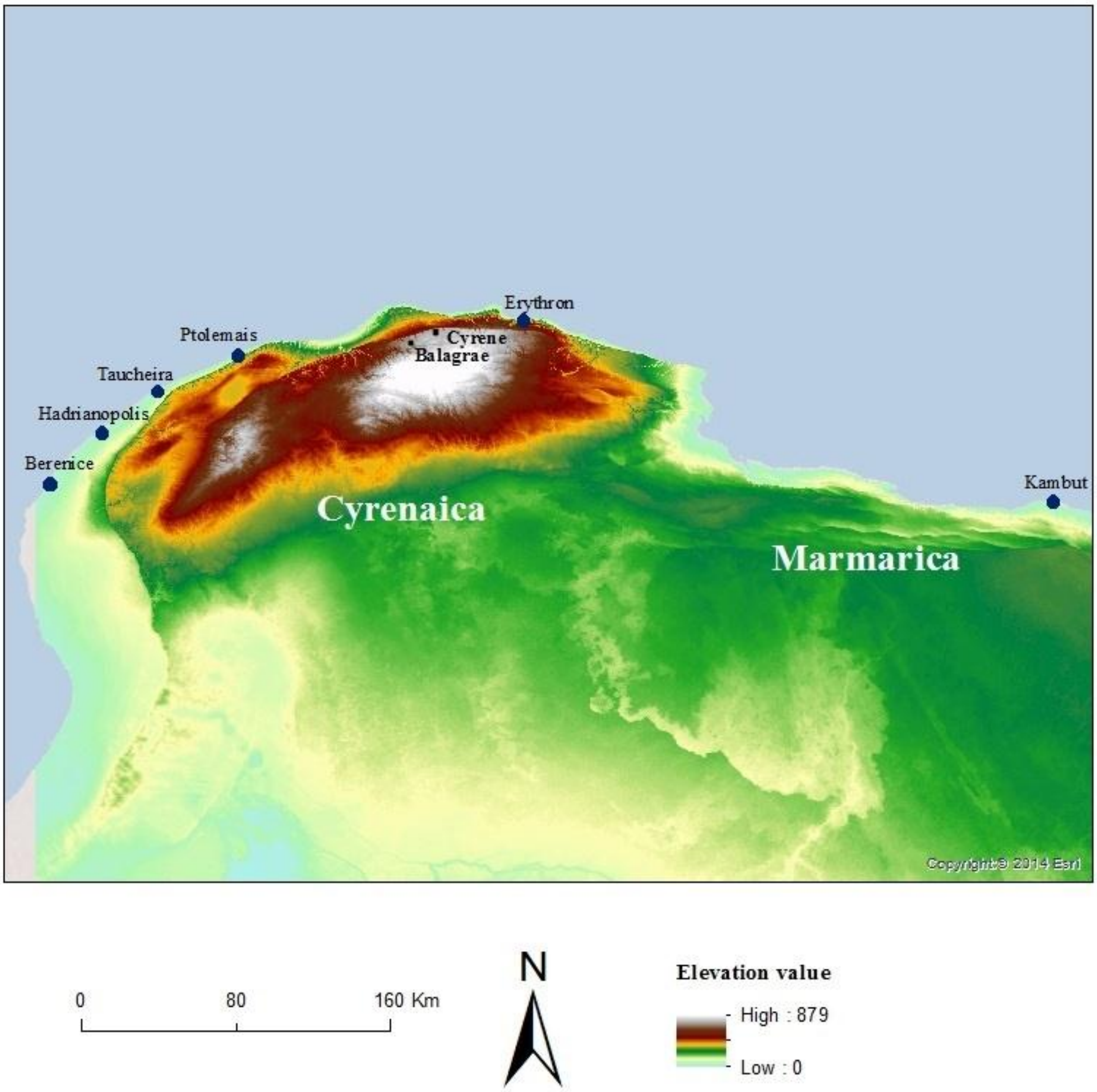


Figure 5-1: The location of pottery kilns previously recorded in Cyrenaica.

Ancient Name	Modern Name	No. of Kilns	Production type							Date	Comments	Reference
			Amphora	Lamp	C-ware	F-ware	Dolia	Tile	Brick			
Euesperides	Benghazi	1			√	√				4^{th} BC		(Buzaian and Lloyd 1996)
Bernice	Benghazi	6					√	√		H		(Lloyd et al 1977; Riley 1979a)
							√			H		
				?	?	?	?			ER-MR	No pottery type specified	
				√						MR	Lamp production suggested	
				√ ?						MR		
				√?						MR		
Hadrianopolis	Driana	1			√		?			MR?	Further investigation needed	(Lloyd and Little 1971)
Taucheira	Tocra	3	√	√	√	√				MR	Kiln not identified, whereas dump found	(Riley 1979b; Buzaian 2000)
			√		√					H		
										MR	No pottery sherds identified	
Ptolemais	Tolmeta	k1	?	?	?	?	?			MR-LR		Polish Archaeological Mission reports (2007-2009)
		k3	?	?	?	?	?			MR	No pottery type specified	
		k4	?	√?						MR-LR	Lamp production suggested	
Erythron	Latrun	1	√	?	√					MR	Kiln structure not mentioned	(Mazou and Capelli 2011)
Marmarica region		8	√ ?	?	?	?		?	?	R	No confirmed information	(Hulin 2008, 2009)

Table 5-1: Kilns recorded previously in Cyrenaica.

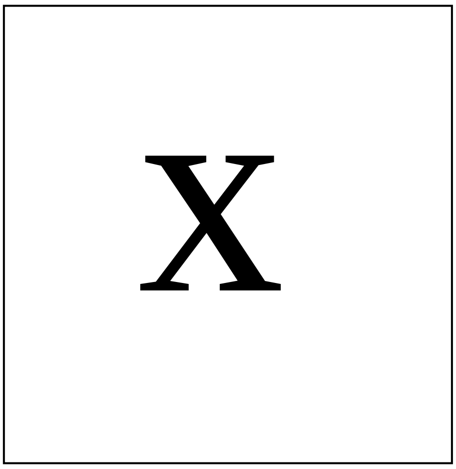


Figure 5-2: Hellenistic ceramic kiln found at Taucheira (Buzaian 2000: 62).

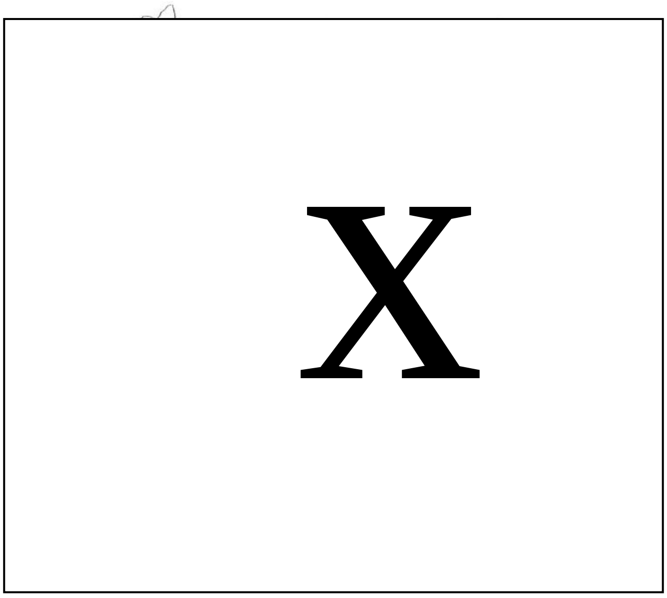


Figure 5-3: Roman ceramic kiln found at Taucheira (Buzaian 2000: 69).

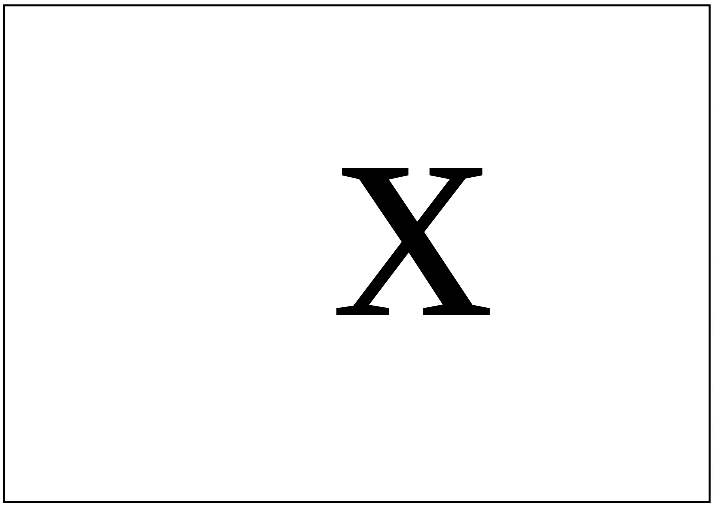


Figure 5-4: One of the ceramic kilns identified in Berenice (Lloyd 1977: 215).

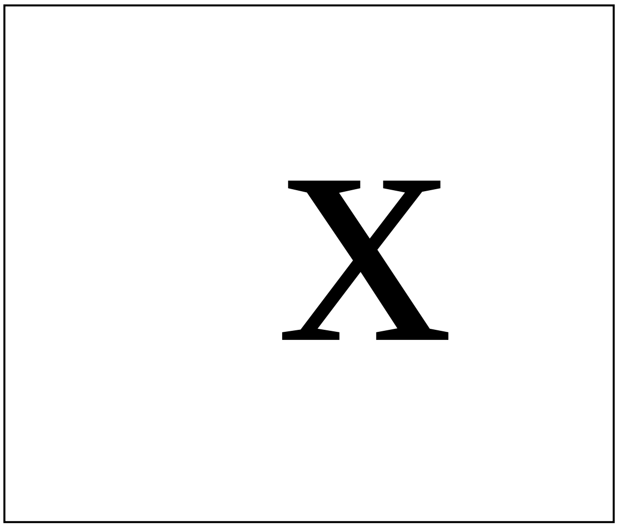


Figure 5-5: A rectangular ceramic kiln was found in Ptolemais (Stępniowski and Maciałowicz 2011).

A survey conducted between the regions of Kambut and Marsa Lukk in the eastern part of Cyrenaica (Marmarica) yielded eight ceramic kilns, five of which had been used to produce amphorae. All of these kilns appear to date back to the Roman Period. It is significant that seven of the kilns were located near the sea, while the other was found inland, approximately seven kilometres from the sea in an area called Sidi Moftah (Hulin 2008; Hulin et al. 2009).

This research review has not in fact increased our knowledge of ceramic production in Cyrenaica. However, it has highlighted the lack of research into amphorae production as indicated in Figures 5-6 and 5-7. The absence of such information creates difficulties in understanding the productive activities which took place across the whole region of Roman Cyrenaica, as the amphorae reflect the region's economic growth and the scale of transportation, importation and exportation of products such as oil, wine and fish sauces at both the local and regional levels (Peña 2007).

Only two sites in Cyrenaica were confirmed with confidence as possessing amphora kilns. One lies at the ancient site of Latrun, and the other is located at the ancient site of Tocra. Other possible amphora kiln sites were recorded in the eastern part of Cyrenaica (east of Marmarica). However, the data from the Marmarica survey has not been published.

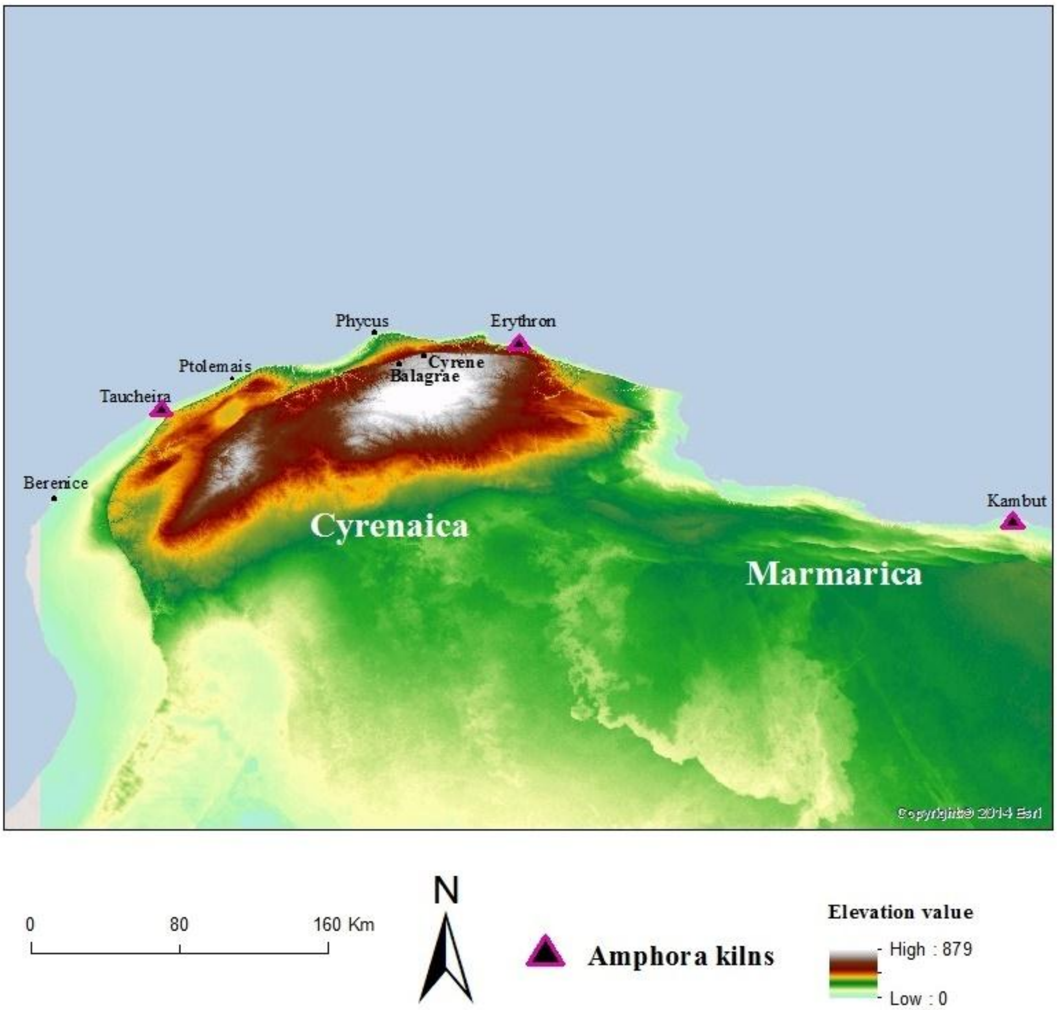


Figure 5-6: The location of previously-identified amphora kilns in Cyrenaica.

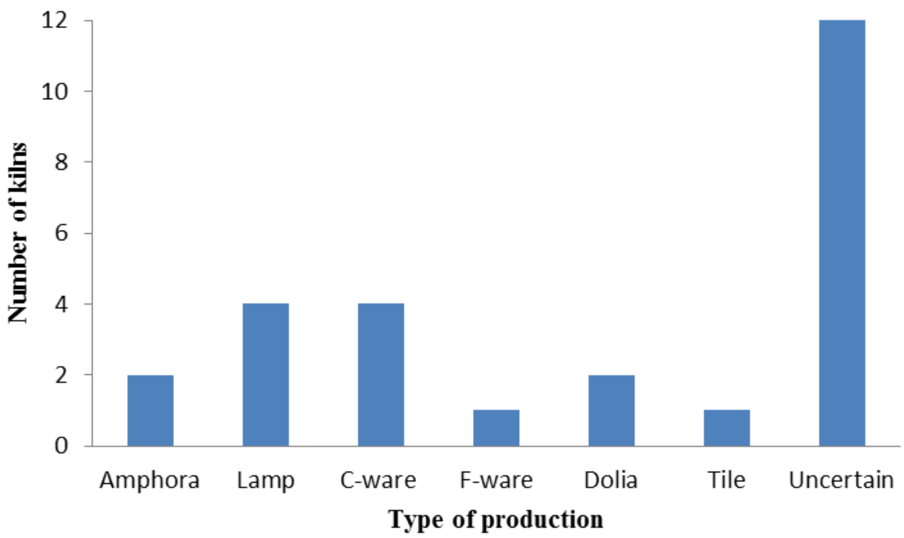


Figure 5-7: Types of kilns previously recorded in Cyrenaica.

5.2.2 New evidence of amphora manufacture in Cyrenaica

This study aims to assess the production and manufacturing activities which took place along the Cyrenaican coast. The SCSC survey attempted to inspect and record all the available data on the ground. Remarkably, as Figure 5-8 indicates, ten new amphora kilns have been recorded for the first time. This discovery has added a new confirmed list of amphora kilns to our dataset. Unquestionably, this discovery is a major contribution to our knowledge about productive activities in the region at a general level, and of amphora manufacture more specifically in Roman Cyrenaica.

The kilns have been mapped and studied with the aim of understanding the distribution and relationship of these sites locally and within the wider region (see Chapter 4). Notably, mounds of pottery wasters were detected in all these kiln sites during the field survey, and a quantity of sherds were collected for further analysis and study.

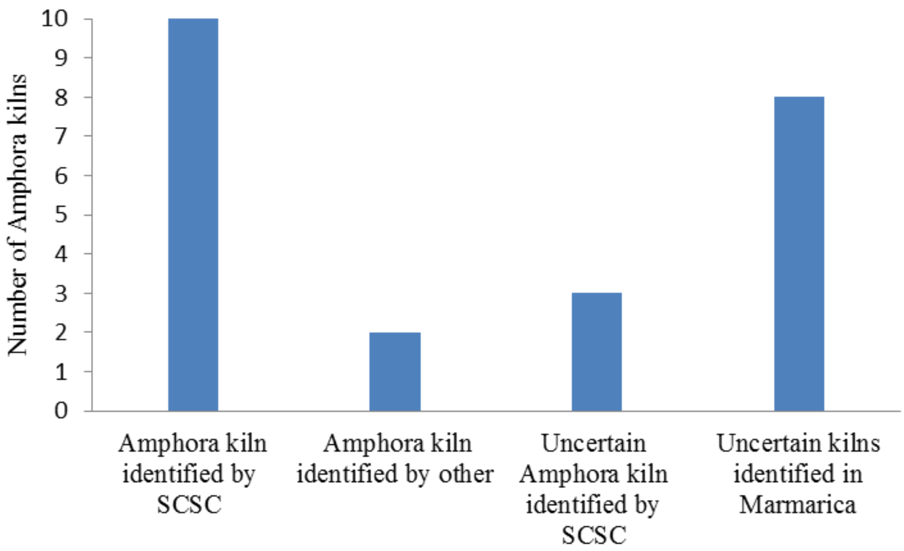


Figure 5-8: Number of amphora kilns identified in Cyrenaica.

The kilns are distributed in three main locations within the surveyed area (Fig. 5-9). Three of the ten are located in one of the districts of Aptouchou (el-Hanya) (site APSC7) to the north-west of the modern cemetery. Four other kilns lie at the ancient site of the Cape of Phycus (site CPSC3), and the other three were found in the ancient site of Mahel Mael (site MMSC1). The two main points distinguishing the location of the kilns are their proximity to the sea and the fact that they are situated on the edge of and in the entrance to the valleys (Fig. 5-10).

Another point worth noting is that they are close to Phycus. Aptouchou is approximately 20 km from the Cape of Phycus, while the Cape of Phycus is 5 km from Mahel Mael. A number of other sites were recorded which probably would also have had pottery kilns at one point. For example, a rectangular shape measuring 1.5 m was recorded at the ancient site of Phycus with clear traces of burning to its internal walls. While no wasted pottery was found nearby, this may be because sand dunes cover most of the archaeological remains at the ancient site of Phycus. The fired bricks on the ground at Mahel Mael (MMSC3) may also be evidence of another possible kiln site.

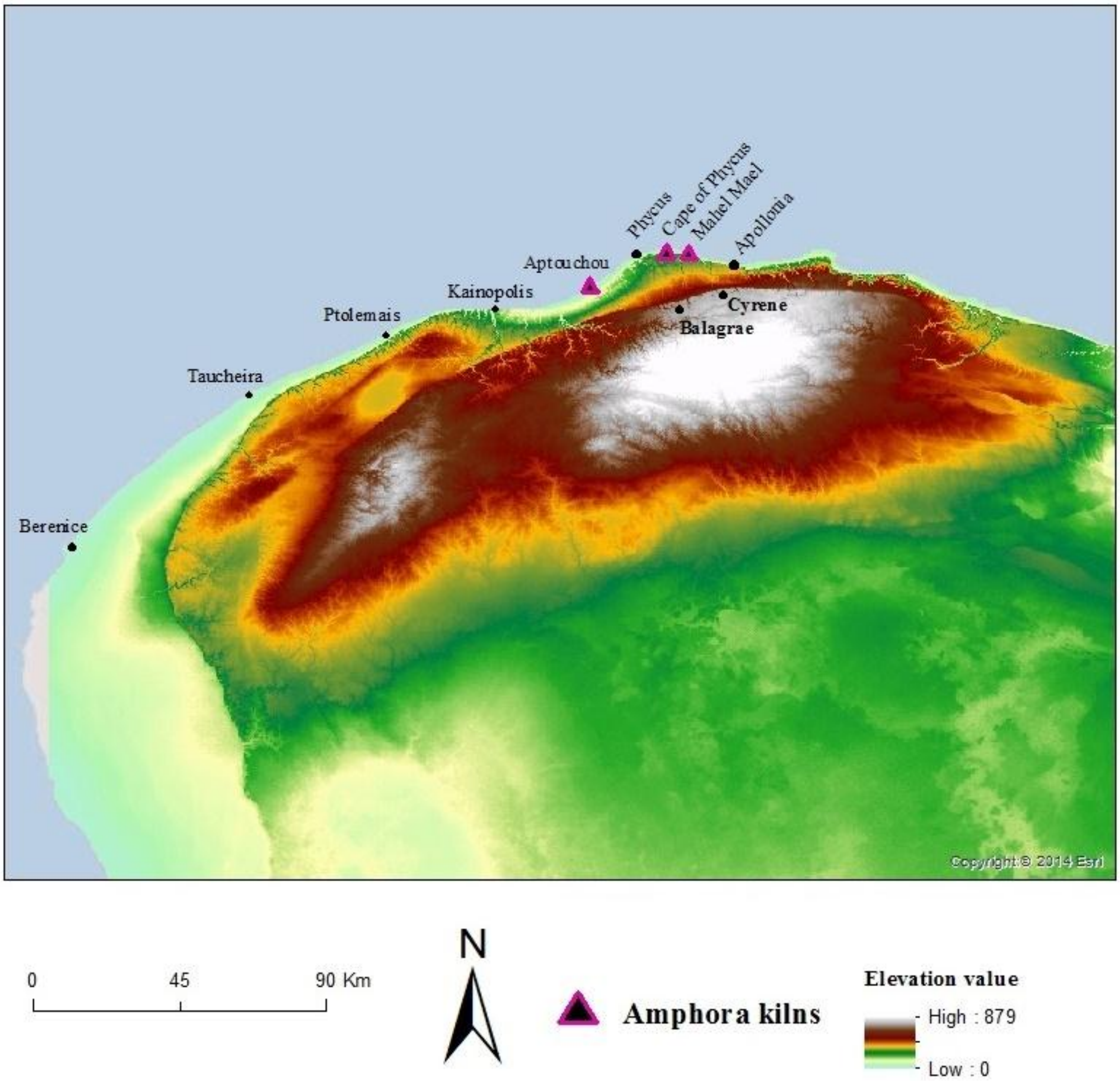


Figure 5-9: The distribution of amphora kilns within the surveyed area.

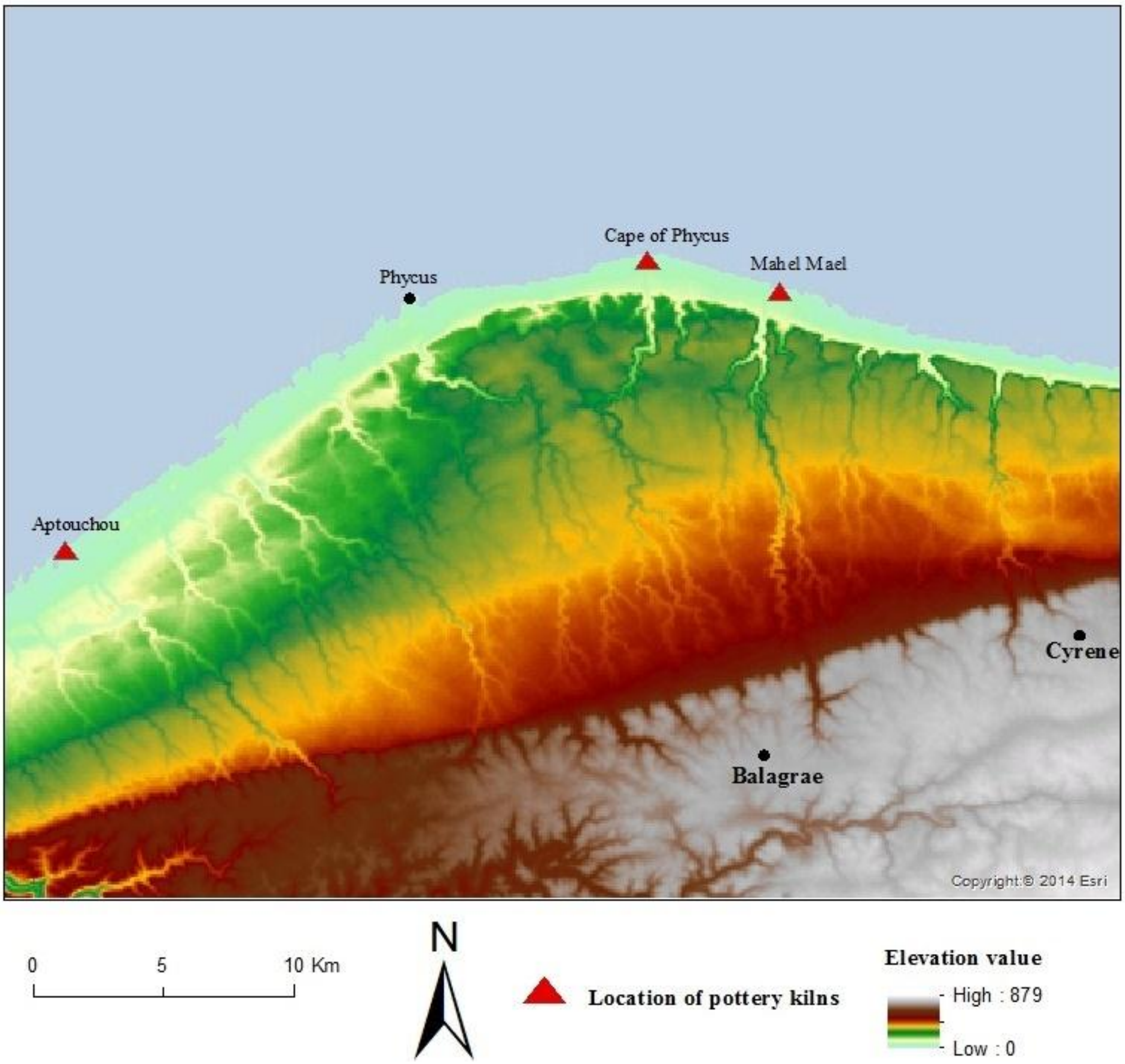


Figure 5-10: The location of kiln sites in the Wadi (Valley).

5.2.3 Amphora kilns identified during the field survey (SCSC)

5.2.3.1 Amphora workshop (MMSC1) at Mahel Mael

This site consisted of a row of three kilns in poor condition and which had suffered erosion by the sea. The general plan of the kilns can be estimated using information from the best-preserved example – kiln 2 (see Fig. 5-11 below). This kiln was 1.5 m wide and almost rectangular. It had been built in a similar way to those at the Cape of Phycus (see below), with a layer of firebrick reinforced from the exterior by another two layers of small stones filled with mud and gravel. These kilns where situated within a courtyard. A wall built of two lines of small stones infilled with mud is contiguous to the southern part of the kilns and at the same time forms the external walls of the kilns.

The wall runs east to west for over 21 m. Other walls emerge from wall (1) and run to the north into the sea. These walls form rooms which might have served as work spaces. Supporting this hypothesis, a small area measuring 1 m^2 was found which had a paved floor or was part of a tank. This area lies to the west of the kilns and north of wall 1.

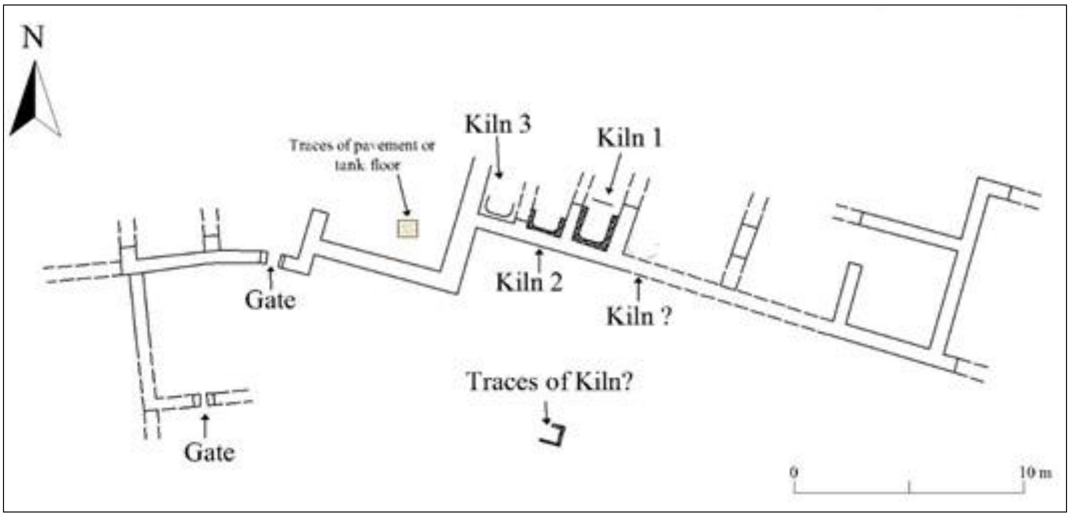


Figure 5-11: Amphora workshop at Mahel Mael, sub-site MMSC1.

5.2.3.2 Amphora workshop (CPSC3) at the Cape of Phycus

The archaeological remains of this site were distributed around an area covering 2000 m^2. The site contained a set of four kilns of different sizes and shapes (Figs. 5-12, 5-13 and 5-14).

Kiln 1 was rectangular and measured 2.5 m × 2.0 m, and survived up to 0.15 m high. The external wall was built up of two lines of small stones infilled with mud, while the internal walls were built of firebricks which were red in colour. The shape of this kiln is reminiscent of one discovered inside the ancient walls of Taucheira (Tocra), which was dated to the Hellenistic period (Buzaian 2000), as well as the rectangular kilns found at the ancient site of Ptolemais (Tolmeta) . Kiln 2 lay to the north of kiln 1. It was hard to reconstruct its shape due to surface damage. However, it appears to have been similar in shape to kiln 1. Kiln 3 lies to the east of kiln 1. It is an oval structure built of the same materials as kilns 1 and 2. As with the other kilns on the site, kiln 3 could not be reconstructed fully without further investigation. However, it seems to have had a diameter of 2 m.

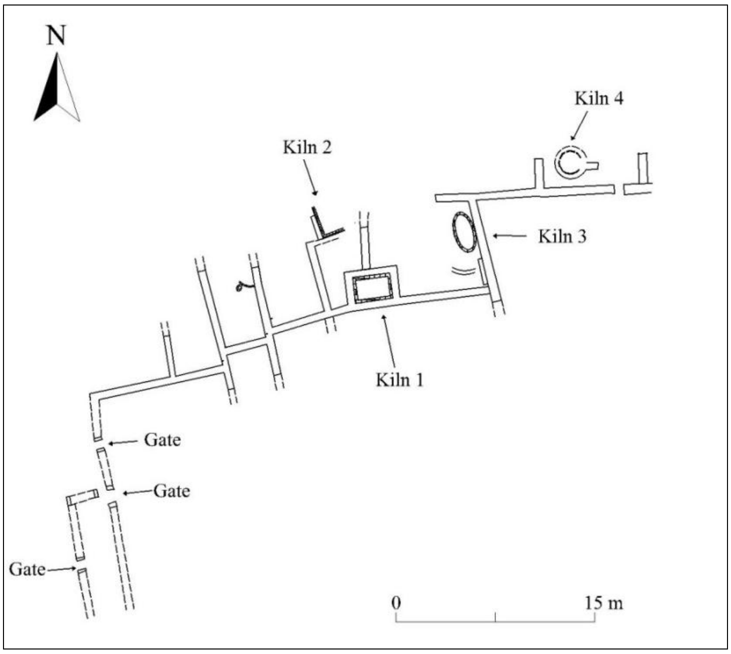


Figure 5-12: Kiln workshop (CPSC3) identified at the Cape of Phycus.

Kiln 4 was a circular structure built of two layers of stones and firebrick. Only half of the diameter and part of what may have been a stokehole could be detected. Excavation is needed to reveal the whole structure. All the kilns on this site were built using the same materials and techniques: an internal layer of firebrick reinforced by two external layers of small stones. They all fall within a courtyard area. A wall (1) built of stones and filled with mud mixed with gravel lays just to the south of kiln 1 and approximately 2.5 m south of kilns 2, 3 and 4. In addition, other walls adjoined to wall 1 run from the south to the sea to the north and then to the south again. These walls form rooms which are adjacent to or surround the kilns. Several mounds of pottery sherds were located 3 m to the south-east of the kilns.

Figure 5-13: Kiln 1 within sub-site CPSC3 at the Cape of Phycus. Looking south.

Figure 5-14: Kiln 3 within sub-site CPSC3 at the Cape of Phycus. Looking south.

5.2.3.3 Amphora workshop (APSC7) at Aptouchou

This site was located to the north-east of site APSC6 and was made up of two parts. The first rose approximately 7 m above sea level and contained three (1, 2 and 3) pottery kilns. The kilns were rectangular, and built in a row running from east to west. Kiln 1 was to the east of kilns 2 and 3 and was the largest at 3.73 m x 2.87 m. Kilns 2 and 3 measured 1.54 m x 2.70 m and 2.48 m x 2.62 m respectively. However, large-scale excavation is needed to get solid information about their shapes.

It is noteworthy that the western wall of kiln 3 continued to the north towards the sea for a distance of 21.73 m. Another sporadic wall at a distance of 1.6 m from of the previous wall ran from east to north for a distance of 15 m (Fig. 5-15).

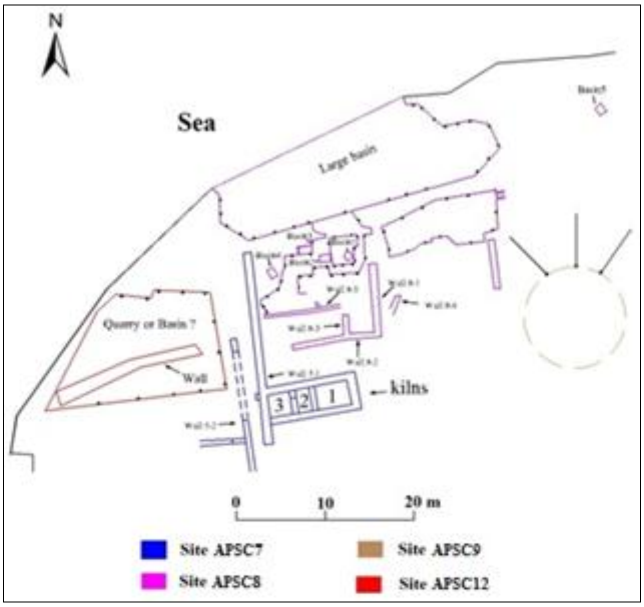


Figure 5-15: Map showing the location of the kilns identified at Aptouchou.

5.2.4 Types of amphora produced in Cyrenaican kilns

As mentioned above, there is a scarcity of information related to the amphora-borne products produced locally in Cyrenaica. The general lack of research and survey work carried out into the classification of local Cyrenaican amphorae types and fabrics means there is little information available on this subject. Only two studies so far have attempted to explore local amphora production. These two studies concentrated on the data that came out of the excavation work conducted at Berenice and Euesperides, both of which lie beneath the modern city of Benghazi (Göransson 2007; Riley 1979a). The pioneering research by Riley still serves as a guide and example used by pottery specialists. Riley’s study (1979a) paved the way for further work on the assemblage of the local amphorae recovered at the ancient Hellenistic site of Euesperides during excavation work between 1996 and 2006 (Göransson 2007). Unfortunately, there are no parallel studies for other parts of Cyrenaica similar to those carried out in Berenice and Euesperides.

The examples of local pottery identified as coming from Euesperides consists of five types of amphorae (Table 5-8). These types are classified according to their shape and fabric into Cyrenaica amphorae 1-4, as well as Cyrenaica amphora B (or Cyrenaica Corinth B amphora). It is worth mentioning that Cyrenaica 1 is an imitation of Chian amphorae, whereas Cyrenaica amphora 4 is a copy of MGS IV, V and VI amphorae. In addition, it seems that Cyrenaica amphora B imitated Corinth B amphorae. Cyrenaica amphorae 1, 2 and 3 were also found at the ancient site of Berenice in a Hellenistic context (Riley 1979a). Concerning local amphora production during the earlier Roman period, one type of amphora has been identified in two different places - the ancient sites of Tocra and Berenice.

The mid-Roman period seems to have been one of the richest manufacturing periods for several different types of amphora. Three types of local amphorae were found at the ancient site of Berenice: MRA 8, 9 and 10 (Riley 1979a). Similar types have also been recorded at the ancient site of Tocra: Tocra A1, A2 and A3 amphorae (Riley 1979b). Using Erythron as another example, a pottery assemblage recovered from a waste area revealed that MRA1 was also produced at the site. Over 75% of the pottery sherds collected from both kilns at the ancient sites of the Cape of Phycus, Aptouchou and Mahel Mael during the SCSC field survey were amphorae sherds.

After analysing the shapes of the collected assemblage, there appear to have been two types of amphorae produced at the kilns of the Cape of Phycus. Meanwhile one type of amphora seems to have been produced at Aptouchou and Mahel Mael. The first type seems to be the mid-Roman Amphora 1 (MRA1) (Fig. 5-16). This type of amphora is similar to those presented at Berenice, and to types 1a and 1b found at Erythron (Latrun) (Mazou and Capelli 2011; Riley 1979a). In this context this thesis will use the name ‘Mid Roman Cyrenaican Amphora 1’ (MRCA 1) instead of the name given by Mazou and Capelli, Latrun Amphora 1 (Mazou and Capelli 2011).

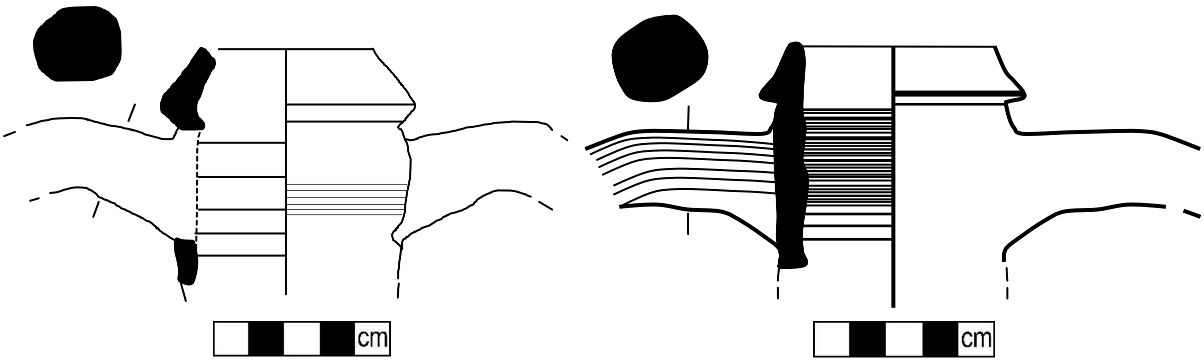


Figure 5-16: Mid-Roman Amphora 1 (MRA1) identified at the Cape of Phycus.

The discovery of local MRA1 at different centres and workshops along the Cyrenaican coast raises questions about the origins of this type of amphora (Fig. 5-16). Interestingly, the pottery data collected from Berenice suggests that the percentage of imported amphora-borne products from Tripolitania, Tunisia, Spain and Italy during the Mid Roman period declined. At the same time mid-Roman amphorae appeared sporadically from the first century AD, and peaked among other amphora sherds in the mid-Roman period (Riley 1979a). This could suggest that there was a peak in amphora production in Cyrenaica during this period. This might also reflect changing market interests, as Riley argued (Riley 1979a). I suggest that Cyrenaica was probably self-sufficient in amphora production in this period.

The locations and origins of MRA1 amphorae are widely debated by archaeologists (Bonifay 2004; Mazou and Capelli 2011; Riley 1979a). However, it is principally concentrated and distributed in the centre of the Mediterranean region. Although this type of amphora has generally been assigned a North Africa origin due to its frequent presence in Tripolitania and Tunisia, several MRA1 workshops have been discovered in Sicily, leading a number of scholars to argue that MRA1 was mainly produced there (Freed and Wilson 1999; Wilson 2000). Wherever MRA1 was originally produced, the new discovery on the Cyrenaican coast strongly confirms that Cyrenaica manufactured a considerable volume of this type of amphorae. The case for this argument is reinforced by my field survey, which revealed 10 MRA1- producing kilns despite only investigating a small area. Surely, if the survey had been extended to the east, west and south of the surveyed area, more amphorae kilns would have been discovered.

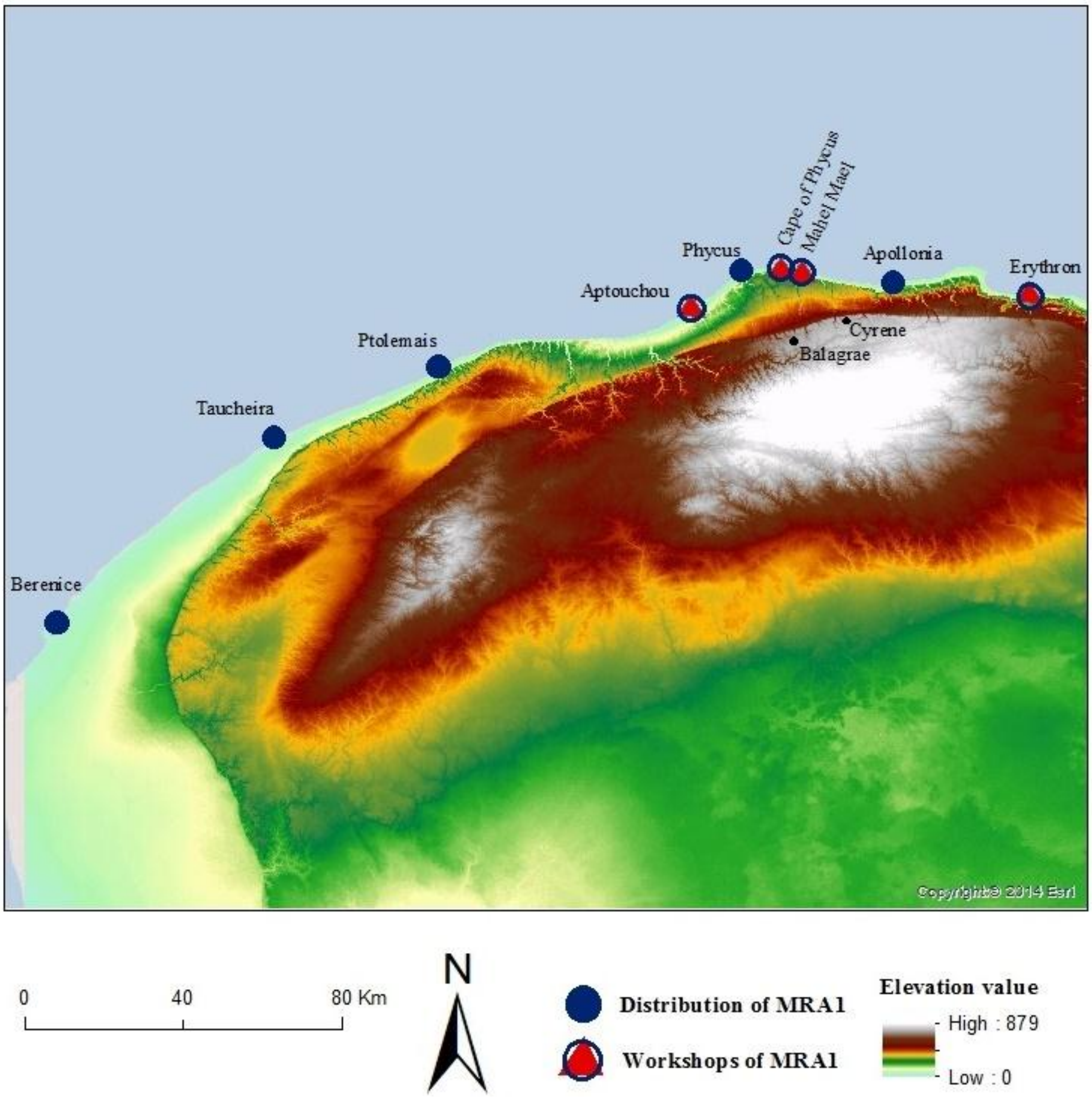


Figure 5-17: Distribution of MRA1 along the Cyrenaican coast.

A second type of amphora that might have been produced in the study area is the Mid Roman Amphora 8 (MRA8) (Fig. 5-18). This type of amphora may have been produced at the kiln sites (CPSC3) recorded at the Cape of Phycus. It is remarkable that this type of amphora was recorded in many different places across Cyrenaica, including Berenice, Taucheira, Ptolemais and Apollonia. Sherds of MRA8 were also recorded at other sites within the survey area, such as Kainopolis (Fig. 5-17). The contents of MRA1 and MRA8 are still widely debated. However MRA1 was more likely to have carried wine, while MRA8 probably carried fish sauce (*garum*) (Wilson 2004; Bonifay personal communication; Mazou personal communication).

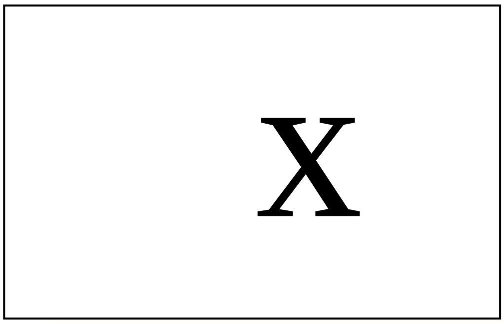


Figure 5-18: Mid Roman Amphora 8 (MRA8) (after Riley 1979).

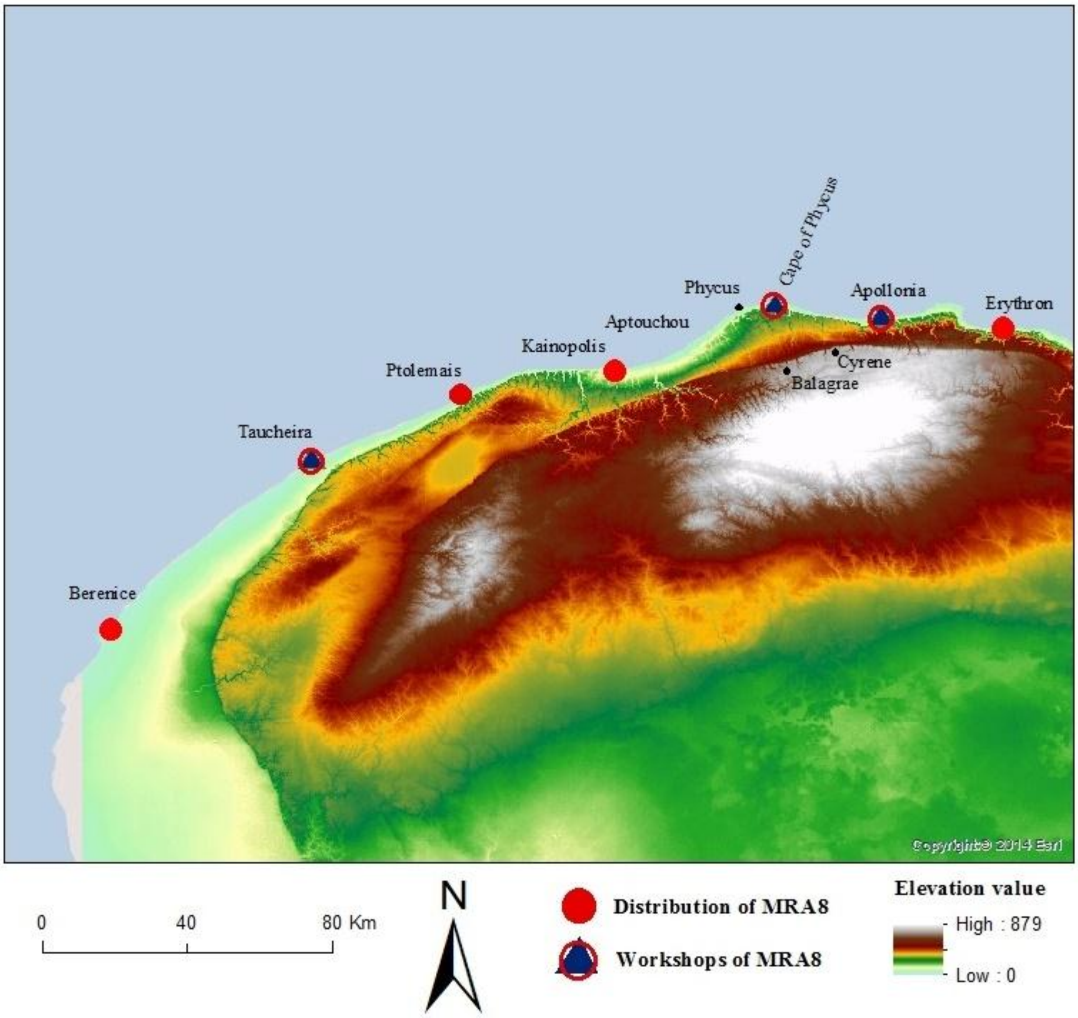


Figure 5-19: Distribution of MRA8 along the coast of Cyrenaica.

5.2.5 Typology of Cyrenaican pottery kilns

The survey results show that three types of pottery kiln were present in Cyrenaica (Figs. 5-20, 5-21 and 5-22). To an extent they are identical to the broader typology of pottery kilns identified in different parts of the Mediterranean. The most important and famous kiln typology was written by Cuomo Di Caprio (see Figure 11, Appendix I), which classifies the Roman ceramic kilns found in Italy. Although, Cuomo Di Di Caprio (1971) was the first to study the structure of Roman kilns, his work still serves as a guide to archaeologists who study ceramic kiln structures. However, this typology was later adopted by researchers who attempted to analyse and categorise the ceramic furnaces found in different parts of the Mediterranean. For example, Hasaki (2002) attempted to typologise the pottery furnaces found in Greece (see Figures 12 and 13, Appendix I).

As a result of the poor preservation of the ceramic kilns recorded in Cyrenaica and the limited time available to record their internal divisions, this study's initial classification of these kilns must be viewed as preliminary. This typology would benefit from the excavation of more Cyrenaican pottery kilns in future.

This thesis adopted the same two-division system of Cuomo Di Caprio used in his typology, dividing kilns between the circular and rectangular styles (types I and II). It is also attempted to record the sub-types if possible (Figs. 5-23 and 5-24), depending on availability. However, this thesis adds a new oval shaped (III) division or type to the Cyrenaica's typology (Table 5-2). It is worth noting that the provisional typology is based on the 23 ceramic kilns identified in six areas in the Cyrenaican region. Ten of these kilns were identified during my field survey (see Chapter 4, kilns 1-3 within site MMSC1, kilns 1-4 within site CPSC3, and kilns 1-3 within site APSC7), while the remainder were recorded by other scholars (Table 5-3). These kilns date from the Hellenistic and Roman periods, with one sole example of a kiln from the early-Greek period.

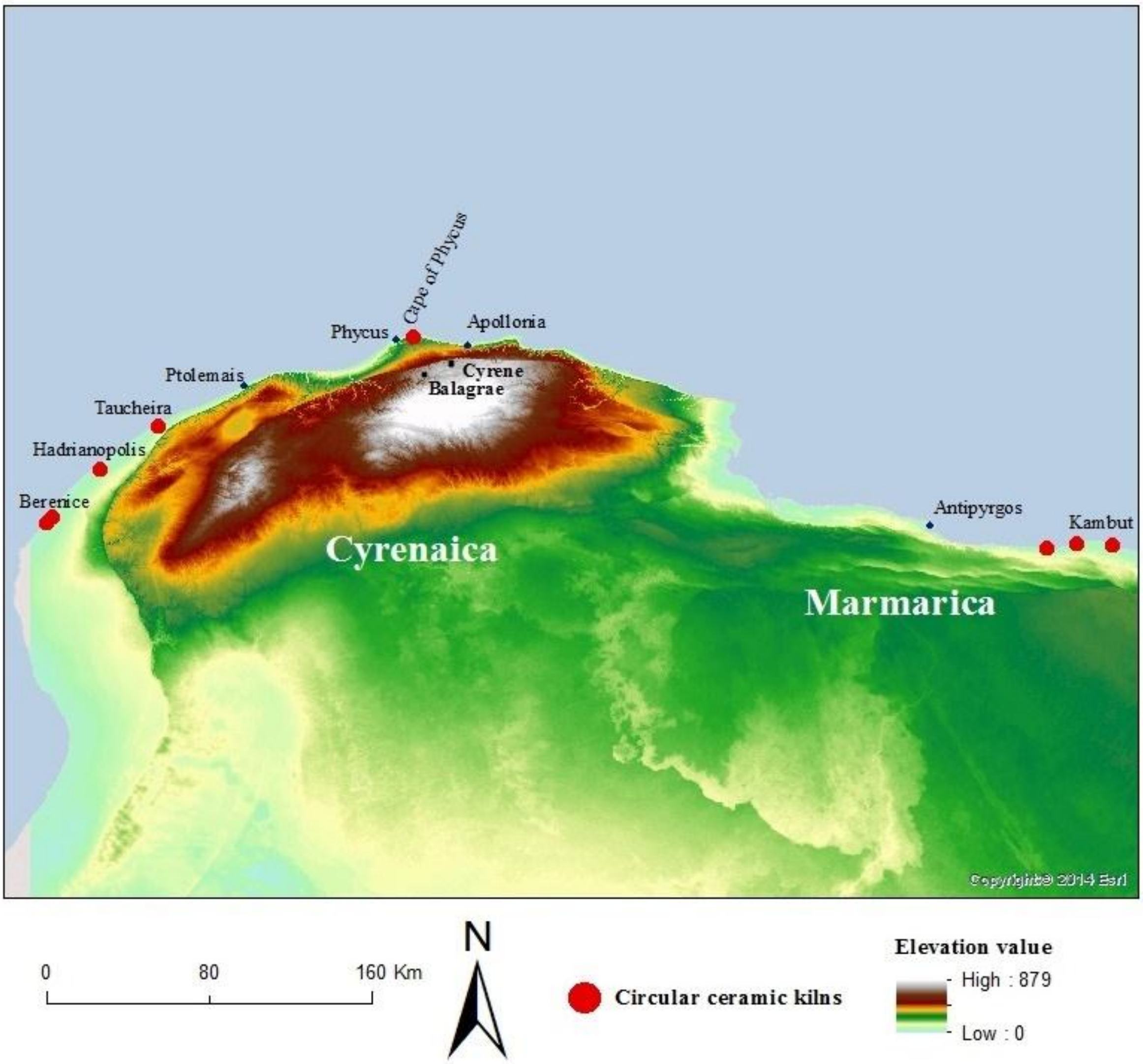


Figure 5-20: The distribution of circular kilns in Cyrenaica.

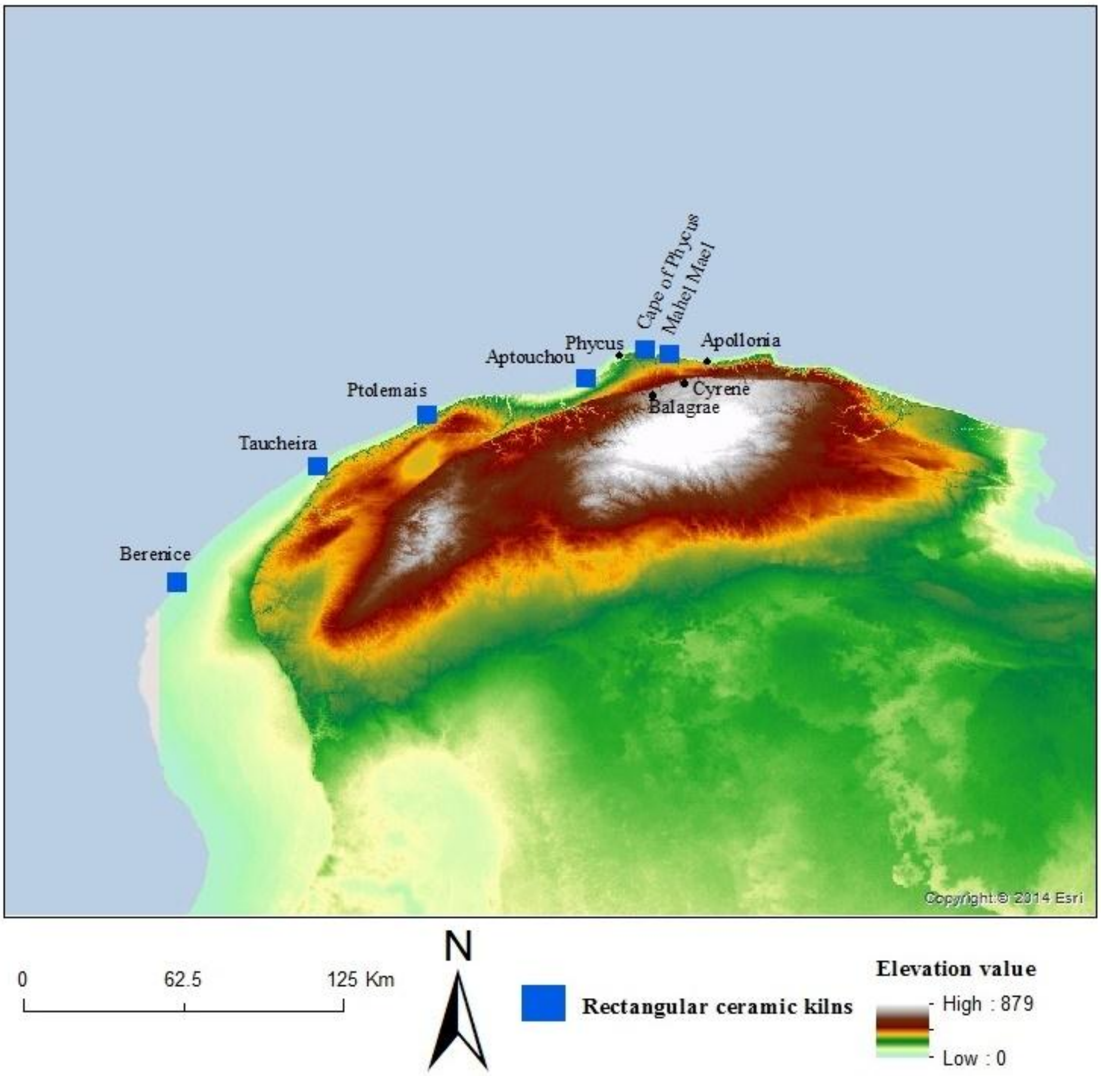


Figure 5-21; Distribution of rectangular kilns in Cyrenaica.

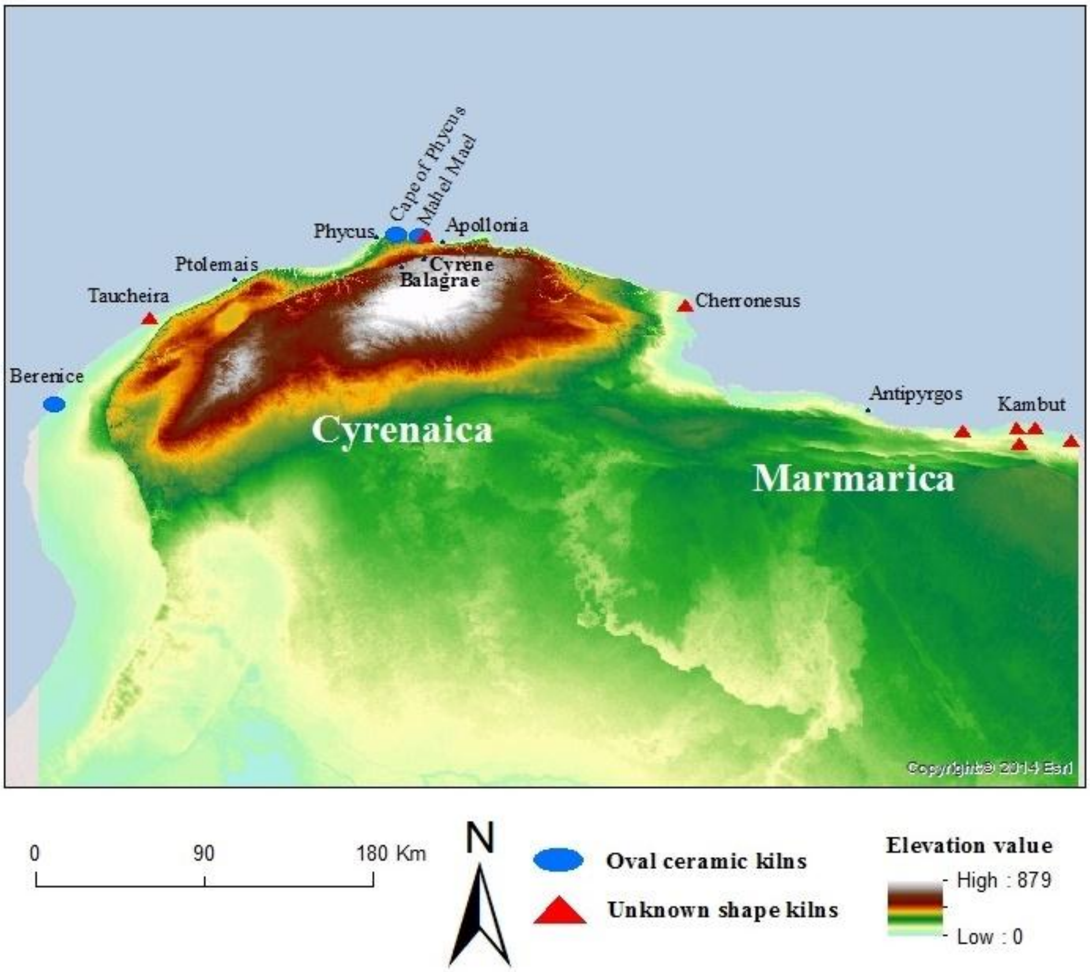
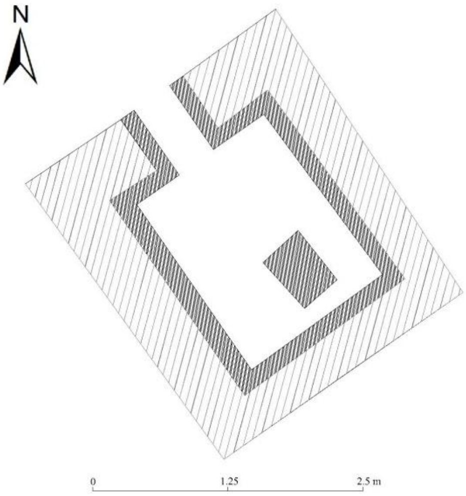


Figure 5-22: Distribution of oval and unidentified kilns in Cyrenaica.



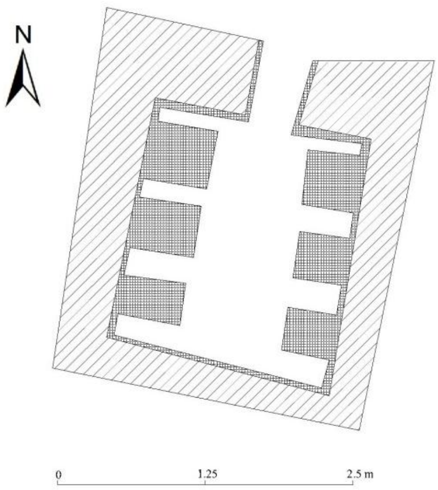


Figure 5-23: A rectangular ceramic kiln found at Taucheira. Type IIa (After Buzaian 2000).

Figure 5-24: A rectangular ceramic kiln found at Erythron. Type IIc (After Michel 2012).

Kiln structure	Type	Sub-type a	Sub-type b	Sub-type c	Analogous typology
Circular	I	√			Cuomo Di Caprio's typology
Quadrangular	II	√	√	√	Hasaki's typology
Oval	III				

Table 5-2: Typology of Cyrenaican kilns.

Ancient Name	**Kiln no.**	**Type of Kiln** I	II	III
Euesperides	1	√		
Bernice	k1	√		
	k2		√	
	k3			√
	k4		√	
	k5		√	
	k6	√		
Hadrianopolis	k1	√		
Taucheira	k1			
	k2		√	
	k3	√		
Ptolemais	k1		√	
	k2		√	
	k3		√	
Aptouchou	k1		√	
	k2		√	
	k3		√	
Cape of Phycus	K1		√	
	K2		√	
	k3			√
	k4	√		
Mahel Mael	k1	√		
	k2	√		
	k3	√		
Erythron	k1		√	
Marmarica	k1-k8			

Table 5-3: Types of kilns in Cyrenaica.

5.2.6 Comparison between Cyrenaican, Tripolitanian and Tunisian Ceramic Kilns

In terms of location all Cyrenaican pottery kilns found so far have been distributed along the coast and near to ports, and no records of pottery kilns have been found further inland. In Tripolitania, unlike Cyrenaica, the bulk of amphorae kilns were identified in the hinterland adjacent to production villas (Ahmed 2010). Meanwhile, in Tunisia the majority of amphora kilns were recorded along the coast and near to ports (Hobson 2012). It is remarkable that only circular ceramic kilns have been identified in Tripolitania (Tables 5-5 and 5-6). No rectangular, oval or differently-shaped kilns have been recorded there to date (Goodchild 1951; Ahmed 2010).

In terms of size, Cyrenaican kilns seem to be smaller than those discovered in Tripolitania (Fig. 5-25). Only one kiln larger than the Ain Scerciara kiln in Tripolitania has been found, at the site of Hadrianopolis to the east of Berenice. The Ain Scerciara kiln is one of the largest Roman kilns recorded in North Africa (Goodchild 1951). The Hadrianopolis kiln is about 6.8 m in diameter (Little 1971) with a total area of 36 m^2, while the Ain Scerciara kiln is 6.0 m in diameter (Goodchild 1951) with a total area of 28.29 m^2. Meanwhile, the largest kiln documented in Tunisia to date is 4.9 m in diameter (Bonifay 2004; Bonifay and Trcglia 2007; Humphrey 2009; Leitch 2010; Stirling et al. 2001) and has an estimated total area of 18.84 m^2 (Fig. 5-26 and 5-26). Generally, the average area of Cyrenaican kilns is approximately 5.37 m^2, which is 5% smaller than the kilns found in Tunisia and 10% smaller than those in Tripolitania. Cyrenaican kilns also seem to be on average 20% smaller than the one found in Greece (Hasaki 2002) (Fig. 5-27).

Due to damage it was difficult to assess the heights of the Cyrenaican kilns. However, if we assume that the highest kiln building found in Tripolitania was approximately 2 m above ground (Ahmed 2010), it is likely that Cyrenaican kilns were around the same height.

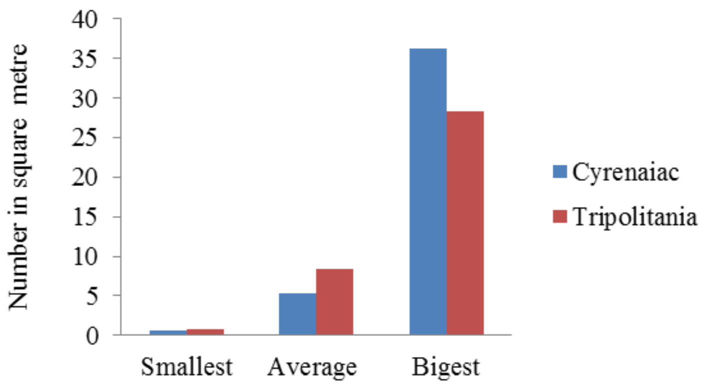


Figure 5-25: Comparison between Cyrenaican and Tripolitanian kiln areas.

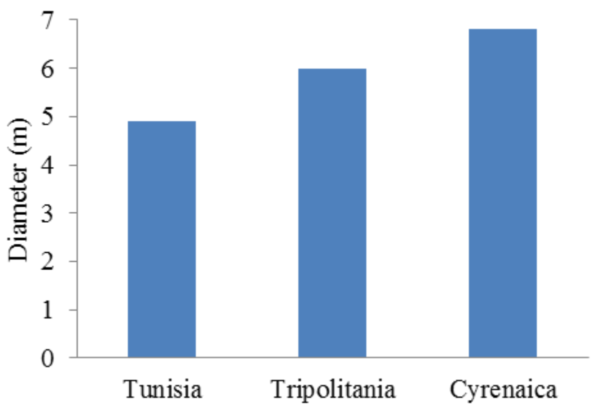


Figure 5-26: Largest kiln sizes recorded in Tripolitania, Tunisia and Cyrenaica.

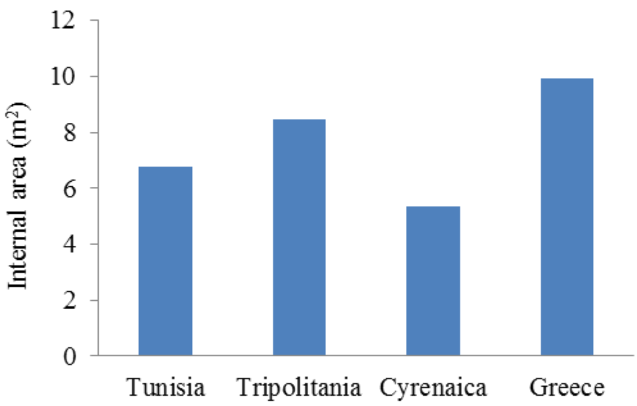


Figure 5-27: The average area of Tunisian, Tripolitanian, Cyrenaican and Greek kilns.

The results obtained from this comparison are only a rough estimation, and may be inaccurate due to the limited number of kilns and lack of comparable excavations and records.

Another key factor to be considered is why the majority of pottery kilns recorded so far in Cyrenaica are rectangular (Fig. 5-28) rather than circular, particularly given that circular kilns were the most common in Roman North Africa. Why Cyrenaican potters adopted this particular type of kiln structure is unclear. Unfortunately, there is no ethnographical parallel that can be referred to in order to understand the decision-making of ancient potters in this regard (Riley 1979a). Such a profession no longer exists in Cyrenaica, and is certainly outside living memory. This is in contrast with the examples from other parts of North Africa, such as Tripolitania and Tunisia.

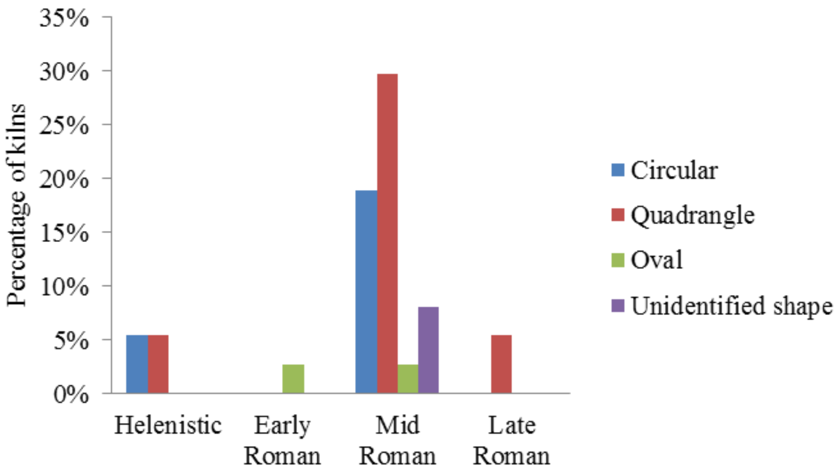


Figure 5-28: Percentage of each kiln type found in Cyrenaica.

Studying the structure and form of kilns during the Roman period is challenging, and requires an ethno-archaeological approach. In addition, obtaining a broad understanding of Roman kiln structures depends to a great extent on studying examples from different Roman provinces. This sort of research is not possible at the present time, as many sites are either in the process of being excavated or remain undiscovered. It is thus inevitable that a long period is needed for new and robust discoveries that can be published. The five kinds of Roman-period kilns identified so far are the circular, semi-circular, quadrangular (Fig. 5-29), oval, and pear-shaped types. Semi-circular, oval, and pear-shaped kilns are relatively uncommon, while circular and quadrangular kilns are the most common (Peacock 1982).

The reasons behind these variations in the shape of Roman kilns are still unknown, and continues to be the subject of much debate (Manacorda and Pallecchi 2012). An outstanding ethno-archaeological study of the behavioural patterns of potters in the

Mexican village of San Juanico investigated how and why they adopted particular shapes of pottery kiln (Papousek 1989). The study took into account the socio-economic changes that occurred during the time and how this may have influenced different aspects of their decision-making (*e.g.* manufacturing, kiln structures, transportation, marketing and so on). In terms of kiln structures, the artisans used two forms - circular and rectangular - to fire their pottery. The rectangular structure was adopted at a later period. This investigation could help to uncover the reasons behind the potter's decision to shift from circular to rectangular kilns, or whether they continue to use the traditional structure.

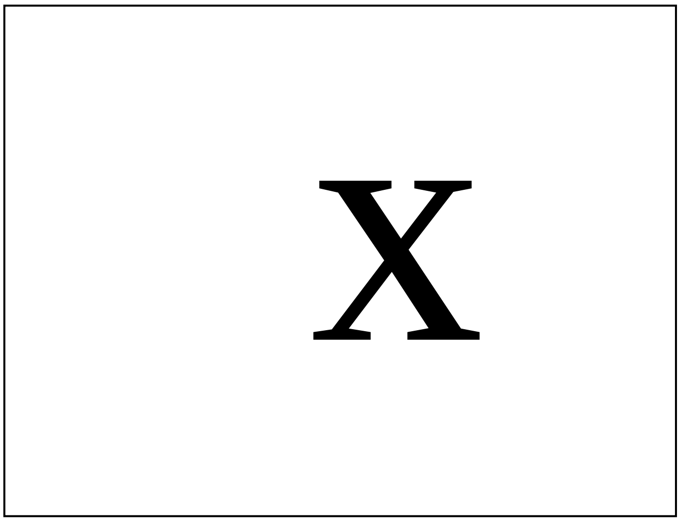


Figure 5-29: The main pottery kiln types in use during the Roman period (Peacock 1982).

There appear to be no convincing reasons for transitioning to the new forms or for sustaining the old ones by the artisans from the Mexican village of San Juanico. The owners of circular kilns could have argued that the rectangular furnace might consume more fuel, or that it is impractical for certain types of pot and difficult to run. Meanwhile, proponents of the rectangular type could contend that rectangular kilns are easier to construct as there is no need to dig up the firebox, and that they are more suitable on the strength of their experience designing and producing all types of pottery.

Generally, there seems to be no real advantage or disadvantage in adopting different kiln structures. It appears that personal preferences may have been the critical factor when ancient potters were deciding which type of kiln to use (Papousek 1989).

It can be argued that a kiln's shape is unlikely to affect the quality of the items it produces or the productive activities of the community that created it. The personal preference for a particular form, however, is not as important as the changing sizes and capacities of kilns, as this reflects the scale of economic growth and increase or decline in supply and demand over a particular period. For this reason, size is considered to be the key factor in the economic process rather than the shape.

Rectangular kilns seems to have enjoyed a long life in Cyrenaica, one that goes back to the Hellenistic period, and it appears that construction of this shape continued throughout the Roman period. This type of structure was very common during this period throughout the Greek world (Hasaki 2002). Meanwhile the circular structure was most likely a Roman tradition, influenced by Roman North Africa (Lloyd 1977), although it seems to have existed since the Hellenistic/Punic period.

No evidence has been found suggesting the existence of quadrangular kilns in the western neighbours of Cyrenaica, such as Tripolitania and Tunisia. All the kilns which have been documented to date are circular or elliptical in shape (Tables 5-4, 6-5, 5-6 and 5-7).

Region	Number of kilns	Kiln type			
		Circular	Oval	Rectangular	Other
Attica	14	√		√	
Peloponnese	68	√		√	
Central Greece	50	√		√	
Western Greece	20	√		√	
Northern Greece	46	√		√	
Aegean	57	√		√	
Total number of kilns	355				
Total number of circular kilns	200				
Total number of oval kilns	0				
Total number of quadrangular kilns	137				
Average kiln area	9.92 m²				

Table 5-4: Types and quantities of Hellenistic and Roman ceramic kilns recorded in Greece, author table, data from (Hasaki 2002).

Region	Number of kilns	Kiln type			
		Circular	Oval	Rectangular	Other
Cape Bon	5	√	√		
Carthage	5	√	√		
Mactar	2	√			Pear-shaped
Byzacena	4	√	√		
Leptiminus	5	√			
Neapolis	9	√			
Total number of kilns	40				
Total number of circular kilns	32				
Total number of oval kilns	8				
Total number of quadrangular kilns	0				
Average kiln area	6.76 m²				

Table 5-5: Types and quantities of Roman ceramic kilns recorded in Tunisia. It is worth mentioning that fewer kilns are shown here than were originally found in Tunisia and Tripolitania. This table contains only kilns whose structures and dimensions were confirmed.

Region	Number of kilns	Kiln type			
		Circular	Oval	Rectangular	Other
Tripolitania	12	√			
Tarhuna Plateau	21	√			
Total number of kilns	33				
Total number of circular kilns	33				
Total number of oval kilns	0				
Total number of quadrangular kilns	0				
Average kiln area	8.47 m²				

Table 5-6: Types and quantities of Roman ceramic kilns recorded in Tripolitania.

Region	Number of kiln	Kiln type			
		Circular	Oval	Rectangular	Other
Euesperides	1	√			
Bernice	6	√	√	√	
Hadrianopolis	1	√			
Taucheira	2	√		√	
Ptolemais	3			√	
Aptouchou	3			√	
Cape of Phycus	4	√	√	√	
Mahel Mael	3		√	√	
Erythron	1			√	
Total number of kilns	24				
Total number of circular kilns	9				
Total number of oval kilns	2				
Total number of quadrangle kilns	13				
Average kiln area	5.33 m²				

Table 5-7: Types and quantities of Hellenistic and Roman ceramic kilns recorded in Cyrenaica.

A number of quadrangular ceramic kilns seem to have been constructed in different areas of Bronze Age Greece. For example, the use of rectangular pottery kilns became noticeable in Crete from the Bronze Age, and continued throughout the Classical and Hellenistic periods (Davaras 1980). However, circular and oval shapes have dominated ceramic kiln structures and were the most common type adopted by potters in different areas across Crete and the Aegean, including Kommos, Aghia Triada, Palaikastro, Kavousi and Knossos (Davaras 1980; Gesell et al. 1988; Hasaki 2002; Homann-Wedeking 1950; Shaw et al. 2001; Tarling and Downey 1989). Remarkably, the number of quadrangular kilns increased considerably during the Roman period. They became the most common Greek kiln structure, particularly in the Peloponnese and Attica regions (Table 5-4) (Hasaki 2002). 67 rectangular kilns have been identified from Roman times, while 36 circular kilns have been recorded from the same period (Hasaki 2002).

However, rectangular kilns assigned to amphora production have been documented in different parts of the northern Mediterranean, including Italy at the ancient site of Beridisi (Fig. 5-30). These kilns date back to the second century BC (Manacorda and

Pallecchi 2012). This type of amphora kiln structure has also been found in France and Spain (Peacock 1982).

The prevalent belief among scholars of archaeology at the moment is that the circular type was used for the production of pottery, while rectangular and square kilns were usually used for brickmaking, as well as for amphora and dolia production (Peacock 1982). It appears that the kilns recorded by SCSC field survey and those found by others (see above) are most likely to be consistent with this view. Although the production of bricks in rectangular kilns is not yet confirmed, it is known that amphora kilns used this shape.

The circular kilns found in Cyrenaica seem to have been used exclusively for pottery production. However, functional classifications based on structural form must be approached with the utmost caution as some exceptions might exist. For instance, a circular kiln producing dolia and tiles dating back to the Hellenistic period has been found in Berenice (see Table 5-1). In addition, archaeological evidence found in a villa in Italy suggests that bricks were produced alongside pottery in a circular kiln (Peacock 1982).

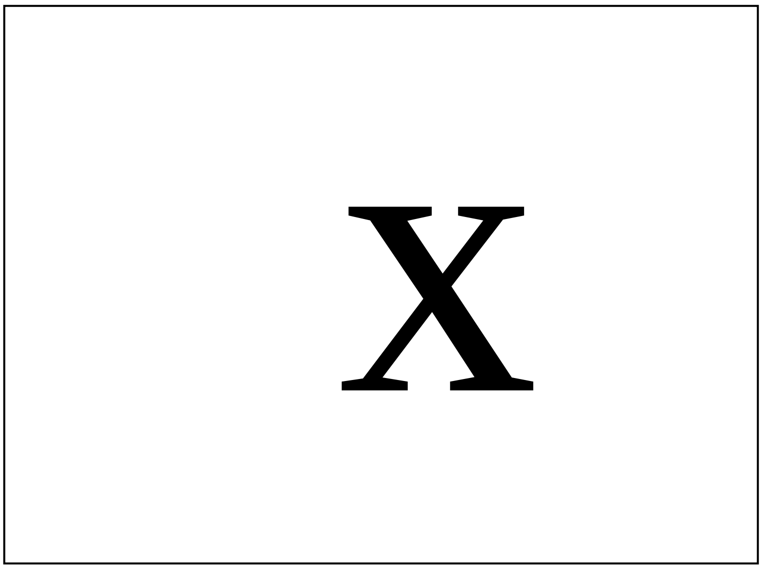


Figure 5-30: One of the rectangular amphora kilns found in Beridisi (Manacorda and Pallecchi 2012: 42).

5.2.7 Fabric of Cyrenaican Pottery

As Cyrenaica is a limestone area, the expected fabric seems to have been extracted from Eocene limestone topped with Oligocene and Miocene limestone (Riley 1979a: 93). This raw material can be found in many different parts of Cyrenaica, including the Al-

Jabel Al-Alkhdar area (Green Mountain), south-east of Cyrene, the Benghazi region, and other places in western and southern Cyrenaica. As a whole, the fabric used for local pottery production in Cyrenaica consists of tiny quartz grains, limestone and shells (Riley 1979a).

5.2.8 Conclusion

The evidence from the recorded kilns and collected pottery suggests the presence of active industrial production in Cyrenaica (Fig. 5-31). The current evidence further suggests that pottery production peaked in the mid-Roman period. The majority of the documented kilns have been attributed to this period, which amounts to approximately 75% of all the kilns recorded in Cyrenaica. The kilns varied in shape, although rectangular ones were most common. This chapter has also shed light on amphora production in Cyrenaica, which for a long time has been underestimated and poorly understood.

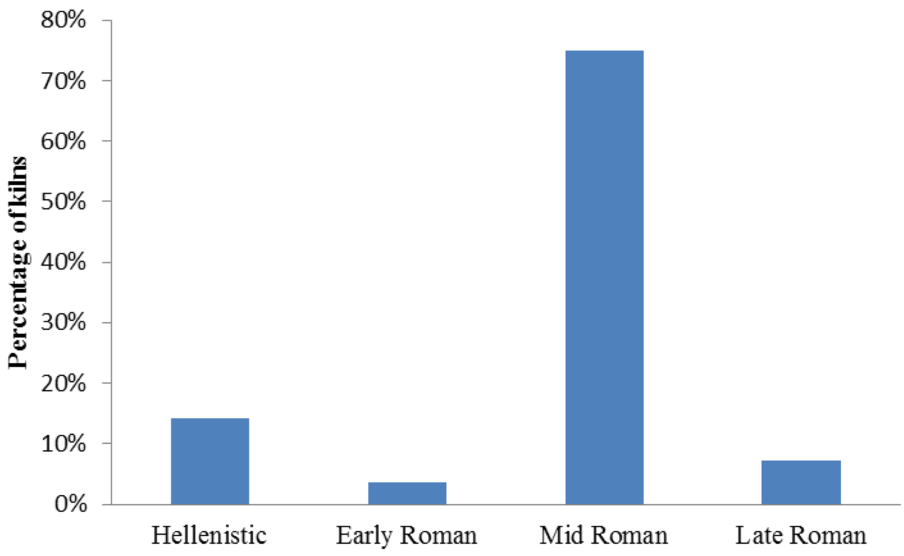


Figure 5-31: Kilns found along the coast of Cyrenaica according to their date.

Amphora Type	Location	Description	Date: Pre-Hellenistic	Date: Hellenistic	Date: Early Roman	Date: Mid Roman	Date: Late Roman	Imitation
Cyrenaica Amphora 1 Hellenistic Amphora 1	Euesperides /Berenice	Oval body, vertical and cylindrical neck, rolled rime, elongated handles		√				Chian Amphora
Cyrenaica Amphora 2 Hellenistic Amphora 2		Thickened rim, slender handles, Bulging neck		√				/
Cyrenaica Amphora 3		Oval short handles, short neck, projecting rim		√				/
Cyrenaica Amphora 4	Euesperides	Averted, projecting and triangular, rim, cylindrical neck, thin and long handles		√				MGS IV,V,VI
Cyrenaican (Corinthian B) B Amphora		Triangular, road and sloping rim, oval body, curved handles		√				Corinthian B
ER Amphora 14/ Tocra A4 Amphora	Taucheira/Berenice	Thickened and short neck, bag body shape, lunate and short handles			√	√		/
MR Cyrenaican Amphora 1 Latrun Amphora 1 and 2	Erythron/Mahel Mael/Cape of Phycus/ Aptouchou	Narrow neck, carinated shoulder, squat body, round handles, thickened rim				√		MR Amphorae 1
MR Amphora 8 Tocra A1 Amphora		Short and vertical neck, thickened flanged rim, oval handles, plained body				√		/
MR Amphora 9 Tocra A3 Amphora	Taucheira/Berenice	Thickened and elongated rim, cylindrical neck, oval handles				√		/
MR Amphora 10 Tocra A2 Amphora		Cylindrical neck, oval handles, thickened and rounded rim				√		/
LR Amphorae 9	Berenice	Vertical or averted rim, thick handles,					√	/

Table 5-8: Types of local amphora-borne products found along the Cyrenaican coast.

5.3 Evidence of Fish-Related Industry

5.3.1 Introduction

The field survey (SCSC) documented eight sub-sites that were probably associated with the exploitation of marine resources (Fig. 5-32). These sites were located at Assa Musa (site AMSC1), the Cape of Phycus (site CPSC2), Phycus (sites PHSC1 and PHSC4), Aptouchou (sites APSC13 and APSC14) and Kainopolis (sites KASC5 and KASC7) (for descriptions, measurements and plans see gazetteer section/Chapter 9).

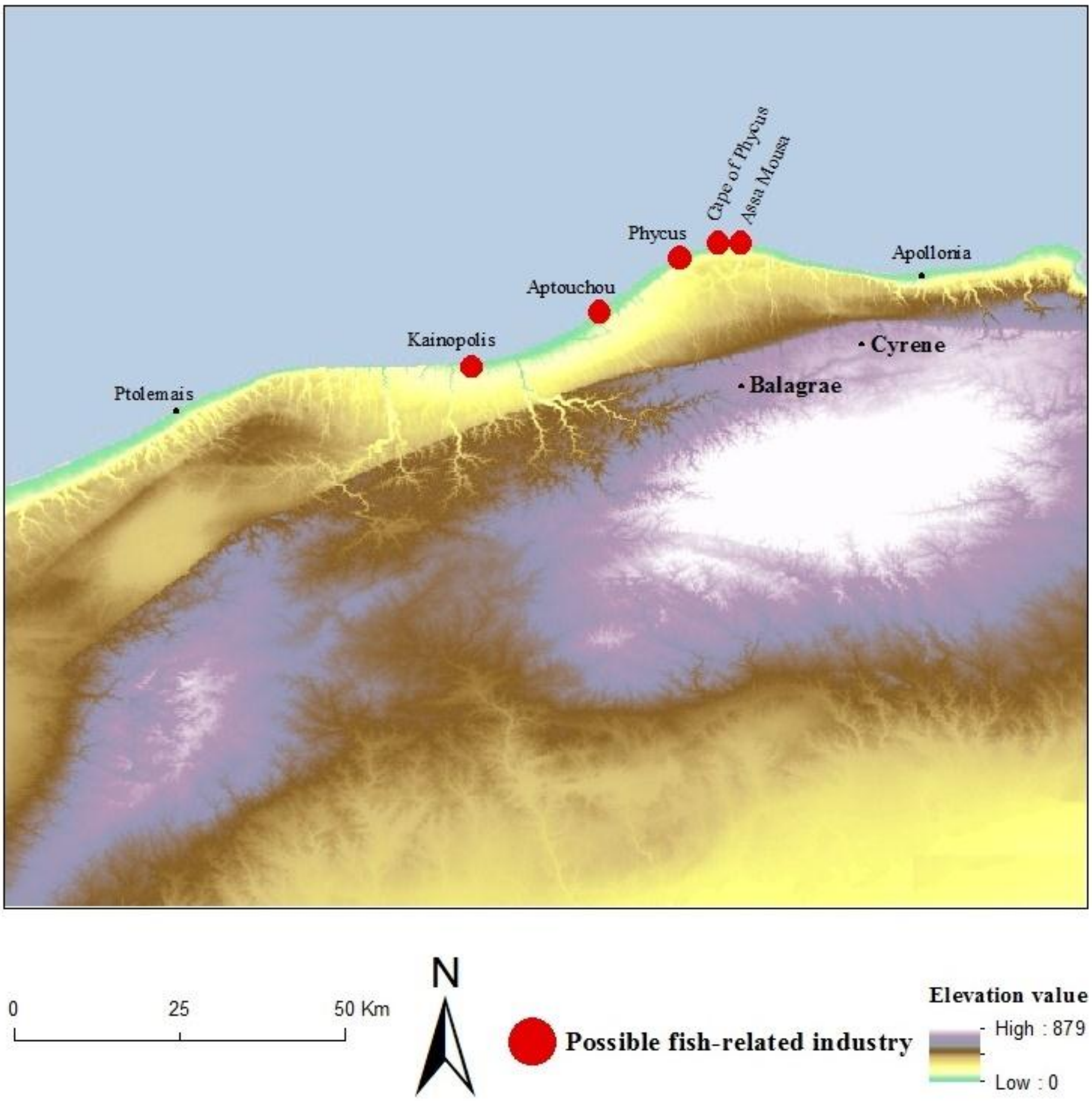


Figure 5-32: Possible fish-related production within my study area.

In evaluating the significance of the ancient Cyrenaican fish-processing industry, two points need to be considered. First, we must note the references ancient writers made regarding the high demand for marine products in the Roman period, especially the growing demand for fish sauces such as *garum* and *liquamen* (Curtis 1983; 1991; Trakadas 2005). Secondly, we need to assess whether this industry grew over time at coastal sites, whether by the construction of new sites or the development of pre-existing locations. Certainly the production of marine products seems to have increased during the Roman period in this area.

Synesius (letter 148) discussed the villagers who lived far to the south of Cyrenaica. He stated that there were no urban agglomerations, roads or commercial areas in that region. However, two important statements can be extracted from his writings. First, salt was produced and marketed in Cyrenaica's coastal regions. He said in the letter "the people here do not take to the sea, even for the purpose of getting their salt". Secondly, the people of Cyrenaica, or at least those living in urban sites, were aware of the importance of the sea as a source of food, as Synesius wrote that they "refuse to believe that the sea too is able to nourish mankind." The majority of evidence for fish processing concerns groups of vats. SCSC survey found three types of vats, which were circular or bottle-shaped, quadrangular shapes cut into the rock, and quadrangular shapes built from stone. All these types were lined with *opus signinum* (Fig. 5-33 and Table 5-9).

Type	Feature	Lining	Examples
Type I	Circular, cut into the rock	opus signinum	AMSC1; PHSC1; APSC13; APSC14
Type II	Quadrangular, cut into the rock	opus signinum	PHSC1
Type III	Quadrangular, built of stones	opus signinum	CPSC2; PHSC4; KASC5 and KASC6

Table 5-9: Type of possibly-fish production related features recorded along the coast of the surveyed area.

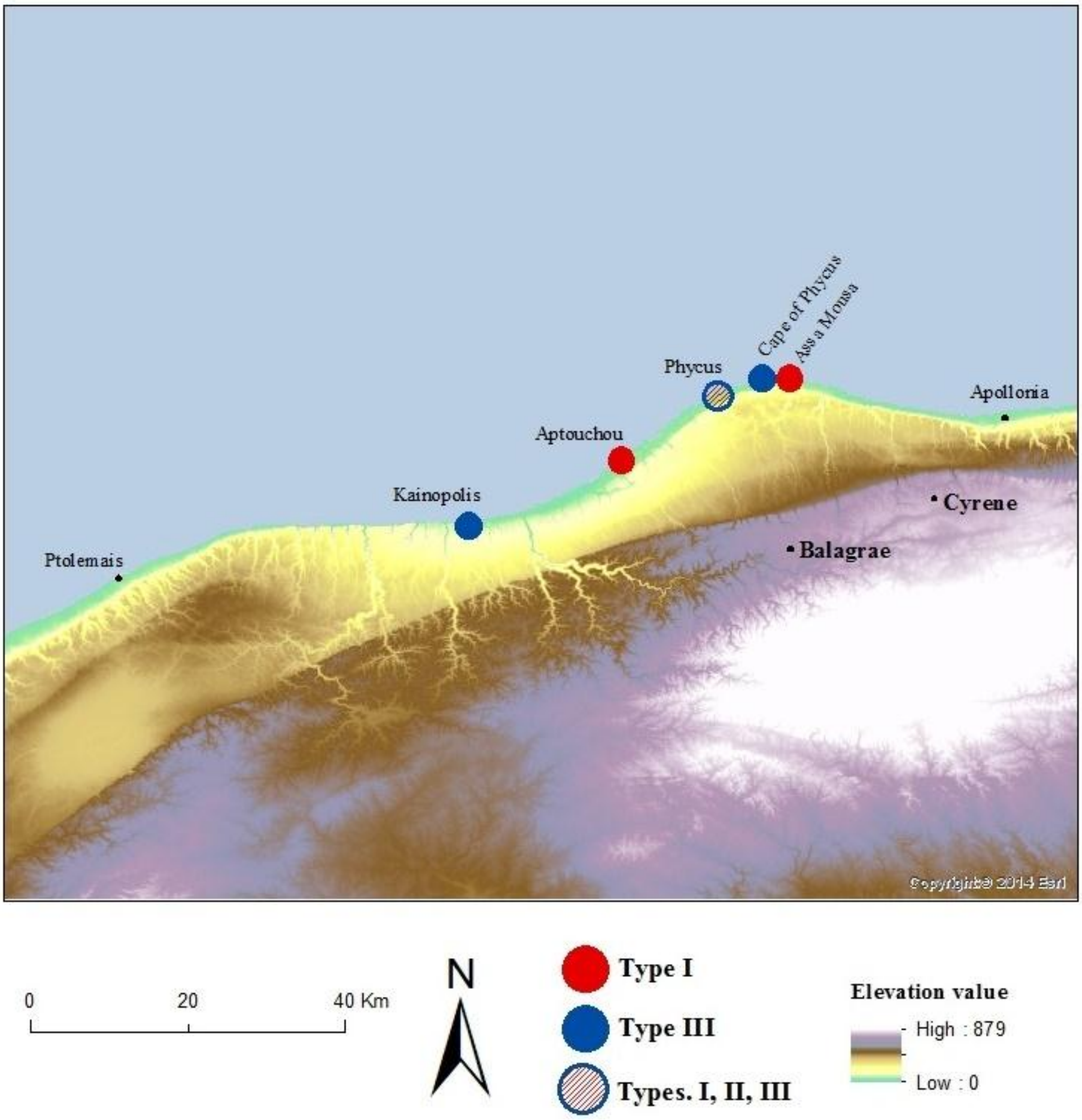


Figure 5-33: The distribution of the three types of possible fish vats along the study area.

5.3.2 The evidence from the archaeology – fish or other productions?

5.3.2.1 Circular and bottle-shaped vats

The installations recorded along the Cyrenaican shore offer possible confirmation of the large-scale use of vats (sites AMSC1, PHSC1, APSC13 and APSC14) on or a few metres from the sea, which raises questions about the exact purpose of their construction. If we assume theoretically that the main purpose of these vats was to keep and preserve fresh water, then it is unclear why a site such as PHSC1 (see site gazetteer/ chapter 9) at Phycus would need to reserve an area for 30 circular and bottle-shaped vats cut into the rock (Fig. 5-34). There are three wells (PHSC19, PHSC20 and PHSC49) (two of which are still in use today) a few hundred metres west of the promontory where the vats were cut. Why did they need these huge quantities of water? This thesis argues that they were clearly not used for the storage of fresh water.

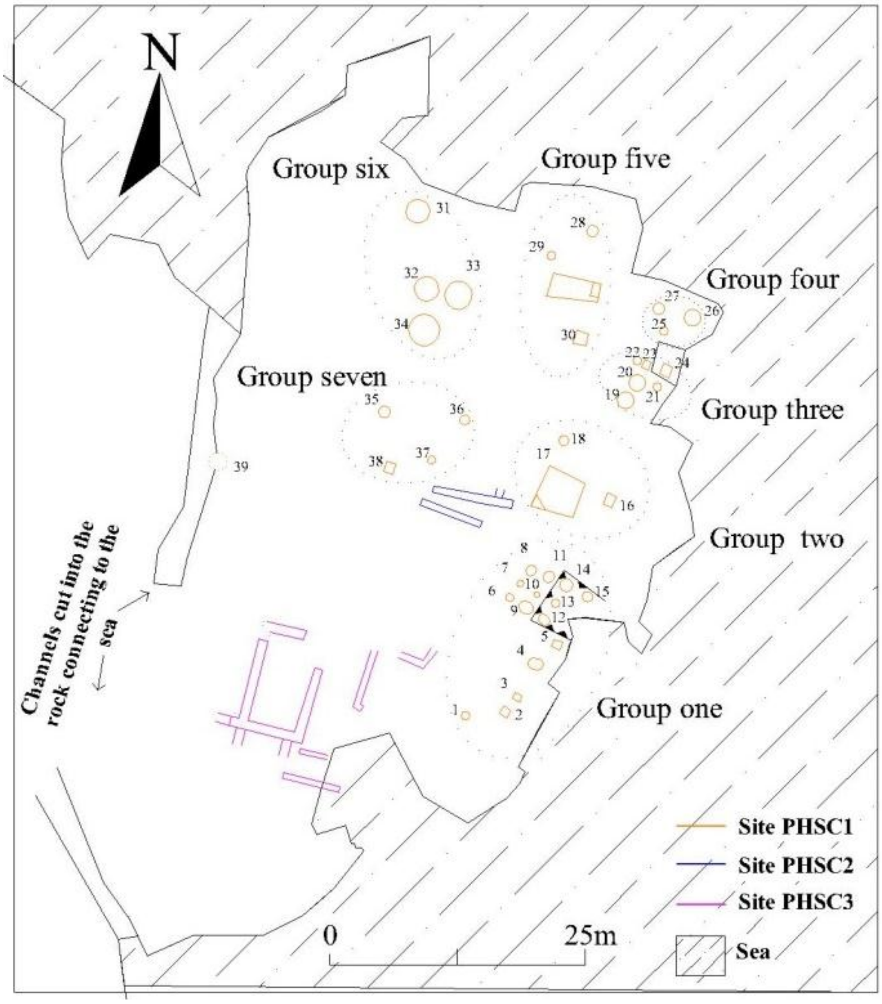


Figure 5-34: Map illustrating the density of the vats distributed in PHSC1 at Phycus.

Hypothetically, it would be more practical to build one large cistern for keeping water instead of building 6, 9 or 12 parallel vats containing small volumes of water. The deliberate arrangement of the vats also suggests that they were intended to be part of an elaborate process and used to make different types of products.

In addition, the water cistern found in Cyrenaica had a different geometric arrangement. In a personal communication, Ahmed Emrage confirmed that his recent field survey in Cyrenaica identified three types of water cisterns. The first type has a narrow opening (Fig. 5-35) leading to a huge water collecting square chamber, and can be up to 6 m deep. The second is a vaulted rectangular cistern containing one or more chambers (Fig**.** 5-36) divided by an arched wall. This type of water cistern has been found in different areas in Cyrenaica, such as Ptolemais and Cyrene (Kenrick 2013). The third is very large and rectangular, with a roof sometimes supported by a column.

Figure 5-35: Water cistern, type one. Facing north (Emrage forthcoming).

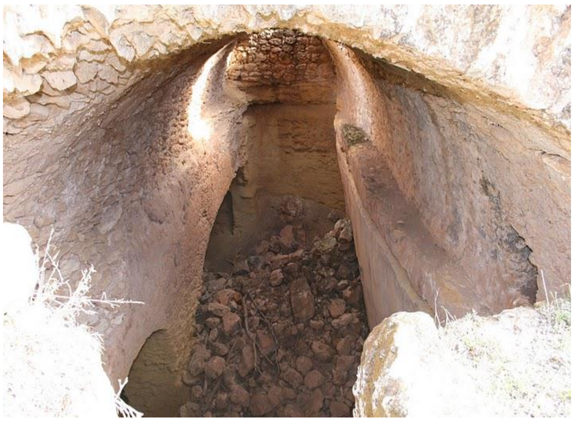


Figure 5-36: Example of a cistern found in Cyrenaica. Facing north (Emrage forthcoming).

It is certainly possible that some of the larger vats identified during this field survey were used for the collection and preservation of water. The quantities involved suggest that there was an industrial process being carried out nearby which required a huge amount of water.

One production process that can be rejected is purple dye manufacture, as the dye could not be produced with rock-cut vats. As Wilson states, “the production of purple dye required heating the shellfish, which could not be done in sunken vats” (Wilson 2006: 527). Wilson confirms that the new evidence from purple dye production sites at Meninx (Jerba) and Euesperides (Benghazi) suggests that the purple dye production process did not require vats (Tébar Megias and Wilson 2008; Wilson 2006).

Furthermore, the absence of any remains of murex shells or burnt remains at the sites described above supports this view. Indeed, these vats do not seem to have been intended for textile dyeing, leather tanning or rinsing (see section 5.4). Such tanks would require vats built above ground level with their bases at floor level (Tébar Megias and Wilson 2008; Wilson 2003).

Furthermore, the absence of permanent elements such as oil presses around these installations excludes the possibility that they were used for storing olive oil products. Presses were also mainly built in the hinterland of the main cities and not on the coast. This has been confirmed by recent works at Cyrenaica (Bentaher and Buzaian 2010; Buzaian 2009; Wilson 2001).

Two other production processes which these vats might have been involved in are wine fermentation and the production of fish-related goods. Wilson refers to a number of bottle-shaped vats which have a similar structure to those discussed above (Wilson 2001). These vats have been recorded inside the circuit walls of a number of coastal cities, namely Ptolemais, Taucheira, and Berenice. In terms of location, it is important to differentiate between the vats located inside the circuit walls of cities (*e.g.* those mentioned by Wilson), and those along the shore (*e.g.* those identified by the author in the surveyed area, those by the shore of Ptolemais mentioned by Yorke and Davidson, and another set of five vats located in the rocky area by the shore of Apollonia (Figs. 5-37 and 5-38) (Buzaian 2000; Flemming 1971; Lloyd 1977; Wilson 2001). Wilson argues that such vats are more likely to be associated with wine production using a treading floor.

However, Wilson does not use any concrete evidence to support his claims about the existence of treading floors associated with these vats. An exception is the vat at Taucheira, of which he seems to be uncertain. He writes that,

> *Since no olive pressing structures have been found nearby (such as orthostats, press beds or olive mills), I am inclined to believe that they were more likely to have been used for the fermentation of wine. This suggestion receives some support from the presence a little to the north, though not in strict demonstrable association with the vats, of a feature which I would identify as a wine treading floor* (Wilson 2001: 32).

Some doubts remain about the presence of fish-related industries within cities, as the production process would produce a strong and unpleasant smell (Curtis 1991). However, garum workshops have been found inside urban cities, including the garum workshops in ancient Hispalis in Spain (Amores et al. 2007), Pompeii (Bernal et al. 2009) and Sabratha in Tripolitania (Wilson 2007).

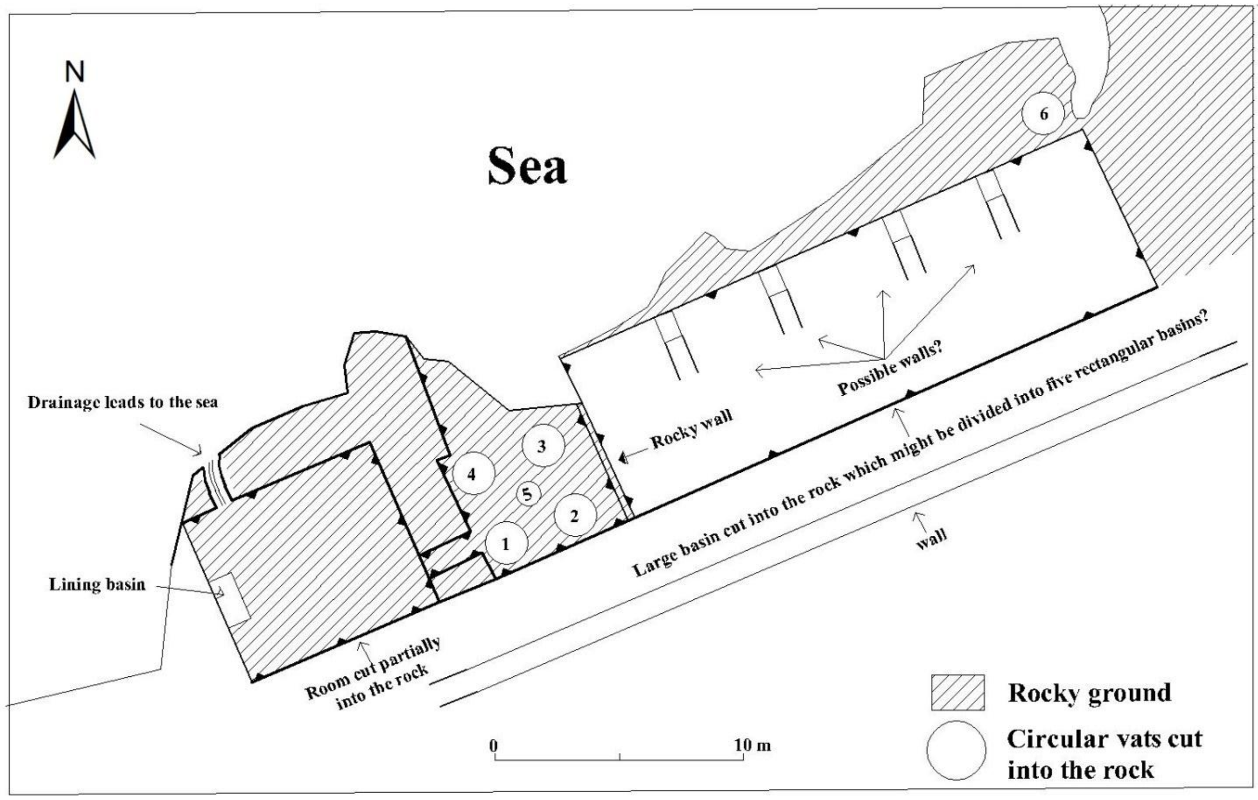


Figure 5-37: The possible fish installation at Apollonia.

It is worth adding that Wilson believes that the fish-salting vats are rectangular based on the Tunisian and Tripolitanian examples. As with kilns, we need to recognise the possibility that Cyrenaica had its own distinct traditions and a local preference for circular vats. Indeed, there is no sign of an associated treading floor near the vats, as mentioned by Wilson at Apollonia. Adding to this the occurrence of submerged *vivarium* (see below) (Flemming 1971) 100 m to the north-east of these vats, it seems very likely that these vats could have been associated with fish-related industries.

In addition, the presence of a large rectangular basin to the north-east of these five vats (see Figures 5-37 and 5-39), which seem to have been divided by rock-cut walls into five rectangular basins, raises the possibility that they might be related to salted fish tanks. Moreover, there is a room partially cut into the rock (Figs. 5-37 and 5-40) to the south-west of the five vats containing a drainage channel leading to the sea (Fig. 5-41), which could have used for fish preparation. There is another vat cut into the rock located to the north-east corner of the large basin.

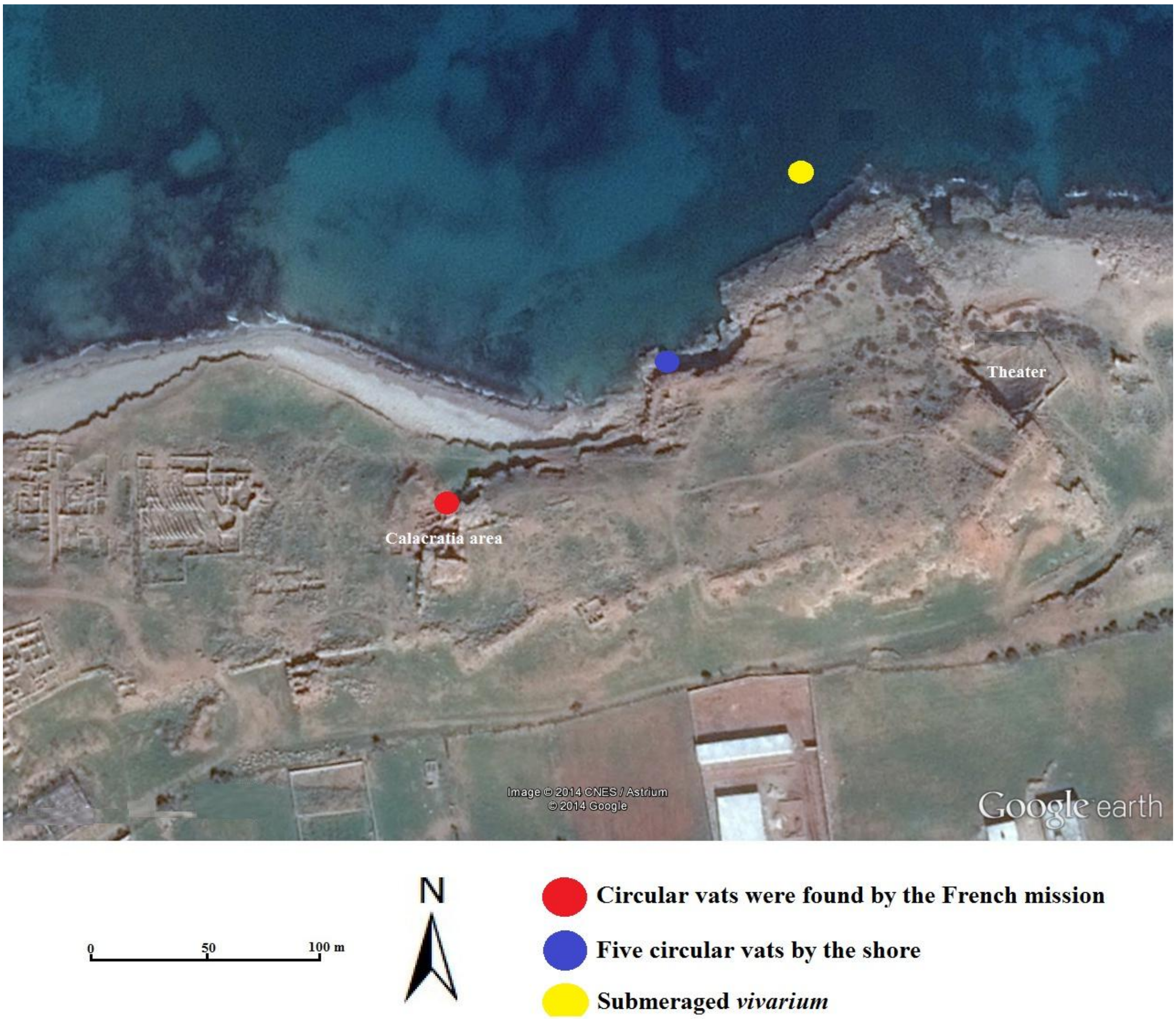


Figure 5-38: Distribution of circular vats and vivarium recorded at Apollonia.

Looking at another example from Apollonia, work carried out by a French mission revealed a house containing six vats with depths of 3 m sunk into the ground (see Figure 5-38) in a similar way to those found by the shore. Samples from the vats were taken for chemical analysis, although the initial results did not show any evidence of fish processing. Subsequently, the chemist who conducted the analysis wrote in a personal communication to the present author that when the results from the Apollonian vats were compared with those from other fish production sites around the Mediterranean, it became possible to suggest that fish sauce might be present. If new chemical evidence arises which confirms that fish products were in these vats, it strongly suggests that such vats could be involved in fish production in some way.

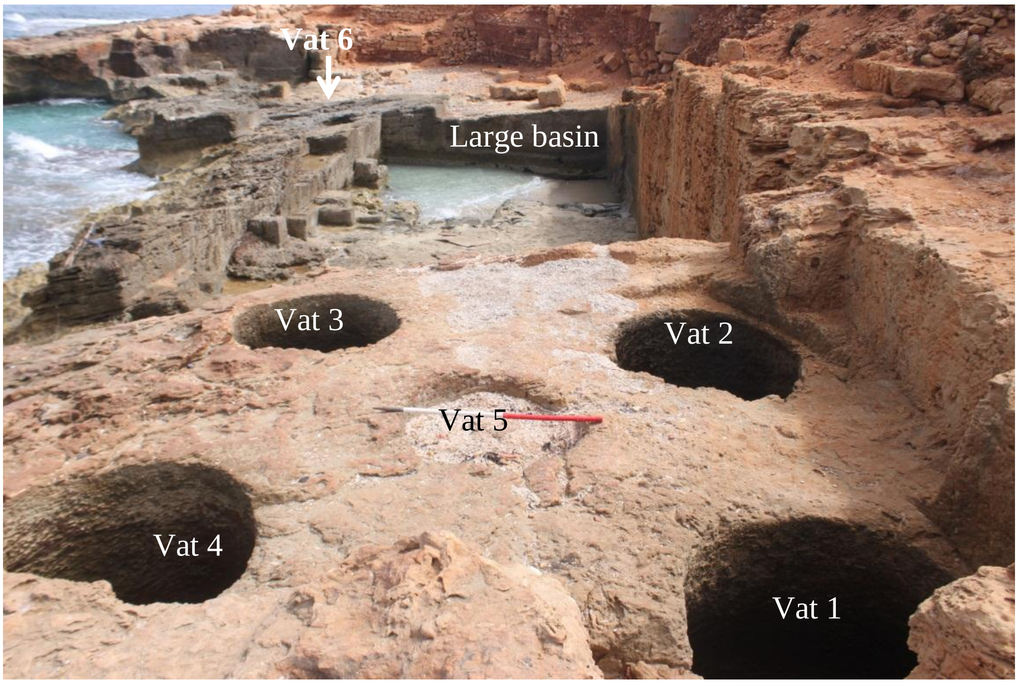


Figure 5-39: The circular vats by the shore. Looking north-east.

Figure 5-40: The south-western room near the five vats. Looking north-east.

Figure 5-41: Drain in the south-west room. Looking north.

No square or rectangular areas with drainage which might have connected to these vats seem to exist in the survey area, except at one site further inland (see section 5-3.). This excludes the hypothesis of an association with wine-treading vats, such as the vat found at the ancient site of Balagrae (Bentaher and Buzaian 2010; Buzaian and Bentaher 2002).

Also, it would be a mistake to assume that wine was pressed inland and then brought in animal skins to the shore for storage in these vats while awaiting shipping. This would have been impractical for several reasons, not least the multiple transhipments of wine or olive oil between pressing and shipping. Additionally, cutting one large vat in the ground instead of six would make it easier to store a single type of substance (as explained above for water). Additionally, it would make more sense to fill wine or olive oil directly into amphorae from transport skins and then to store them in a warehouse while waiting for shipping, marketing or local consumption.

The existence of these vats a few metres from the sea and on the promontories and small islets seems to suggest that they could have been used for fish-related products. Similar examples cut into the rock in the promontory have been noted by the shore at Ptolemais (Fig. 5-42). These vats were initially interpreted as a fish factory (Yorke and Davidson Forthcoming). Supporting this view are the large quantities of fish-related production sites found along the shores of the Mediterranean. Some of these facilities were cut into the rocky areas.

Figure 5-42: One of the circular vats recorded along the promontory of Ptolemais.

Identical forms were found in different locations along the Tunisian coast. For example, 153 vats cut into the rock were found at the ancient site of Gummi (Mahdia). These vats were built in four shapes: 64 were circular or nearly bottle-shaped, 39 were rectangular, 5 were cylindrical, and 1 was square (Ameur 2005). This set of vats lies on a peninsula which overlooks the passage used for seasonal fish migration (Fig. 5-43). Similar geometrical structures and shapes were found at other sites in Tunisia, such as Thaenae, Sullecthum, Sidi Daoud and El-Mamoura (Fig. 5-44), and have been interpreted as *cetariae* for the fish industry (Ameur 2005).

According to Yorke and Davidson, a number of circular fish vats cut into the rock were found at Tipasa in Algeria, while other rectangular fish tanks cut into the rock were found at the ancient site of Cherchel (Yorke and Davidson 1969). In southern Spain and Morocco, more fish production tanks of different sizes and shapes have been found cut into the rock (Trakadas 2004).

Some of these features seem to have the same character as those found on the Cyrenaica coast. For example, circular vats which had been sunk into the ground were also found at the ancient site of Baelo. Furthermore, in Ceuta large circular lined holes have been found cut into ground located within a fish installation.

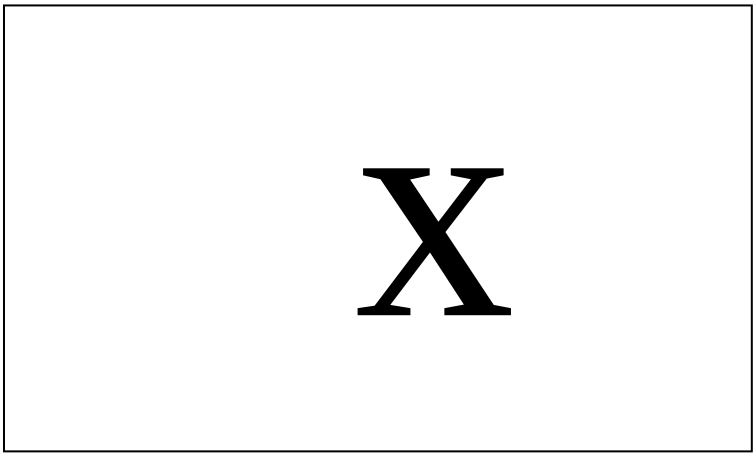


Figure 5-43: Rock-cut fish vat from the ancient site of Gummi in Tunisia (Ameur 2005: 76).

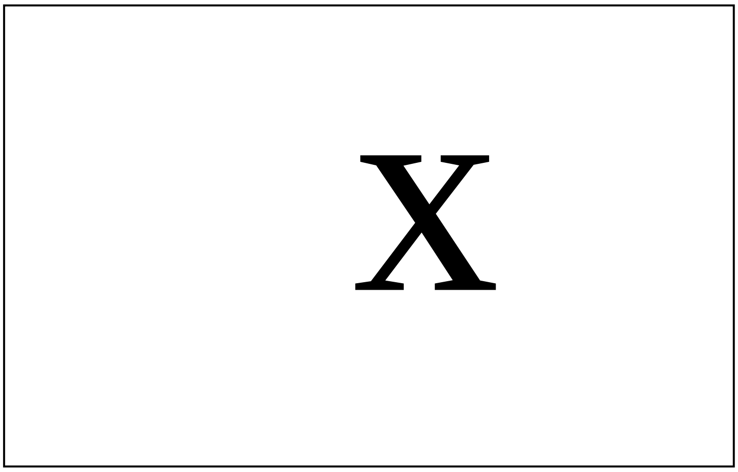


Figure 5-44: Rock-cut fish vat from the ancient site of El-Mamoura in Tunisia (Ameur 2005: 71).

It is worth mentioning that the features found in fish production sites such as Calpe and Punta de L’Arenal have been interpreted as vats for producing fish sauces (Trakadas 2004). In Crete, which faces the Cyrenaican coast, rows of vats which vary in size were found cut into the rock at Chersonesos were used to catch and keep fish during the migratory seasons, to be sold later in the markets rather than used as breeding basins (Davaras 1974). Similarly, several rock-cut tanks used for breeding or holding fish for salting which were connected to the sea by channels were found in Tunisia (Slim et al. 2004). Similar tanks connected to the sea by channels were also identified in Apollonia (Flemming 1971) and other sites in Cyrenaica.

Producing fish sauces (*garum*) does not require a specific shape or size of container. Manilius and Columella state that salted fish were placed in succession in large cetariae or ceramic containers (Manilius 5.656-81; Columella 12.55.4). Supporting this idea, the dolia found in the garum workshops at Pompeii suggests (Fig. 5-45) that they were used as containers for making *garum* (Bernal et al. 2009; Wilson 2006). Also, the workshop found at Hispalis had three dolia containing fish remains (Amores et al. 2007). The circular shape is highly suggestive of an installation used for making *garum* sauce as such structures facilitate stirring, which is part of the production process (Trakadas 2005).

Figure 5-45: Dolia found in the garum workshops at Pompeii (Hesein 2014).

5.3.2.2 Rectangular vats

A second set of what seems to be fish tanks consists of rectangular tanks set next to each other. These tanks were found in different locations in the surveyed area; for example, rectangular and square vats were recorded within sub-sites PHSC1 and PHSC4 (Fig. 5-46) at Phycus, site CPSC4 (Fig. 5-47) in the Cape of Phycus, and at sites KASC5 and KASC6 within ancient Kainopolis. It is difficult to trace the entire structure of these tanks as most of them have been covered by sand or disturbed by human activities. Large-scale excavations are needed to obtain a comprehensive picture of the remains, their depth and their exact function. The structures are probably sets of tanks of different shapes and sizes, although they are mainly rectangular. There are two main types of structures. The first were built of brick, and their interior walls were faced with opus signinum (*e.g.* sites PHSC4, CPSC4, KASC5 and KASC6). The second type was cut into the rock in the promontory area. The only recorded examples of these were found within site PHSC1.

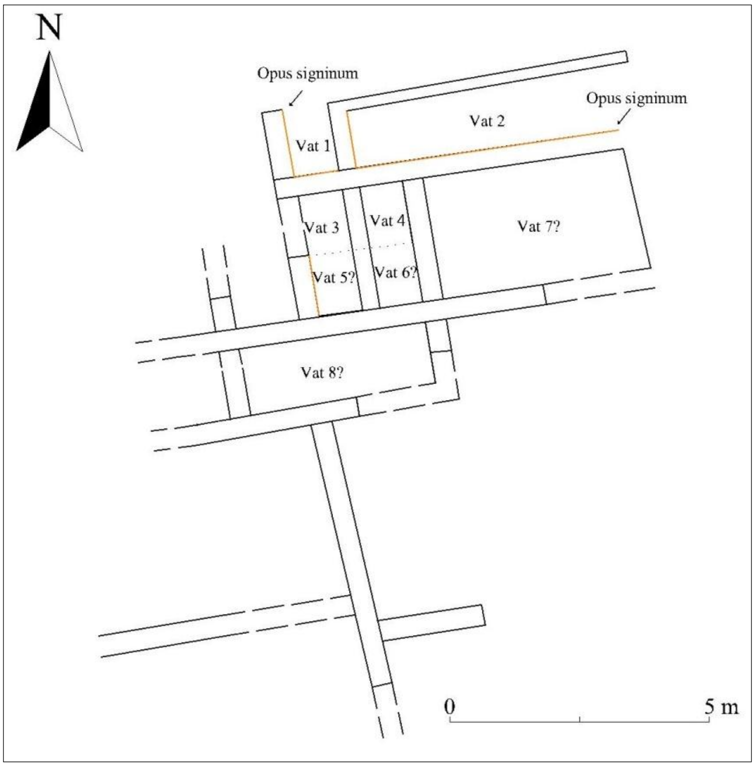


Figure 5-46: Sub-site PHSC4 at Phycus.

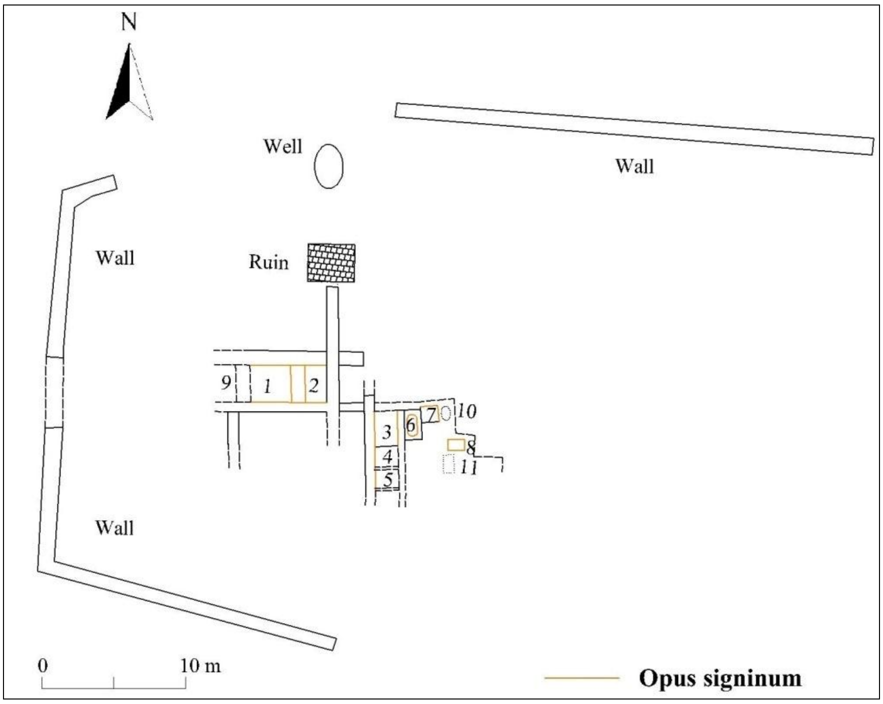


Figure 5-47: Map showing the quadrangular vats within sub-site CPSC2 at the Cape of Phycus.

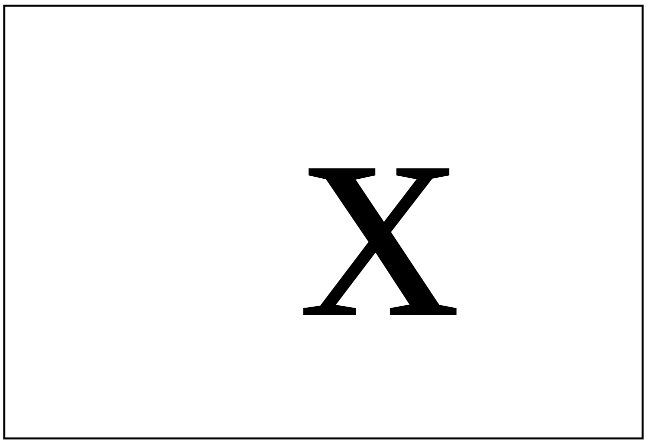


Figure 5-48: Two vats lie to the north of Byzantine wall at Sabratha. They were interpreted as fish salting vats (Wilson 2006: 36).

However, this thesis' preliminary interpretation is that they were fish salting tanks, based on their size, shape and location close to the sea. These tanks seem to have the same structural format as the examples found in Sabratha (Fig. 5-48), and have been interpreted as salted fish tanks by Wilson (Wilson 1999) along with those found along the Tunisian coast (Ben Lazreg et al. 1995; Slim et al. 2004). The square and rectangular tank shapes are probably the most common types for the salted fish *cetariae* that have been found around the Mediterranean basin. The second type has also been found in different places across the Mediterranean. Identical fish vats (*cetariae*) were found cut into the rock in the promontory areas along the coast between Santa Pola and Punta de L'Arenal (Fig. 5-49) (Trakadas 2004).

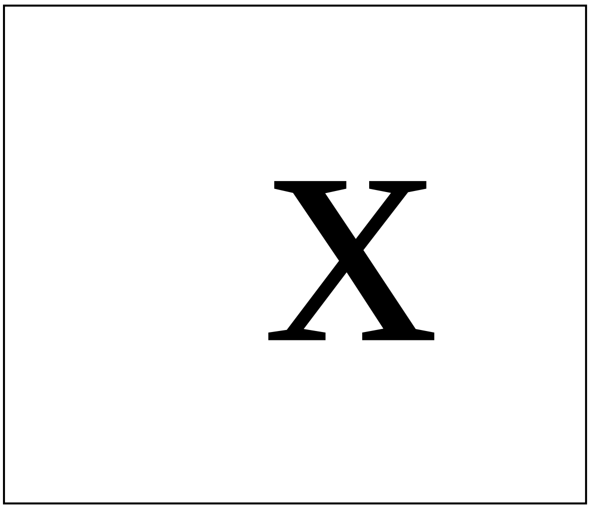


Figure 5-49: Cetariae cut into the rock at Praia de Angeiras (Trakadas 2004: 59).

5.3.2.3 Vivaria

Two sites were identified as *vivaria* along the coast of Cyrenaica. The first site which suggested the presence of *vivarium* was located on the eastern boundary of Apollonia. It is a submerged *piscina* which lies about 150 m to the north-west of the theatre and about 15 m from the shore (Flemming 1971). The second example is a set of three submerged basins which are believed to be *vivaria* (Flemming 1971) located at the ancient site of Phycus. They lie about 60 m to the north-west of site PHSC4, and have been interpreted as salted-fish tanks (see above).

Apollonia's *vivarium* seems to have has a fairly complex design (Fig. 5-50). It is a rectangular basin cut into a wide rocky area. The *piscina* measures about 750 m^2 (50 m long x 15 m wide), while the depth of the *piscina* could not be identified as the ground area was full of rubble, pottery and fragments of marble (Flemming 1971). It is remarkable that this total area is much larger than the *vivaria* recorded along the Tunisian coast (Slim et al. 2004), or in other Mediterranean areas such as Levant and Greece (Marzano 2013).

However, at both ends of the *piscina* (eastern and western sides), low walls divided the internal basin into compartments. This type of division suggests it was designed to keep different species of fish separate (Flemming 1971; Marzano 2013). According to Flemming, it is noticeable that the *piscina* is surrounded from the southern, eastern and northern sides by a pathway cut into the rock at a depth of 2.5 m and a width of 2 m. On the southern side of the pathway, steps lead to the internal side of the *piscina*. There is a wall rising about 1.5 m above the pathway from the northern side. This wall seems to have served as a parapet to protect the *vivarium* from high waves.

There are two square blocks in the internal centre of the basin, each measuring 6 m x 6 m with their surface level with the surrounding pathway. It has been suggested that "the size of the pool made it difficult to catch the fish, and to facilities this, the small islands were connected to the sides by planks" (Flemming 1971: 113).

In terms of water circulation, the *piscina's* engineers used four sluice gates to act as inflows and outflows, keeping a degree of water circulation inside the *vivarium*. The first (channel 1) lies north-east of the corner of the *piscina*, and is a 1 m wide channel cut into the pathway and parapet. Channel 2 lies about 23 m to the west of channel 1 and is approximately 1.5 m wide. Channel 3 is located about 10 m to the west of channel 2, and is the largest sluice gate at approximately 2.5 m wide. Channel 4 in the north-west corner seems to have been directed to face the north-west winds and sea currents.

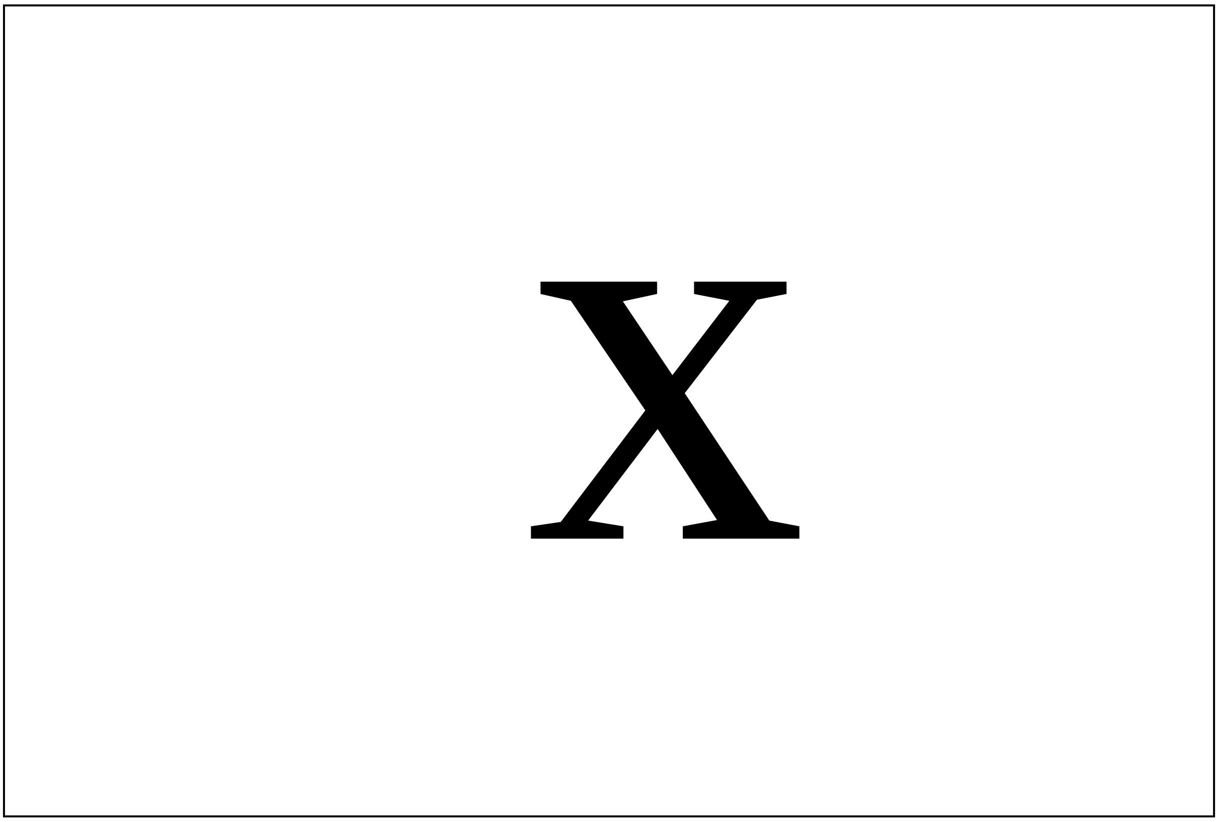


Figure 5-50: The submerged vivarium recorded at Apollonia (Flemming 1971: 112).

This channel might have acted as an inflow in order to maximise the flow of water to the enclosure, while the north-east channel served as an outflow. This systematic distribution of channels was an attempt to keep the *piscina* as fresh as possible.

The *vivaria* identified at Phycus, on the other hand, seem to have been similar to the sample rock-cut fishponds recorded along the Tunisian coast (Slim et al. 2004) and in Crete (Davaras 1974). This type of *piscina* is smaller than those recorded at Apollonia (Flemming 1971) or along the Tyrrhenian coast (Higginbotham 1997; Marzano 2007; 2013). Generally, it is a rectangular cut-rock basin with a basic structure. Phycus' *vivaria*, as with many others of this type, use a single channel which allows the sea to flow into the enclosure.

It is possible that the existence of *vivaria* at ancient Phycus and Apollonia near to what are believed to be fish salting vats increases the likelihood that these vats were involved in a fish-related industry. However, the small size of the *piscina* recorded at Phycus raises question about whether they were a temporary holding area used for keeping the fish alive ahead of the next process. However, the *piscina* found at Apollonia seems to have been used for long-term fish breeding.

5.3.2.4 Vat volume and capacity

It is difficult to estimate the volume and total productive capacity of these vats. However, it is possible to draw some preliminary rough estimates of the total capacity of the vats recorded in SCSC field survey.

Estimates can be obtained for vat number 25, found within site PHSC1 at ancient Phycus, which had a total capacity of 5.25 m^3. This vat is one of the best preserved and most exposed vats, with a known depth of 2 m (Figs. 5-51 and 5-52). This vat seems to have been a medium-sized specimen as larger vats were found within the same site, such as vats 32, 33 and 34. Vat 25 will be used as a standard for the calculation of the other recorded vats.

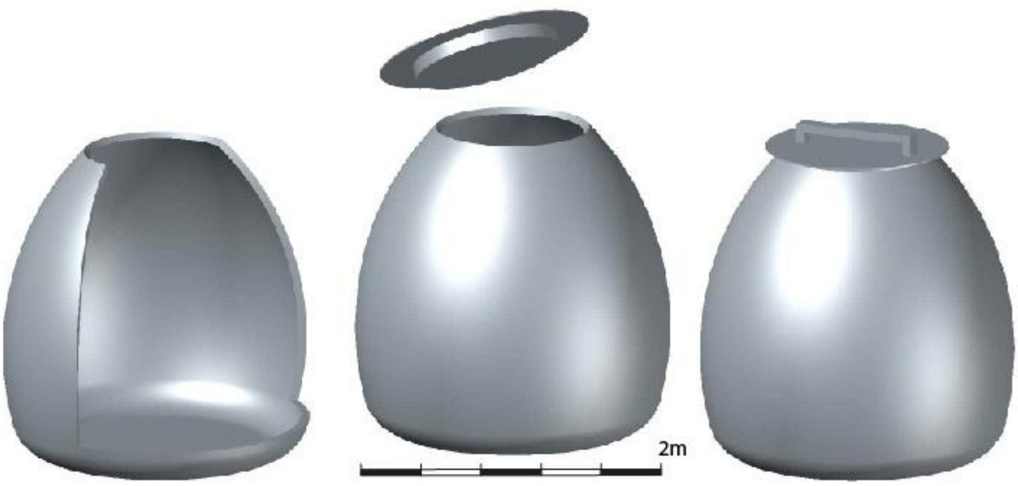


Figure 5-51: A vat similar in shape to vat 25 (Hesein 2014).

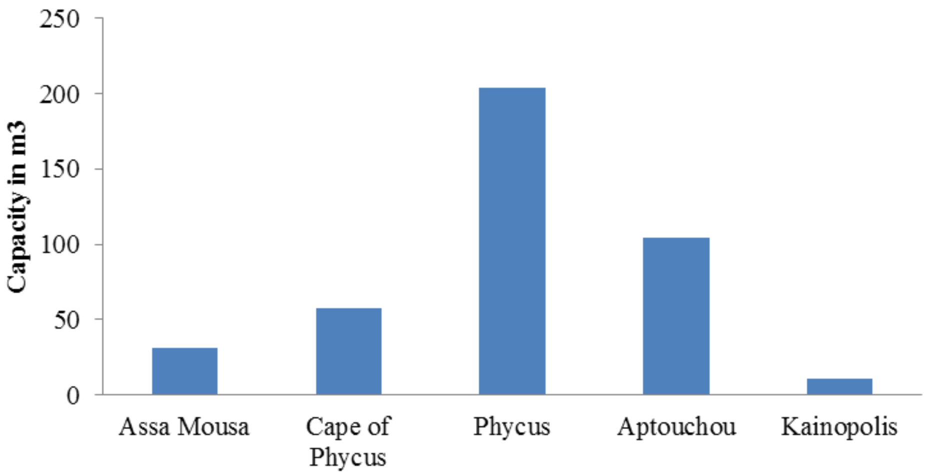


Figure 5-52: The average capacity in cubic meters of each individual recorded site along the study area.

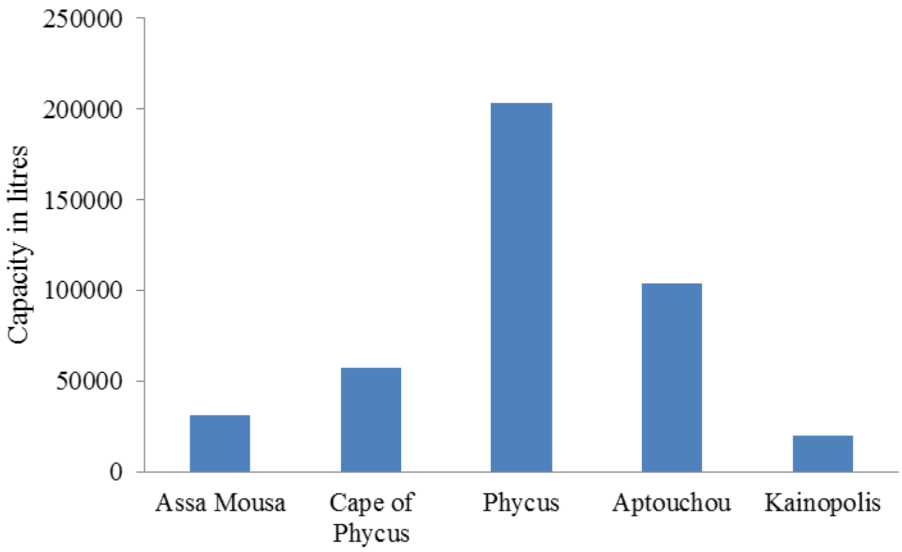


Figure 5-53: The average capacity in litres of each individual recorded site along the study area.

According to this calculation, it can be argued that ancient Phycus has the highest volume capacity of production. The total capacity of the recorded vats at the site is estimated to have been *c.*20,397 m^3, which equals *c.*20,397,000 litres. Aptouchou ranks second, with a total estimated vat capacity of *c.*104.6 m^3 and *c.*104,000 litres (Fig. 5-53). It is noticeable that the estimated figures from Phycus and Aptouchou seem to greatly surpass the total estimated capacity of the fish-salting workshops identified at Sabratha, which was *c.*98 m^3 (Wilson 1999; 2007). Meanwhile the capacity of other sites, such as Assa Musa, the Cape of Phycus and Kainopolis, are estimated at *c*.31.38 m^3, *c*.57.53 m^3 and *c*.10.46 m^3 respectively.

The average total capacity of all sites	
Cubic meters	*c*.40,794
Litres	*c*.415,910

Table 5-10: The average total capacity of vats recorded within the study area in cubic meter and litres.

To conclude, the estimated total capacity of recorded vats shown in Table 5-10 suggests a high level of production which would leave a surplus for export, as such a quantity could presumably not be consumed locally.

5.3.3 Salt pans (salinae)

Salt is a precious material, as it forms the main ingredient for the bulk of foodstuffs and food production, including salted fish, meat and other products. Although Synesius mentioned the existence of *salinae* along the Cyrenaican coast (see above), and there seem to be the remains of fish installations (see above) that would have required large amounts of salt, no salt works have yet been recorded at Cyrenaica. However, one site recorded during my field survey could be a candidate for a *salinae*: the site located at ancient Kainopolis. Site (KASC1) possesses a set of 12 vats with a depth of 0.2 m, and seems to have been involved in salt production (Fig. 5-54). However, there does not appear to be a channel to feed the basins with seawater. This leads to argue that these salt pans might have been filled with water by workers rather than by a canal connected to a sluice gate. The evaporation process might have occurred in these 12 vats, with the brine then being transferred to the two circular vats a few meters to the west (see Chapter 4) for the final drying.

A similar example of circular salt pans not connected to a canal has been recorded in the Mediterranean (Marzano 2013). At ancient Caria in Turkey, 48 circular salt pans with a diameter of 4.28 m and a depth ranging between 0.14 m and 0.18 m were found (Caumtis 2008).

Figure 5-54: Possible salt pans at site KASC1 in ancient Kainopolis. Looking north.

I have previously suggested that sub-site KASC1 might be related to fish production (Hesein 2014). Also, the key criteria here are the salt's shallow depth and the lack of *opus signinum* lining in comparison to the fish-salting tanks.

5.3.4 Conclusion

The square and rectangular vats scattered along the shore of Cyrenaica, such as those at Phycus and the Cape of Phycus, can be attributed with some confidence to the production of salted fish. However, the neighbouring bottle-shaped vats should be interpreted with caution at the present time. Wine fermentation is one possibility, but *garum* production should not be discounted.

Large-scale excavations and chemical analyses are required to prove this idea conclusively and to provide evidence for what was manufactured at these sites. This thesis' interpretation is based on a comparison of vats of similar shapes and sizes along the coast of North Africa, and the location of these vats close to the sea. It seems likely that the function of these sites could be related to fish processing, with *garum* production being carried out in the bottle-shaped vats and salted fish production in the rectangular or square tanks. The large volume of estimated production is significant and suggests the presence of an intensive and large-scale export trade.

5.4 Other Productions and Processes (Wine, Purple Dye, Fulling and Tanning)

The SCSC survey has recorded a number of sites along the surveyed area which seem to have been involved in different production and processing activities. For instance, wine production was recorded in two areas along the coast of the surveyed area. Evidence of large-scale wine production was recorded at the site of Noat 1 (NOTSC) (see gazetteer/Chapter 9). A total of 23 dolia and another 15 rock-cut vats were identified (Fig. 5-55). Two types of wine processes seem to have been carried out at this site. The evidence of press elements, such as counterweights, possible crushing stones and orthostats cut into the rock suggest that wine was produced here using a press. Also, wine production using a treading floor seems to have occurred at the site. There is a second example in Phycus, where at sub-site PHSC48 in particular there is evidence of small-scale wine production. Two circular vats have been recorded which were connected to each other by a channel. There are also traces of another channel connected to these vats and to a flat area where grapes were probably trodden.

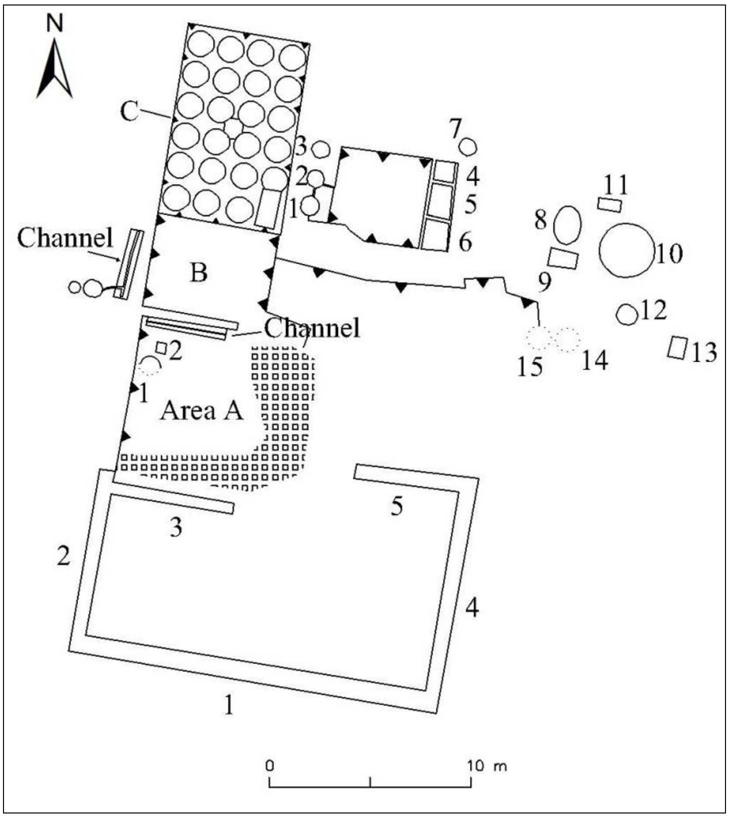


Figure 5-55: Wine production workshop at Noat 1.

Clear evidence of purple dye production has been recorded at two sites along the Cyrenaican coast. Signs of purple dye manufacturing were recorded at Euesperides (Wilson and Tébar Megías 2008) and Cheressous (see gazetteer/Chapter 9), including dumps of the murx shells from which the dye was extracted. However, the lack of evidence of purple dye production at other sites along the survey area leads one to suggest that this production was only carried out on a small scale to meet local needs.

At sub-site PHSC18 (see gazetteer/Chapter 9) in Phycus, a number of recorded vats were found which appear to be different to those fish or wine vats documented above in terms of their size and distribution within the workshop. However, the recorded vats seem to be similar to the fulling tanks recorded in different parts of Mediterranean (Flohr 2003; 2013; Wilson 2003) (Fig. 5-56). Therefore, this similarity may support the suggestion that these vats were involved in the fulling process.

There is also a possibility that tanning was carried out at Noat 2. In fact, the structure of the vats recorded within this site - being circular and built of stones above ground level, and lacking evidence of press elements or a treading floor - leads to the assumption that tanning could indeed have taken place (see Figure 4-21). A final point to be mentioned is that three circular kilns were recorded at sub-site PSCS56 within Phycus (see gazetteer/Chapter 9). These kilns seemed to have been used for lime production (see Figure 9-78).

To conclude, presented here is a mere introduction and brief acknowledgment of these possible activities. However, these proposed production processes need further investigation. More excavations and analysis are needed to expand our knowledge and understanding of these important subjects.

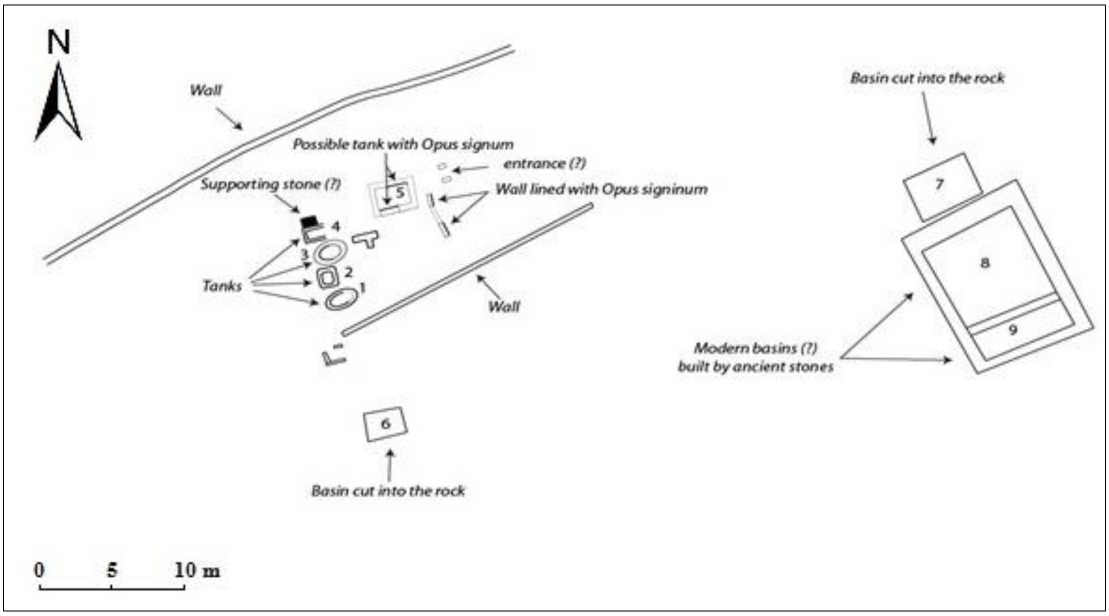


Figure 5-56: Site PHSC18 at Phycus.

5.5 Conclusion

The archaeological evidence presented in this chapter suggests that the coast of Cyrenaica was heavily involved in productive activities. The most significant part of this chapter is the analytical study of the new data relating to industrial features such as ceramic and fish-related production, and a typology of some of these recorded features. This data has allowed a new perspective on Cyrenaican production and trade for the local and export markets.

Chapter 6: Typology and Chronology of Cyrenaican Harbours

6.1 General Introduction

This chapter sets out an initial typology of Cyrenaican harbours and examines the role of these ports within a chronological framework. The trade networks linking the harbour areas with their hinterlands and the main urban sites in Cyrenaica are also investigated. Establishing a preliminary typology of Cyrenaican harbours will assist in gaining an understanding of the role of each harbour, and hence the roles of large and small harbours in regional trade networks. This analysis also aims to create a model for Roman harbours which will further our understanding of the wider role of major and minor harbours around the Mediterranean basin.

The chapter is divided into four sections following this general introduction (6-1). Next, part 6-2 examines the different types of Cyrenaican harbours. Following this, part 6-3 addresses the role of these harbours and how they interacted with each other. This is followed by section 6-4, which addresses port chronologies. Section 6-5 summarises the findings.

6.2 Port Typology and Hierarchy in Cyrenaica

6.2.1 Introduction

The last two decades have witnessed a growing interest in the commerce of the Roman provinces. Although ports can be a strong indicator of the scale of socio-economic growth in any region (Karmon 1985), little is known about the types of ports present in Cyrenaica, their roles, or the extent of their connectivity (Blackman 1982a; 1982b).

There are two types of modern research on harbours. Most substantial projects have concentrated on the mega-ports such as Portus and Alexandria (Keay et al. 2005; 2012), or on other major ports such as Carthage and Leptis Magna (Bartoccini 1958; Hurst and Duhig 1994; Hurst and Roskams 1984). These studies tend to focus on the ports themselves, and pay little or no attention to neighbouring subsidiary harbours and their connectivity with each other. In other words, little attempt has been made to understand their role in either the local or wider contexts. .

The second type of research has endeavoured to establish a hierarchy of Roman harbours according to their economic capacity (Schörle 2011; Stone Forthcoming; Wilson et al. 2012). This has been estimated by calculating the facilities of artificial harbours, such as the area of the harbour's basins as well as their wharves and quays. There is no doubt that this method increases our understanding of the economic growth of the region and the total capacity of these particular harbours. However, this method is only effective for ports which possess artificial features where such calculations can be made. The literature is thus still confined to a limited number of ports.

The scale of investment in harbour construction and infrastructure, however, can be the clearest gauge of the scale of seaborne trade and communication at both the inter- and intra-provincial levels. The existence of advanced harbour facilities and infrastructure can certainly play a major part in reducing ship losses and cost value. The frequency of shipwrecks was highest between the second century BC and the second century AD, and they dropped sharply after this date (Parker 1984; 1992). Some scholars argue that this was due to the development of the infrastructure of artificial harbours (for more discussion of this see, Robinson et al. 2012; Robinson and Wilson 2011b; Wilson 2011). Improved harbours were better able to handle and moor vessels and load and offload goods.

Nonetheless, our knowledge of these matters is still limited. Most studies are patchy and confined to investigating harbours with artificial features. The ambiguity of the available information can be summarised in the following points:

1- Most publications have concentrated on major harbours and have paid little attention to ports as key elements of trading relations.
2- Few studies have combined underwater investigations with land surveys and excavations, leading to gaps in our knowledge about both harbours and their vicinities.
3- There is a lack of studies on connectivity and trade routes, and on the networks that linked harbours with their hinterlands, productive areas and major urban agglomerations and emporia.
4- More studies are needed that aim to enhance our understanding of the hierarchies of harbours and how major, secondary and ancillary harbours interacted.

Two main types of maritime shipping have been suggested by scholars. These are inter-provincial and intra-provincial ports (Arnaud 2005; 2011). The first *(le grand cabotage)* involves long-distance trade and sailing through open sea, while the second *(cabotage)* was more likely to involve short voyages with ships sailing along the coast from harbour to harbour (Arnaud 2011; Wilson 2011). It should be noted that the term ‘cabotage’ has been widely debated, and its meaning and role has been misunderstood as some scholars have wrongly identified cabotage to mean tramping. For more discussion and details of the exact meaning and role of cabotage and how it is different from tramping, see Arnaud (2011).

Blackman (1982) suggests that there were five principal types of harbours in antiquity. The first type is the commercial harbour, which dealt with the export of local commodities. The second type refers to those harbours built around industrial areas. The third category is the refuge or sanctuary harbour. This type was usually linked to a city and provided shelter from storms and winds. The fourth type refers to military harbours, which would be separated or partially-separated from commercial harbours. The most famous examples of this division can be seen in Apollonia. Laronde (1986; 1990) argues that the inner basin of the Apollonian harbour was likely intended to be a military harbour. The fifth type is the private harbour. Blackman defined another sub-type of harbour related to passenger traffic, which would be used by ferry services operating across straits and rivers (Blackman 1982).

Similar divisions are discussed in Schörle’s (2011) recent study conducted on the harbours of central Tyrrhenian Italy. Schörle (2011) argued that four types of harbour were used in this area. The first were the major ports involved in long-distance trade and commerce. The second type concerns industrial harbours, which also seem to have been involved in long-distance trade. The third type is the port of call or service port. This type seems to have acted as a shelter for ships in bad weather, supplying them with water and food. The last category is the private or villa harbour (Schörle 2011) (see Table 6-3).

Undoubtedly, the two typologies of harbours discussed above are reasonable and rational. However, they are both also loose and broad. They lack information about the relationship between each type and their wider commercial interactions. Also, they neglect other important types of harbour, such as the secondary harbours which played a key role in the economic growth of their neighbouring major ports. Additionally, Schörle's divisions are based only on artificial harbours and paid little or no attention to natural ones.

Another question to be answered is what the terms 'port of call' and 'shelter port' actually refer to. For many reasons it is not rational to establish a port just to shelter ships from bad weather or to provide passing ships with water and food. Ports are generally set up to provide a package of services, which can vary according to their size and suitability for accommodating vessels. The main services they offer include the transport and redistribution of commodities, for example to other local or more distant ports. Providing ships with food, water and shelter would have been secondary functions. It would have been more practical for a ship experiencing difficulties to steer into the nearest port no matter its size, or even into a mere natural bay. It is important to mention that Nieto (1997) has initiated a debate about the trade patterns between major and secondary ports.

However, little is known about the hierarchy of Cyrenaican harbours, as data regarding their typology, roles and chronology is largely missing. Few studies have investigated the harbours and their construction, and those which have tend to focus on a few major ports along the Cyrenaica coast, such as Apollonia and Ptolemais (Kraeling 1962; Laronde 1987; 1990; Laronde and Sintés 1998; Nowakowski et al. 2011). These studies, as discussed above, are mainly concerned with the cities and pay little attention to their harbours.

6.2.2 Typology of Cyrenaican harbours

A set of parameters have been employed to establish this study's provisional division and typology of Cyrenaican harbours. These criteria are based upon:

1) The size of the city or harbour settlement (see Chapter 4),

2) The scale and significance of the harbour's productive capacity (see Chapter 5)

3) The size of the port (basin area)

4) The existence of artificial constructions and port facilities, such as lighthouses and warehouses (see gazetteer/chapter 9).

Data on the first three factors has been obtained via the field survey carried out along the coast of the study area and from previous works conducted along the Cyrenaican coast, which includes sites outside the scope of the SCSC survey. The fourth factor is based on the evaluation of data from the underwater survey reports of some of the Cyrenaican harbours (Beltrame 2012; Flemming 1965; 1971; Jones and Little 1971a; Laronde and Sintés 1998; Pizzinato and Beltrame 2012; Tusa 2010; 2011; Yorke and Davidson 1971-72; 1973). Using these factors has enabled the creation of an initial typology of Cyrenaican ports.

The sizes of the ports (basins) were calculated by measuring the visible area of the basin. However, the size of Apollonia's port has been estimated more accurately thanks to the map produced by Flemming (1971) (Fig. 6-1). A relatively accurate estimation of a port's size (basin area) can be obtained when an artificial enclosure is measured, while the area of a natural harbour is more difficult to assess accurately (Schörle 2011). However, it is necessary to calculate the area of natural harbours in the absence of detailed maps based on underwater studies. This method can at least provide us with a rough idea about the potential capacity of a port. In these calculations, Google Earth imagery and AutoCAD software were used to measure the area of the natural harbour basin. Of the 19 Cyrenaican ports analysed, 12 lie along the coast of the study area, 4 are located to the west, and 3 are situated to the east. There are six general types of harbour along the coast of Cyrenaica, including:

1- Major ports (large harbours)
2- Secondary ports (medium harbours)
3- Ancillary ports (industrial harbours)
4- Supervised anchorages (watching harbours)
5- Private harbours
6- Military harbours

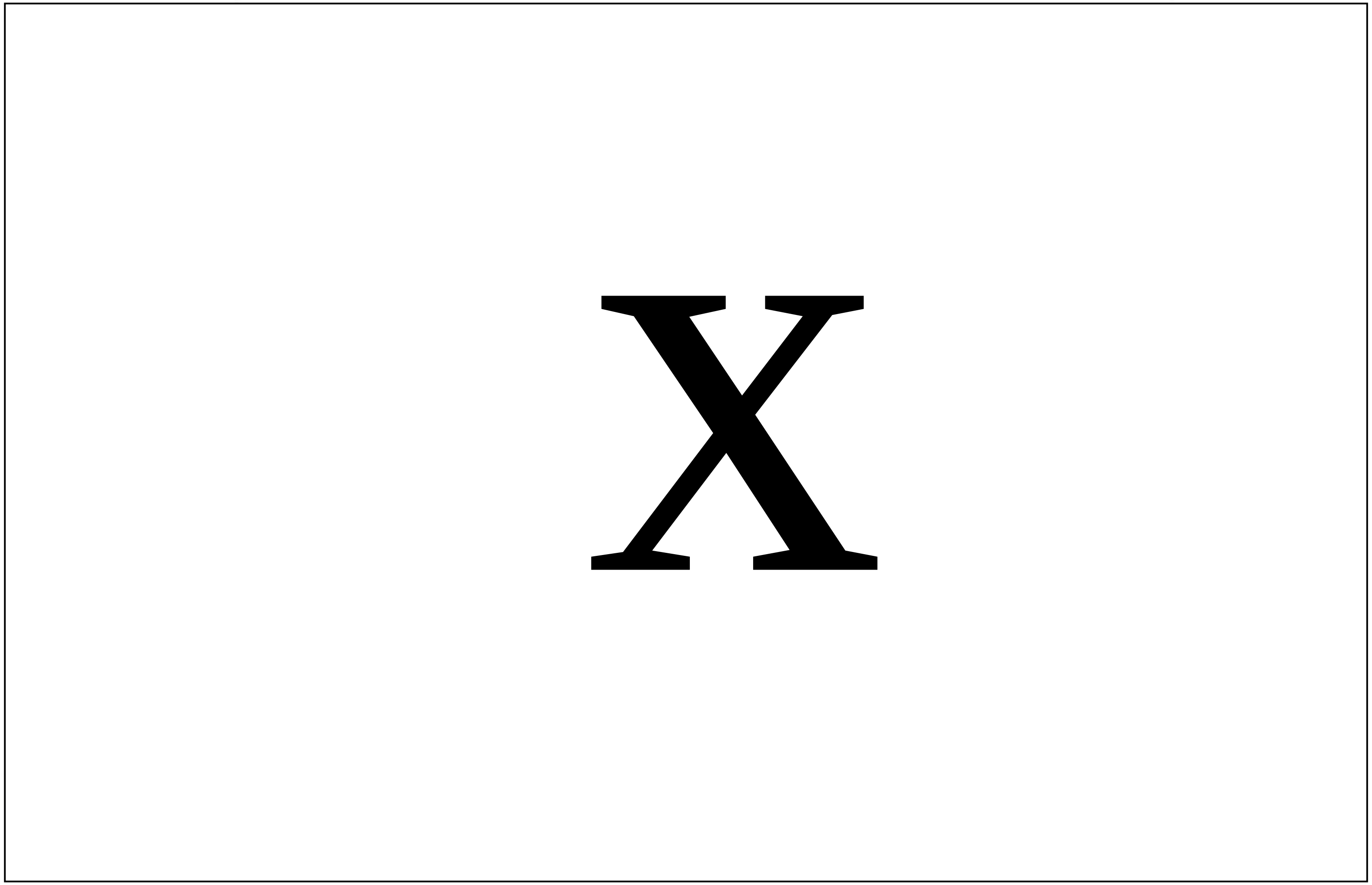


Figure 6-1: General map of the harbour of Apollonia (Flemming 1971: 100. Figure 14).

Five of the nineteen ports were identified as belonging to the first type, two of which probably also had an attached military harbour. Another five ports were classified as the second type, while four were belong to the third type. A further two ports were identified as belonging to the fourth type, while another two seem to have been private harbours (Tables 6-1, 6-2 and 6-3).

	Typology of Harbour						Location		
Port	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Study area	West study area	East study area
Erythron		√							√
Naustathmos		√							√
Apollonia	√					√			√
Noat1			√				√		
Mahel Mael			√				√		
Sil Amer				√			√		
Assa Mousa			√				√		
Cape of Phycus			√						
East -Phycus					√		√		
Phycus	√					√	√		
Shaat el-Marakeb					√		√		
Aptouchou		√					√		
El-Hesi				√			√		
Gergerummah		√					√		
Kainopolis		√					√		
Ptolemais	√							√	
Taucheira	√							√	
Berenice	√							√	

Table 6-1: The typology of harbours along the Cyrenaican coast.

Harbour	Harbour Features										Other Features	
	Natural elements			Artificial elements								
	Bay	Off-Islands	Enclosure	Breakwater	Jetty	Slipways	Quays	Other	Lighthouse	Storage	Wrecks	Anchors
Erythron	√							Dock				
Naustathmos	√										√1	
Apollonia	√	√	√	√	√	√10	√9		√	√	√2	√+
Noat1	√											
Mahel Mael	√					√		Dock				
Sil Amer	√											
Assa Mousa								Dock				
Cape of Phycus	√											
East Phycus						√		Dock				√
Phycus	√				√				√	√		√+
Shaat el-Marakeb	√											
Aptouchou	√	√		√		√		Dock		√		√+
El-Hesi	√	√										
Gergerummah	√	√										
Kainopolis	√	√		√?							√1	
Ptolemais	√	√		√	√	√	√+		√	√	√1	√+
Taucheira				√	√		√2	Dock				
Berenice												

Table 6-2: Features of harbours along the Cyrenaica coast (√? = uncertain element; √+ = more than one identified but no specific number has been given; √1, 2, 9 or 10 = the total number of identified elements).

Typology of Harbours

Cyrenaican typology	Blackman's typology	Tyrrhenian Typology
Major port	Commercial port	Major port
Secondary port	-	-
Industrial port	Industrial port	Industrial port
Supervised port	-	-
-	Refuge port	Refuge port
Private port	Private port	Private port
Military port	Military port	-
-	Ferry port	-

Table 6-3: Typology of Cyrenaican harbours in comparison with other typologies.

6.2.3 Major harbours

6.2.3.1 Introduction

A considerable number of major ports have been identified along the coast of North Africa and the Mediterranean basin (Stone forthcoming). Major ports can be evaluated and assessed using a number of factors, the most important of which concern the port's infrastructure. The readiness of a harbour to handle and accommodate ships can be seen as evidence of the type of port it was. Facilities such as jetties, quays, breakwaters, lighthouses and warehouses are the clearest identifiers of a port's importance. Estimating the capacity of such facilities, particularly wharfage and quay space, can illuminate the degree to which a port was involved in trade and commerce.

Each province in North Africa appears to have had a number of major ports. Among these major sites were one or two larger harbours of exceptional size. For example, the port of Carthage was the largest port in Tunisia by a considerable margin. The port of Lepcis Magna in Tripolitania also had an extensive artificial basin, which seems to have made it the biggest port in Tripolitania. However, it was not the only major port in the province (for more details of major North African ports see Stone (forthcoming). Meanwhile Apollonia was not only the biggest port in ancient Cyrenaica, but also one of the largest ports along the North African coast (Flemming 1980; Laronde 1985).

Other major ports (Fig. 6-2) previously identified in the province of Cyrenaica include Berenice, Tocra, and Ptolemais. It is noteworthy that the ancient port of Phycus can now be added to this list. Important recorded archaeological evidence (see Chapters 4, 5 and site gazetteer) illustrates its importance. Phycus appears to have risen gradually in status from a mere anchorage to a major port with a place in the wider traffic network. Phycus seems to have been fully recognised and developed as a port by the first century BC, and reached its peak in the fifth century AD.

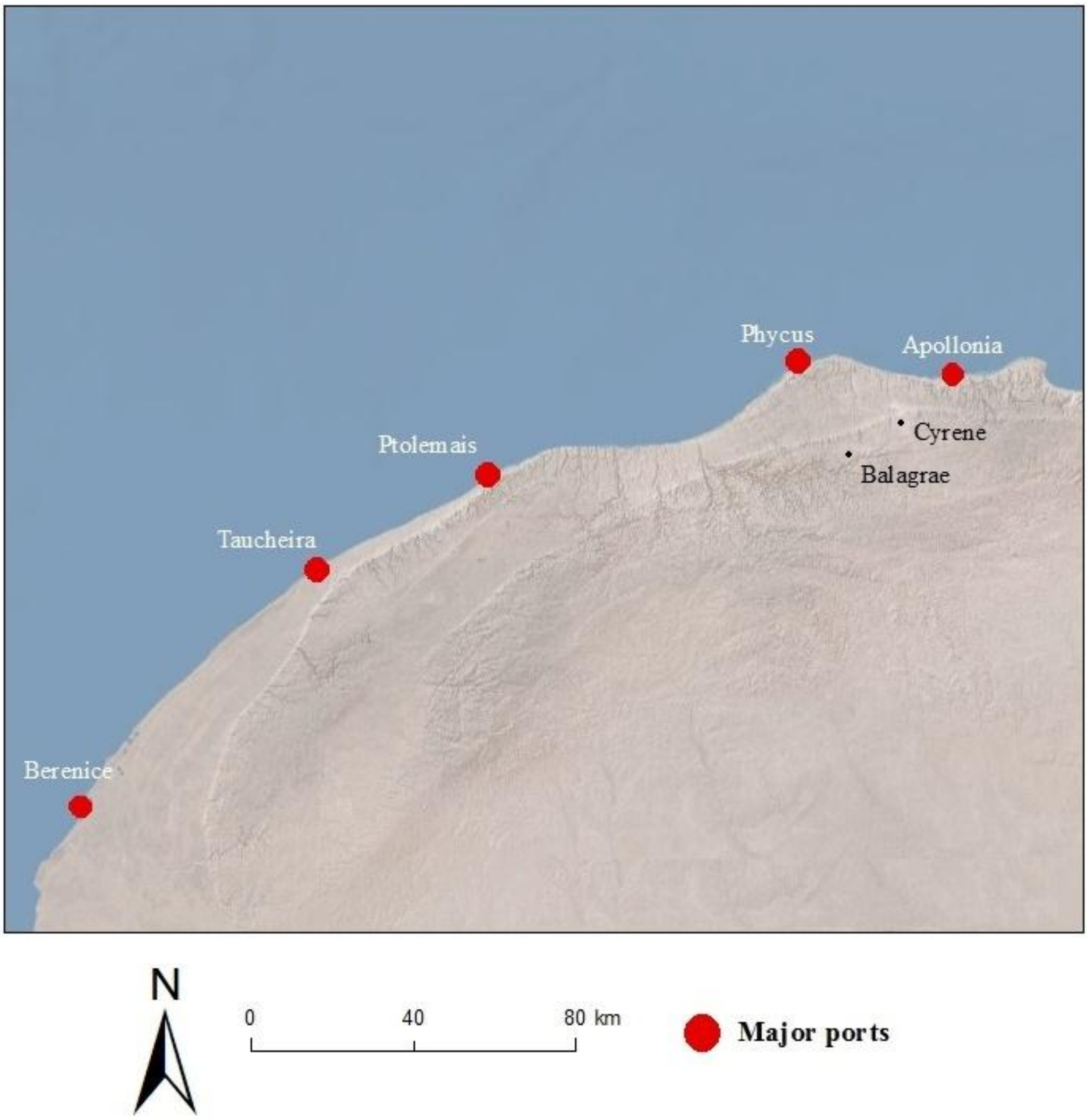


Figure 6-2: Distribution of major ports in ancient Cyrenaica.

Some important signs regarding the capacity of the port of Phycus can be estimated from a statement by Lucan (*Pharsalia* IX, 300) (see Chapter 2, section 2.2.2). Due to the size of Cato the Younger’s fleet, which seems to have been composed of both light raiding (triremes and Liburnian ships) and heavier warships, it appears that the port was provided with facilities to handle many ships mooring simultaneously. It could be argued that these warships were able to berth on the beach and had no need for specialised mooring facilities. However, if this was the case Cato’s fleet could have docked anywhere along the Cyrenaican coast. The choice of Phycus suggests that the site was already a well-equipped port. In the fifth century AD, there is another clear indication in Synesius's Letters that the port played an active role in wider trade networks, as large vessels sailed from Phycus to Alexandria and Constantinople with their cargoes.

6.2.3.2 Location

It is worth noting that three of the major Cyrenaican ports - Apollonia, Phycus and Ptolemais - were located along the coast of Jabal al-Akhdar where the mountain meets the sea. Natural bays and promontories here form shelters and anchorages for ships, geographical features which would have provided a great advantage to ports along this coastal stretch.

The port of Apollonia, for instance, benefited from the presence of two islands and a reef (Grotto reef), which created a natural protection for the harbour. The harbour basin was formed artificially into an inner and outer basin connected by a channel (Fig. 6-1) (Beltrame 2012; Flemming 1965; 1971; Laronde and Sintés 1998). Phycus, on the other hand, has a single large basin which is protected naturally from the north and west by a natural promontory. The ancient port of Ptolemais, a third example of a major Cyrenaican port, consisted of a natural bay protected by two off-shore islands to the east and west. Two other examples of major Cyrenaican harbours are the ancient sites of Taucheira (Tocra) and Berenice (Benghazi). Geographically, both these sites were different from the previous examples as they were located in open areas with little natural protection. For instance, the location of the harbour at Taucheira has been widely debated due to the lack of any natural shelter. The absence of artificial elements was for a long time thought to suggest the absence of a major port here (Jones and Little 1971a; Yorke and Davidson 1973; Yorke et al. 1972). However, the underwater survey conducted by (Yorke and Davidson 1973) and York et al (1973) identified an artificial port which had become totally submerged. The port seems to have had an inner and outer basin. On the other hand, the port of Berenice has yet to be identified. However, the recent excavations at the city have revealed that the city's port seems to have played a major role in the city's daily life, as it was the main driver of the city economy (Lloyd 1979).

6.2.3.3 Artificial features

The scale of investment required to building artificial structures at all of the major ports along the Cyrenaican coast (Table 6-2) provides clear evidence of their importance in wider communication networks. There would be no need to build such expensive facilities in order to accommodate fishing boats or limited number of small commercial ships.

For instance, Apollonia was the first port to be built in Cyrenaica, and the earliest signs of artificial elements recorded along the North African coast are to be found here (Flemming 1971; Laronde 1987; see Stone forthcoming for further comparison and discussion of North African harbour capacities). The port seems to have been gradually reinforced by features including shipsheds, warehouses, quays, slipways, towers, a jetty and a lighthouse (Beltrame 2012; Flemming 1971; Laronde 1996; Laronde and Sintés 1998). Located 15 km to the west of Apollonia, the port of Phycus seems to have been developed from the first century BC (see Chapters 2 and 4). The port appears to have been provided with warehouses, a lighthouse and a jetty to protect the north-eastern side of its basin (Jones and Little 1971a; Tusa 2010).

Thirty kilometres to the west of Phycus, a brief underwater survey at Ptolemais found a number of artificial features including quays, a lighthouse and a jetty connecting the mainland to a small eastern island (Yorke and Davidson 1973). Taucheira seems to have been wholly artificial, with the underwater survey detecting two quays, a long jetty, and two possible basins.

6.2.3.4 Size and capacity of major harbours

The size and capacity of a harbour can be estimated in a number of different ways, such as by measuring the scale of storage, ship size and shipment capacity. However, measuring the basin area and wharf space can provide the most reliable figures for estimating the size of port (Stone forthcoming). However, it is difficult to evaluate the size of a harbour without clear plans and documentation. It is also easier to measure the size of harbours with artificial features than natural harbours. Another point to be considered when comparing the size and capacity of harbours is that the quality of preservation varies from site to site. Such results should thus be treated with a great deal of caution. Another important point made by Stone is that a

> *Concentration of ports could provide facilities similar to those of one or two large harbours in a region. For instance, the cluster of seven harbours in the 100-km long area of Byzacena accounted for slightly more wharf space than the 80-km Gulf of Tunis region, with its one very large port* (Stone forthcoming:46).

In terms of the major Cyrenaican ports, it is clear that the port of Apollonia has been the subject of extensive study compared to the other ports in the region. It was one of the biggest harbours in North Africa and the eastern Mediterranean (Flemming 1971; Laronde 1985; 1996), and with its two basins (measuring approximately 10.5 hectares together) was the second biggest harbour in Africa after Carthage. In terms of capacity, the port also had 1170 m^2 of wharf space. This figure also places Apollonia amongst the biggest harbours in North Africa in terms of total wharf capacity.

It should be noted that Stone (forthcoming) estimates that the port of Apollonia had 580 m^2 of wharf space. The present study's calculations are based on Flemming's plans. There are 9 quays with a length of 25 m and 2 m width, giving a total wharf space of 450 m^2, in addition to the middle jetty which divides the port into two basins. This was used as a dock for the eastern basin (Flemming 1971; Laronde 1996) and is nearly 120 m long and more than 6 m wide. Its wharf space is thus 720 m^2. Adding both figures provides a total capacity estimate of 1170 m^2.

The port of Phycus is another example of a major Cyrenaican port for which we have some documentation. As its basin is unmapped, the area of the basin was measured using Google Earth imagery. It was difficult to obtain an accurate figure; however, it seems that it has an area of *c.*5 hectares. The length of its recorded jetty was about 150 m, and the port's wharf space to the best of our knowledge was about 300 m^2 (Tosa 2010; Stone forthcoming). The port of Ptolemais, in comparison, seems to have been larger than Phycus. It had a basin area of 6 hectares and a total wharf space of 540 m^2. The port of Taucheira meanwhile seems to be have been shrouded in mystery. Jones and

Little (1971a) mention that a line of large blocks extended about 100 m from the shore toward the sea, turning to the east for 15 m. They also mentioned a 150 m-long breakwater emerging from this point. (Yorke and Davidson 1973) meanwhile recorded 2 quays for which he provided no measurements, and a jetty running 220 m into the sea. The absence of a plan in both publications makes it difficult to reconstruct the shape of the harbour and the exact position of their features. However, if we assume that the 100 m-long line of large masonry blocks mentioned by Jones and Little was one of the quays identified by York, we can assume that the second quay was also *c.*100 m long. In this case, the calculation of wharf space is possible to an extent which would be 400 m^2. This figure does not include the 220 m-long jetty. It should be noted that this figure is again larger than that suggested by David Stone.

Another issue is that Stone appears to be confused when referring in his Table 1 to a breakwater measuring 150 m in length at Ptolemais, while he does not mention a breakwater at Taucheira. There is in fact no breakwater identified at Ptolemais, while there is indeed a 150 m breakwater present at the port of ancient Taucheira.

To conclude, Apollonia was undoubtedly the largest of the major Cyrenaican ports, as by itself it accounts for *c.*49% of the total wharf space of the entire Cyrenaican coast. It is followed by Ptolemais, which held for 22%, and Phycus and Taucheira, which possessed 17% and 12% respectively of the region’s wharf space (Figs. 6-3 and 6-4). It is notable that the three ports of Taucheira, Ptolemais and Phycus possessed 51% of the total wharf space of all of the Cyrenaican ports (Fig. 6-5). Another point to be considered is that the three biggest ports - Apollonia, Phycus and Ptolemais - lie along the coastal strip of al-Jabal al-Akhdar within a distance of 100 km. These three ports controlled 83% of Cyrenaica’s total wharf space. This may be because the nearby al-Jabal al-Akhdar (Green Mountain) possessed the most fertile land in Cyrenaica.

It is noticeable that a significant investment seems to have been made in building artificial installations at these ports. Spending a considerable amount on such facilities leads this study to argue that these ports generated a great deal of revenue, which undoubtedly boosted the booming Cyrenaican economy.

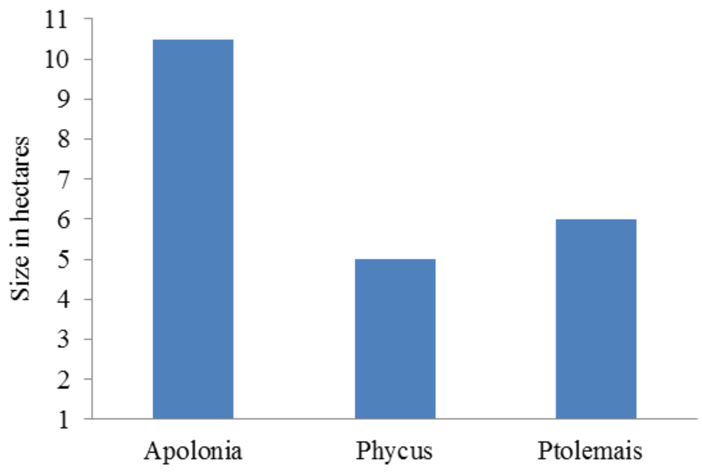


Figure 6-3: The size of major ports according to their basin area.

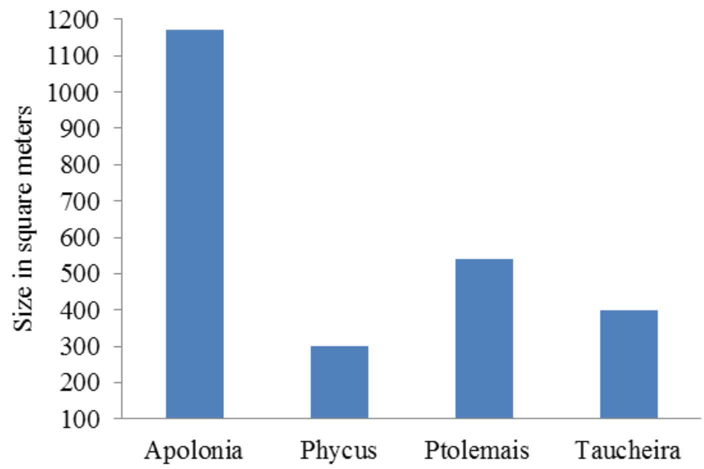


Figure 6-4: The size of major ports according to available wharf space.

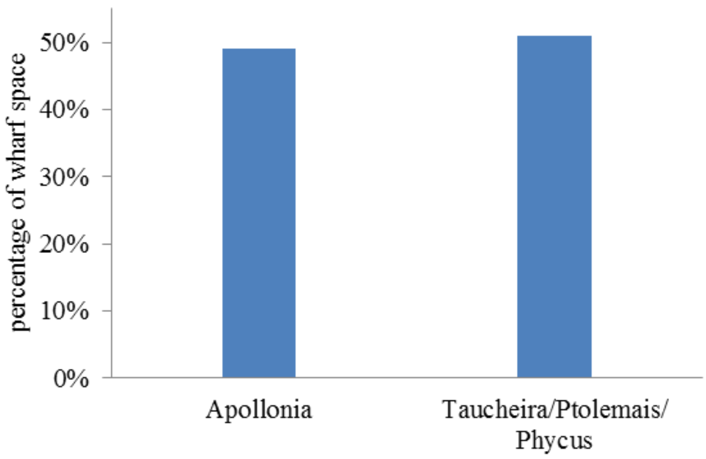


Figure 6-5: The percentage of wharf space at Apollonia compared to the three ports of Taucheira, Ptolemais and Phycus.

In terms of the position of these major harbours relative to the other major ports along the North African coast, this study will adopt the division of North African harbours suggested by Stone. Stone (forthcoming) divides these ports by available wharf space into three categories: small, medium and large. Small ports have a wharf space of 100 to 300 m^2, while medium ports have around 500 m^2 and large ports 1000 to 1500 m^2. (Stone forthcoming). However, this study has made some changes to Stone's divisions in terms of the position of the Apollonian and Taucheiran ports. Stone would place Apollonia in the medium harbour category, and would group Taucheira among the small ports. This study's new calculations of both harbours (see above) place Apollonia in the 'large' category and Taucheira in the 'medium' group. The other major ports of Cyrenaica (Ptolemais and Phycus) seem to fit Stone's medium port category.

The new wharf space figures for the Apollonian and Taucheiran ports change the position of Cyrenaica in terms of regional harbour clusters by wharfage space provided by Stone, moving it from fifth place to third among North African harbours (compare Tables 6-4 and 6-5).

Region	Ports	Wharf space (m^2)	Coastline (ha)
Byzacena	7	5680	100
Gulf of Tunis	3	5030	80
Tripolitania	4	1984	175
Caesarea-Tipasa	4	1720	30
Cyrenaica	4	1620	140
Jerba-Bou Grara	3	910	40

Table 6-4: The regional clusters of harbours on the North African coast provided by Stone (Stone forthcoming: Table 2).

Region	Ports	Wharf space (m^2)	Coastline (ha)
Byzacena	7	5680	100
Gulf of Tunis	3	5030	80
Cyrenaica	4	2450	140
Tripolitania	4	1984	175
Caesarea-Tipasa	4	1720	30
Jerba-Bou Grara	3	910	40

Table 6-5: The regional clusters of harbours on the North African coast after adding the new calculations of Cyrenaican wharf space (after Stone forthcoming).

Comparing the wharf capacity of Tripolitania's major harbours, it seems that at 1200 m^2 the port of Lepcis Magna was slightly larger than Apollonia, which possessed an estimated area of 1170 m2. Oea meanwhile appears to have possessed a wharf over 600 m^2, larger than that of Ptolemais, Phycus and Taucheira. Sabratha seems to have had the smallest wharf in Tripolitania at about 150 m^2 (Stone forthcoming). The three major ports of Tripolitania had a total wharf capacity of 1950 m^2, while those in Cyrenaica had an aggregate of 2450 m^2 (Tables 6-6 and 6-7; Figs. 6-6 and 6-7).

Harbour	Basin area	Wharf Space	Percentage
Lepcis Magna	10.2	1200	62%
Oea	4+	600	31%
Sabratha		150	8%

Table 6-6: Illustrates the basin area and wharfage space of major ports in Tripolitania (the data related to the wharf space and basin area has been taken from (Stone forthcoming Table 1) while the estimation of the basin area of the port of Oea has been calculated using the map in Mattingly 1995:122).

Harbour	Basin area (ha)	Wharf Space (m^2)	Percentage
Apollonia	10.5	1170	48%
Phycus	5	300	12%
Ptolemais	6	580	24%
Taucheira		400	16%

Table 6-7: The basin area and wharfage space of the major Cyrenaican ports.

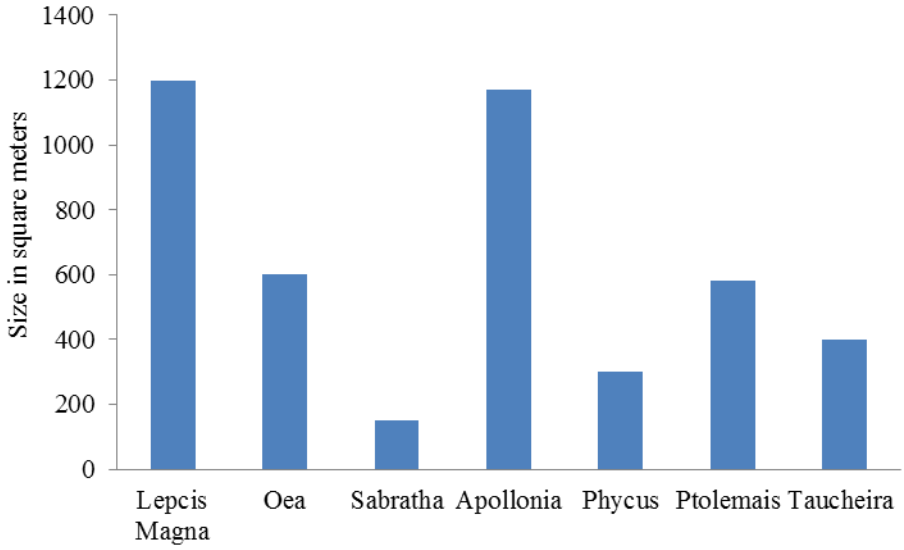


Figure 6-6: Comparison between the wharfage space at the major Tripolitanian and Cyrenaican ports.

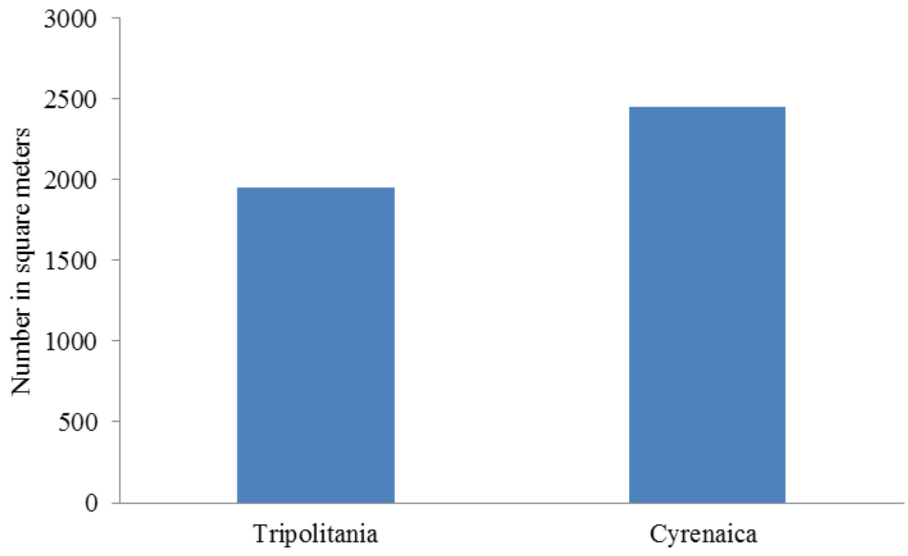


Figure 6-7 Comparison between the total wharfage space recorded at the ancient Tripolitanian and Cyrenaican ports.

6.2.4 Secondary Harbours (Medium Ports)

6.2.4.1 Introduction

The general hierarchy, features and functionality of secondary ports are much less well documented, though it is arguable that these sites were set up in natural bays or promontories. Although such ports seem to have had few artificial elements, they undoubtedly played a substantial role in trade and commerce. Natural harbours seem to have been more common and prevalent than artificial ports. For instance, Stone's recent study concentrating on North African harbours during the Roman period shows that the ratio of artificial to natural harbours was 1:6 (Stone Forthcoming).

In Cyrenaica, five harbours (Fig. 6-8) seem to have been categorised as secondary. These were Kainopolis (el-Agla), Ausigda (Gergerummah), Aptouchou (el-Hanya), Naustathmos (Ras el-Hilal) and Erythron (Lathrun).

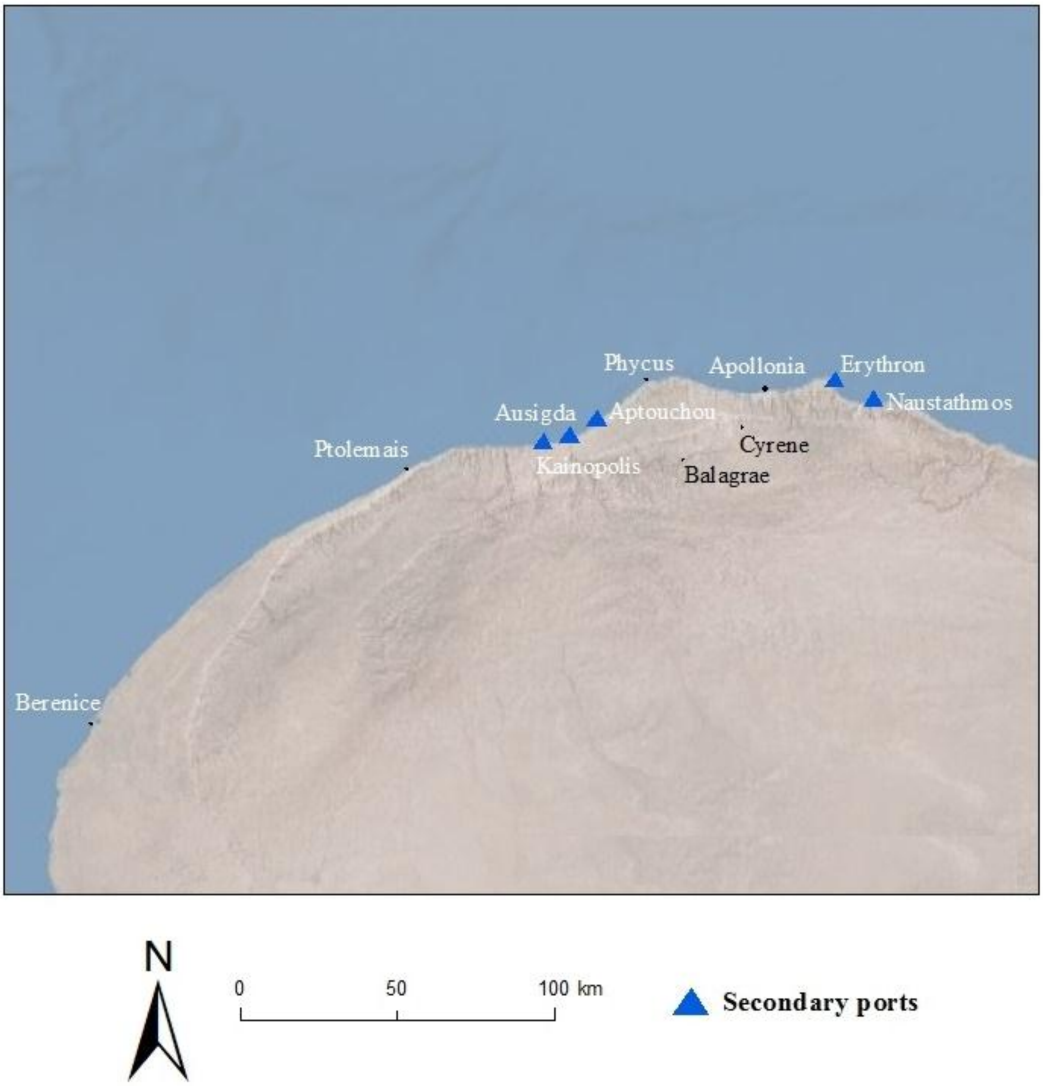


Figure 6-8: The distribution of secondary ports in Cyrenaica.

6.2.4.1.1 Location

These five ports lie along the coastal strip of Al-Jabal Al-Akhdar. The harbours are usually naturally protected by off-shore islands or a promontory headland (cape). The port of ancient Kainopolis (el-Agla) lies to the north-east of the settlement. Its basin was protected by three off-shore islands to the west, middle, and east. These islands seem to have protected the harbour basin from north-westerly winds. Five kilometres to the east of this port is the ancient port of Ausigda (Gergerummah). Its bay was protected by a headland (low promontory) from the west and north-west. The north-east seems to have been protected by an off-shore island. The port of ancient Aptouchou (el-Hanya) is another example, and was also well protected on the north-east side of the bay by a low promontory.

The west and north-west sides of the basin are sheltered by a long rocky outcrop extending 172 m from the shore, with an island situated to the north-east of the head of this reef. The space between the island and the head of the outcrop was occupied by a submerged reef. Together the long rocky outcrop, the submerged reef and the island form an inverted L shape. It is clear that this side of the basin offered a good and sheltered anchorage. The port of Naustathmos (Ras el-Hilal) is also protected from the northwest and west by a 100 m high headland cliff. However, it is difficult at present to determine the exact position of the harbour of ancient Erythron (Lathrun) as the area has two good sheltered anchorages. The first is a small bay protected from the west by a 30 m high cliff. The other shelter is an artificial rectangle *c.*129 m long and *c.*30 m wide, with both sides of the cut protected by high cliffs. Both locations could in fact have been used to protect ships.

6.2.4.1.2 Size and capacity

The secondary ports seem to have been smaller than the major ports. As mentioned, it is difficult to calculate the size of natural ports. The only way to calculate their size entails measuring the basin area of the putative harbour, typically using Google Earth imagery coupled with an assessment of the value of the archaeological remains (see Chapters Four and Six). In terms of size, it seems that the basins of these harbours were generally less than 3 hectares (Fig 6-9).

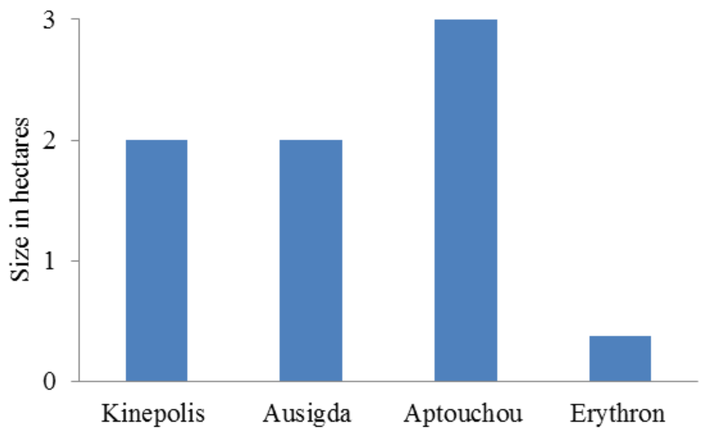


Figure 6-9: Basin sizes of secondary Cyrenaican ports (the given measurement of Erythron is for the second possible basin).

6.2.5 Industrial Harbours (Ancillary Ports)

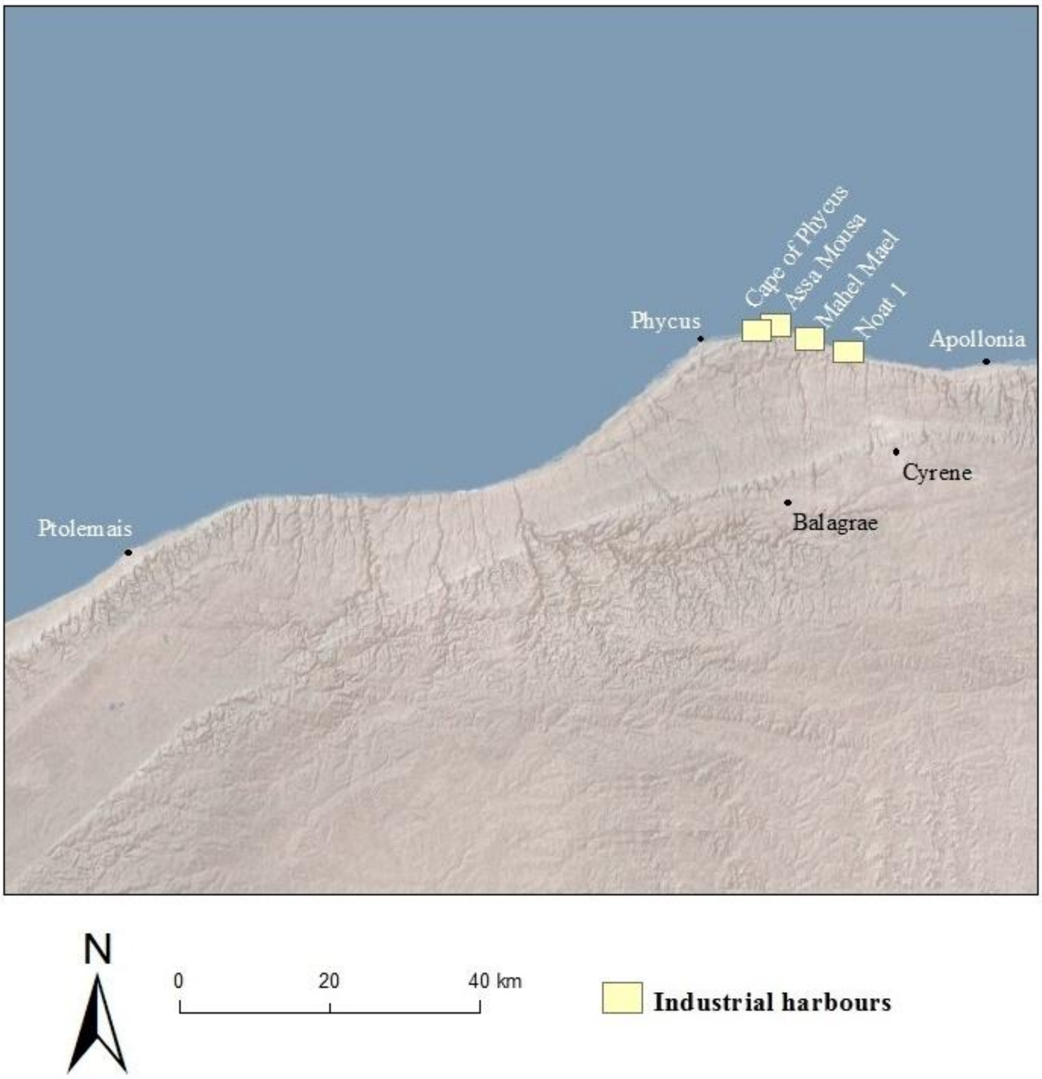


Figure 6-10: The distribution of industrial harbours in Cyrenaica.

6.2.5.1 Introduction

Examples of this type of harbour have been noted in many different parts of the Mediterranean (Blackman 1982a; 1982b; Schörle 2011). Five Cyrenaican harbours (Fig. 6-10) belong to this category. The clearest examples of this type were identified by this study in Al-Jabal Al-Akhdar, at the sites of the Cape of Phycus (el-Mamluh), Assa Mosa, Mahel Mael and Noat 1.

6.2.5.2 Location

The most important feature of this type is its location, and they generally lie in small bays capable of offering a safe haven to small ships. These ports were generally near to production facilities, whether pottery kilns, fish-related industries, or presses (see chapter 5 and site gazetteer/ chapter 9).

6.2.5.3 Size and capacity

Little can be said about the total size and capacity of ports of this type. Large-scale excavations and underwater surveys need to be done to generate such information. However, the average size of these harbour's basin areas are much smaller than those of secondary ports, normally less than 3000 m^2 (Fig. 6-11).

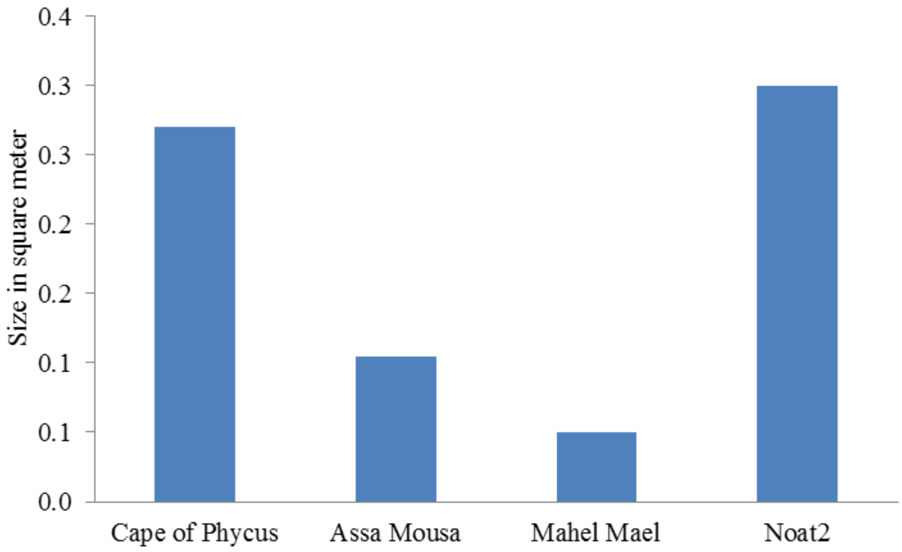


Figure 6-11: The size of harbour basins of the third type of harbour.

6.2.6 Supervised Anchorage (Watching harbours)

6.2.6.1 Introduction

The chief characteristic of this type is a watchtower installed at the top of a high hill by the sea overlooking a possible anchorage. Four examples of this type have been identified along the coast of this study's survey area.

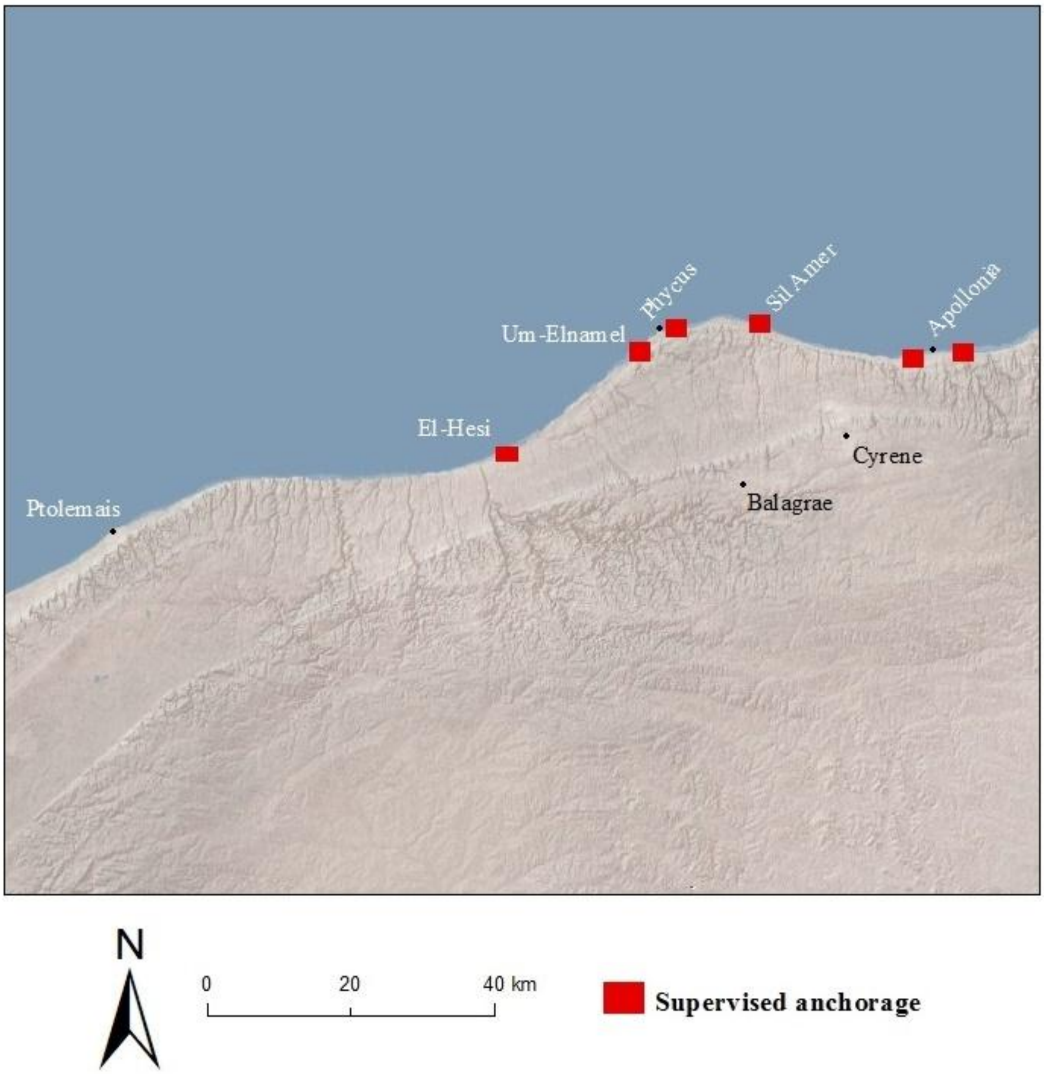


Figure 6-12: The distribution of supervised anchorages (watch harbours).

6.2.6.2 Location

The first site is at El-Hesi, located 10 km to the west of el-Hanya. The second is at Aluet Um-Elnamel, 3 km to the west of Phycus. At the westernmost point of the boundary of Phycus, there is another building built on top of an eminence (site PHSC55). This site seems to have had a similar function to structures in this category. The other example is at Sil Amer, 10 km to the east of the ancient site of Phycus. The first is a wide-open bay protected by two off-shore islands. The latter site is located in a small natural bay and is well-protected from the west and north-west by a 15 m high cliff, while the east and north-east sides were protected by a low promontory. Two similar examples were recorded by the coast near to Apollonia. One is located a few kilometres to the east of Apollonia, and the other to the west (see figure 6-12).

6.2.6.3 Size and capacity

As with industrial harbours, it is difficult to determine the size and capacity of this type of harbour. The capacity of this type does seem to have been limited, as there are no signs of any buildings except for the watchtower. The size of the basin area can be measured only at Sil Amer, which is approximately 0.37 ha. The size of the other anchorages is difficult to estimate.

6.2.7 Private harbours (Villa harbours)

6.2.7.1 Introduction

Private harbours were well-known along the coast of the Mediterranean basin, and were associated with maritime villas. The owners of these were usually wealthy elite citizens or rich merchants, while some emperors also maintained their own private harbours (Blackman 1982a; 1982b; Schörle 2011). Some of these private harbours were larger than the city harbours.

The role of these ports appears to have gone beyond simply providing pleasure and recreation of their owners, and they seem to have served an important economic purpose. They were certainly involved in economic activities, as the majority were close to or attached to agricultural land (Wilson et al. 2012). It is intriguing that legislation was passed to organise their economic role and involvement in trade and commerce (Arnaud 2005; 2011a). For instance, a law issued in 218 BC outlawed senators and their sons from possessing a sailing ship capable of transporting more than 300 amphora-borne products (Arnaud 2011). The most common goods transshipped through these harbours were agricultural products from the surrounding lands (Schörle 2011; Wilson et al. 2012).

In Cyrenaica, some maritime villas appear to have had their own ports. The SCSC survey was able to identify two sites likely to have been maritime villas with their own anchorages (see site gazetteer/Chapter 9 for more details about the archaeological remains of both sites).

6.2.7.2 Location

Both sites are located on the coastal stretch of al-Jabal al-Akhdar (Fig. 6-14). One lies a few kilometres to the east of Phycus, while the other at the site of Shaat Elmrakeb is about 8 km to the west of Phycus. Both sites lie on agricultural land overlooking the sea. The first site seems to have possessed an artificial anchorage suitable for a small ship consisting of a rectangle cut into the rock. The second harbour was a natural bay which seems to have been protected from the west by a 100 m long reef running out from the shore.

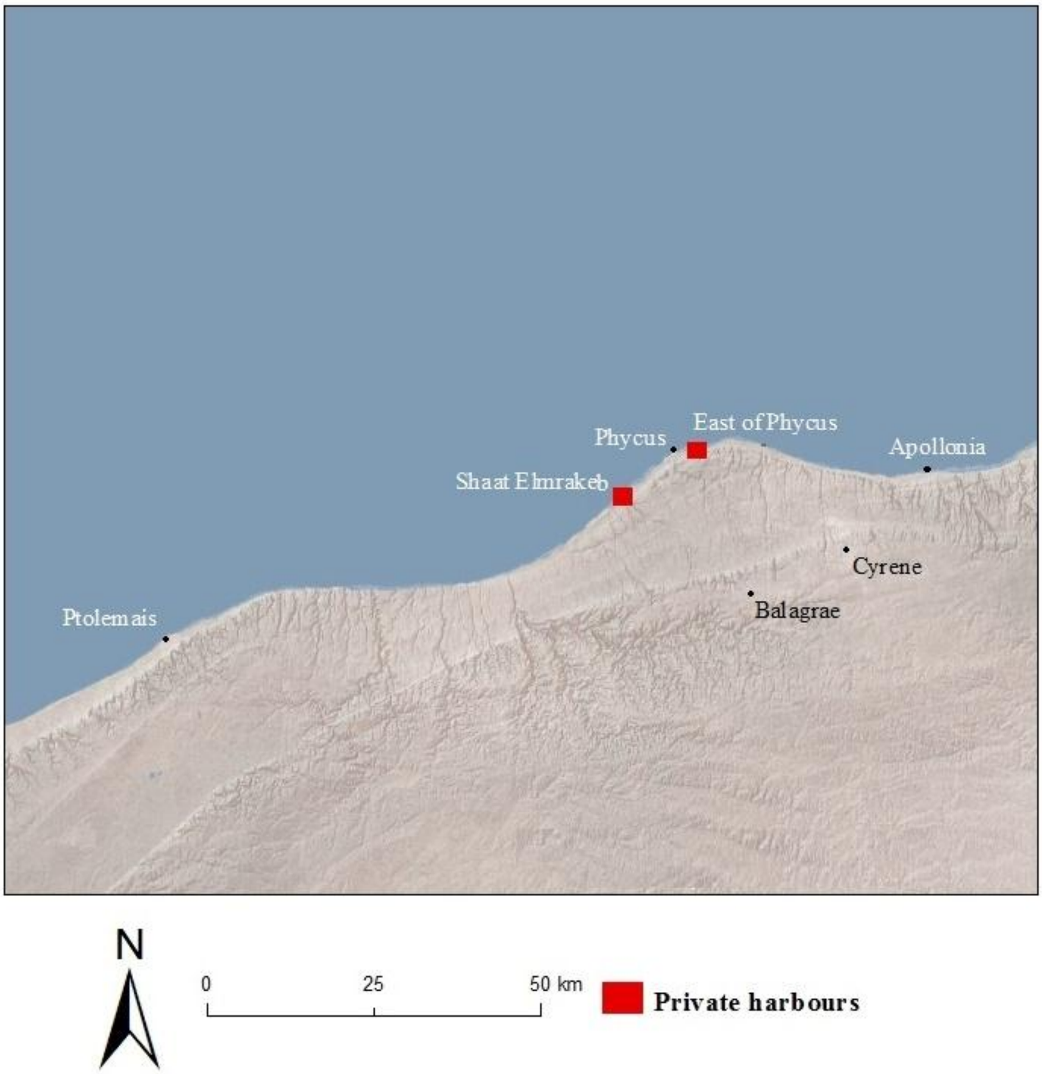


Figure 6-13: Private ports within the study area.

6.2.7.3 Size and capacity

Little can be said regarding the size and capacity of this type, although further excavations and underwater surveys may reveal new data. However, a rough estimation of the basin size can be obtained using Google Earth imagery. The basin size for the first site is approximately 0.06 hectares, while the second is approximately 0.25 hectares.

6.2.8 Military harbours

> *In antiquity warships were not kept in the water for long periods. To minimize rotting and attacks of the teredo navalis, they were not only coated with pitch, and sometimes wax paint, but were kept out of the water and weather when not in use (which was mainly in winter), in a position where they were rapidly available when needed. For this purpose a special type of covered slipway or 'shipshed' was developed* (Blackman 2010: 13).

As mentioned above, shipsheds are perhaps the clearest sign of the presence of a military harbour. Major ancient cities were keen to keep their warships and maritime facilities safe and away from public and foreign visitors. They thus often established their military harbours as either separate ports or in a part of the city harbour (inner basin) to which access could be restricted. The circular basin (inner harbour) of Carthage, for instance, is one of the most famous examples of a military harbour attached to a city harbour (Blackman 1982b; Hurst and Duhig 1994).

In Cyrenaica, it has been suggested that the inner basin of Apollonia and the western side of the harbour of Ptolemais may have served as military harbours, as there is evidence of possible shipsheds at both sites (Baika 2013a; Baika 2013b; Flemming 1971; Kraeling 1962; Laronde 1985; Laronde 1990; Laronde 1996; Sintés 2010). On the north side of the western harbour (inner basin) at Apollonia there is a rock-cut complex likely to have been used for shipsheds (Baika 2013a; Flemming 1971; Sintés 2010). This shipsheds preserve ten slipways (63 m wide and 30 m long) which are in fairly good condition (Fig. 6-14).

At Ptolemais, two rock-cuts complexes with a distinct slope toward the sea were identified by Laronde (1981) as the remains of shipsheds. One is located to the western side of the promontory, and the other is on the middle island. However, Yorke et al. (1972) and Beltrame (2012) have argued that the western rock-cut complex was in fact a quarry.

A site in this study's survey area to the north-west of the eastern headland of the promontory of Phycus featured a group of wide channels cut vertically in the rocky area for more than *c.*4 m. The ground at the site is flat and flooded by the sea to a depth of 50-70 cm, and there are two rooms cut out of the rock (Fig. 6-15). There is also a set of steps leading down to the floor of the site. However, this site does not seem to be a quarry. This has also has been suggested by Flemming (1971), who stated that

> *The purpose of these extraordinary structures is indecipherable. To quarry on the seaward side of the headland meant maximum exposure of the workers to storm waves and that every block removed reduced the city's defences against the sea. Needless to say, the stones that was removed was probably used for building, but this cannot have been the sole purpose of the operation. The flat floor of the channels and two flights of steps both indicate that people walked in the area which is now shallowly flooded* (Flemming 1971: 117).

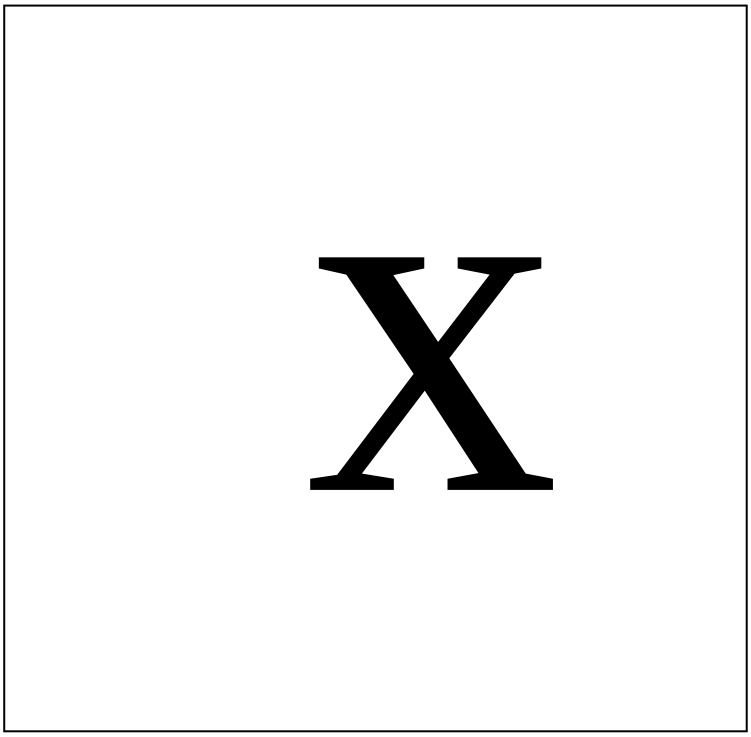


Figure 6-14: The slipways identified at Apollonia.

It should be taken into account that digging trenches or channels in the rocky areas of a promontory in order to build shipsheds was a normal practice at many sites in the Aegean region (For more discussion about rock-cut shipsheds see, Baika 2013c). This suggests that this site was more likely intended to serve as a shipshed to protect Cyrene's warships. This could be consistent with Laronde's assumption that once the port of Cyrene become the independent city of Apollonia, some or all of Cyrene's warships (triremes) were moved to Phycus (Laronde 1985). However, further investigation and underwater surveys at this site will reveal more information about its exact purpose, especially its connection with the sea from the north-east side.

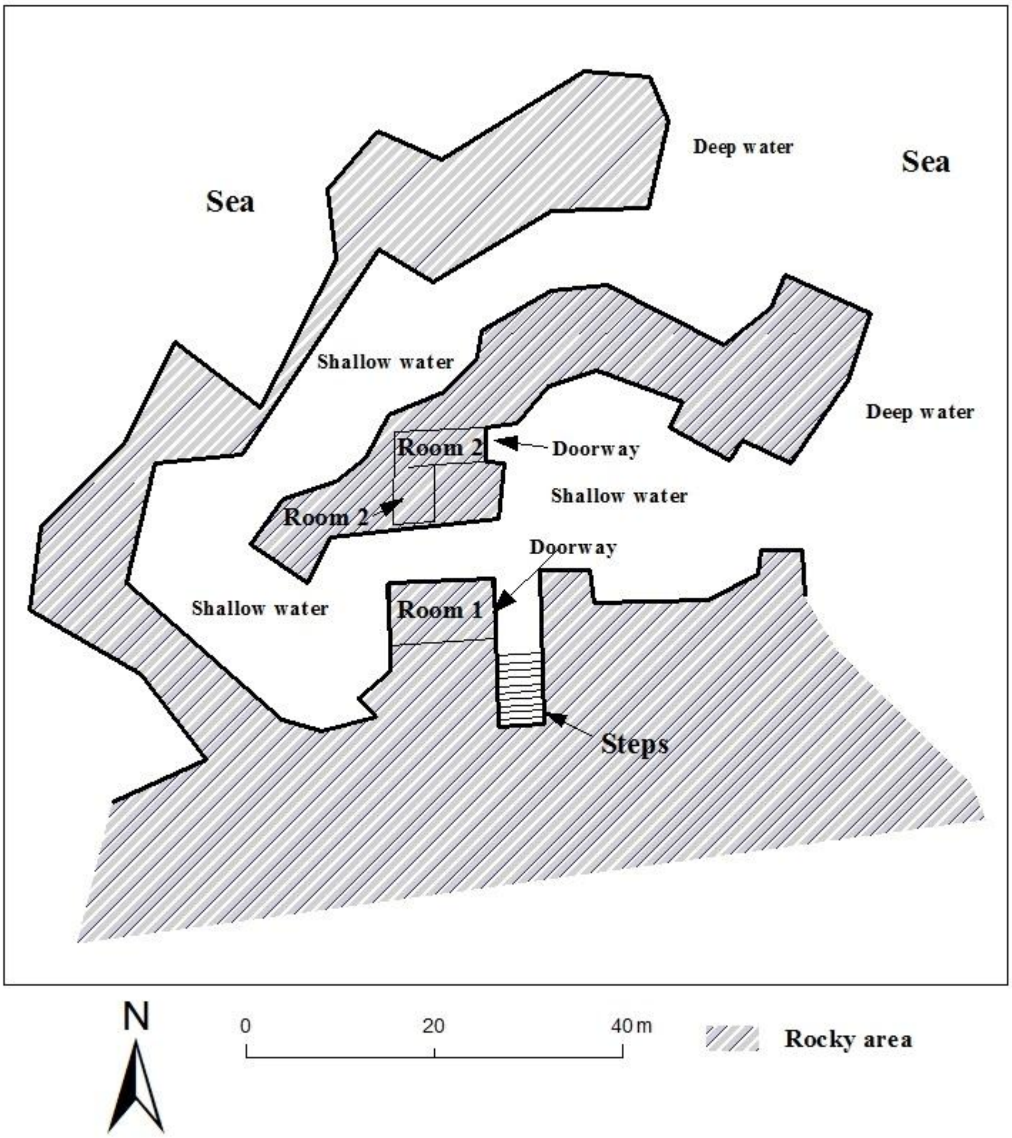


Figure 6-15: Possible shipshed at Phycus.

6.3 The Roles and Connectivity of Cyrenaican Harbours

6.3.1 Introduction

The importance of all of these ports was undeniably related to their role as a bridge between the hinterlands where products and materials were produced and the main local and overseas markets. It is clear that the relationship between a port and the communities clustered in its hinterlands could be of mutual benefit. The latter could be the main producers of exported products and/or the consumers of imported goods. The importance of a port could therefore be obtained from its location within the network of land and marine traffic, as well as its proximity to productive areas.

To understand the role and connectivity of each type of port, their location with respect to the hinterland should be examined. Ideally, one would study in detail the network of routes connecting these areas to the ports. However, due to limited time and funding, in addition to the huge territory covered by the hinterlands of Cyrenaican ports, this study will confine itself to collecting and analysing this type of information via the previous literature, which is however scarce and brief. This study concentrates on the hinterland of the coastal strip of al-Jabal al-Akhdar, more precisely the hinterland of this project's study area.

6.3.2 The Natural features of the hinterland of harbours along the coastal strip of Al-Jabal Al-Akhdar

The hinterlands of the Cyrenaican coast can be divided geographically into three areas: Sahel (coastal plain), the Middle Plateau, and the Upper Plateau (see Figure 3-2) (Attiyah and Laronde 1999; Jones and Little 1971a; Laronde 1987). The coastal strip (Sahel) extends from the ancient site of Ptolemais to ancient Darnis. The width of this strip is varied and diverges at different points. It is up to 1.5 km wide in some regions, and shrinks to nothing at some locations where the mountains touch the sea.

The second area is the middle plateau (el-Useita). This is a flat area extending from the first escarpment of the Al-Jabal to the west of Apollonia, and runs east of wadi Gergerummah. The middle plateau (el-Useita) can be divided in turn into three parts. The centre of el-Useita forms the hinterlands of Aptouchou, Phycus, the Cape of Phycus, Sil Amer and Mahel Mael, and at the same time forms the forelands of ancient Airtimes (Massa) and Balagrea (el-Beida). The second part is east of el-Useita, forming the hinterland of the western area of Noat and at the same time the foreland of ancient Cyrene. The third part is west of el-Useita, and forms the hinterlands of Gergerummah and El-Hesi.

The middle plateau (el-Useita) extends from east to west for more than 45 km, while its width varies. The central part is about 15 km from north to south, while the other two parts are approximately 6 to 7 km.

The central part of el-Useita contains the most fertile lands. It is famous for its abundance of water and *terra rossa* soils, whose thickness reaches 1 m (Attiyah and Laronde 1999). It is well-known today for its cultivation of cereals, olives, almonds, fruit trees and vegetables. Unfortunately this zone has received little attention from scholars, even though it connects two major parts of ancient Cyrenaica. It links the upper plateau, where some of the urban centres and major settlement sites were located, with the coastal plain where the ports were set up. To this can be added the primary importance of agriculture, which made it attractive to the ancient settlers. Extensive archaeological remains exist here, including ancient settlements and the remains of tanks, presses, fortifications and cart routes (Attiyah and Laronde 1999), which demonstrates the importance of el-Useita in antiquity.

On the other hand, the upper plateau is situated close to the southern flank of el-Useita. This part is fairly well known to scholars, with clear evidence of important urban agglomerations such as Cyrene, Balagrea and other sites.

6.3.3 Signs of clustered productive sites in the hinterlands of the study area

Unfortunately, we lack knowledge about the middle plateau. However, important information can be drawn from the initial report of a survey of the National Park of Wadi al-Kuf carried out by Abdusid et al. (1984). This project detected 16 productive sites in an area measuring less than 100 km^2 located in the hinterland between the ports of Aptouchou and Ausigda (the western part of el-Useita) (Table 6-8 and Fig. 6-17). These sites contain the remains of presses, pottery and lime kilns (table 4-8). In addition to these ruins, there are references to several wheel-cut ruts in different parts of this area. Similar discoveries have been made in the eastern part of central el-Useita by Attiyah and Laronde (1999) during their attempts to trace the route linking the ancient city of Cyrene on the upper plateau to the port of Phycus in Sahel. There is no doubt that further surveys and investigation of the el-Useita plateau would increase our knowledge about its role in supplying agricultural products to both the harbours and the major cities on the upper plateau.

Previous studies of Cyrenaican ports have underestimated the role of the middle plateau (el-Useita) in the rise of these ports. Laronde argued that each major port was linked by a direct route to a city on the upper plateau. For instance, the ancient port of Naustathmos was the outlet of Lamluda; Apollonia was the outlet of Cyrene; Phycus was the outlet of Balagrea; Aptouchou was the outlet of Artamis; and Kainopolis was the outlet of Gasr-Libya (Jones and Little 1971a; Laronde 1987). This interpretation subordinates the strength of the ports to the needs of the cities themselves.

This may have been true in the earliest period of Cyrenaica's history, when the region had no centralised government. From the Archaic period of the Greek mainland, many cities were built inland at quite a distance from the sea. These cities were linked to their own outports (Blackman 1982b). This pattern can be seen clearly in Cyrene (the mother city of Greek Cyrenaica), with its port later becoming the independent city of Apollonia.

Alternatively, this interpretation may indirectly support the tramping trade argument whereby each harbour or city might have exported and imported goods individually in a disorganised fashion and without the control of a local state. However, this explanation cannot be accepted as treaties and laws existed in the Hellenistic and Roman periods which criminalised such trade (Arnaud 2011).

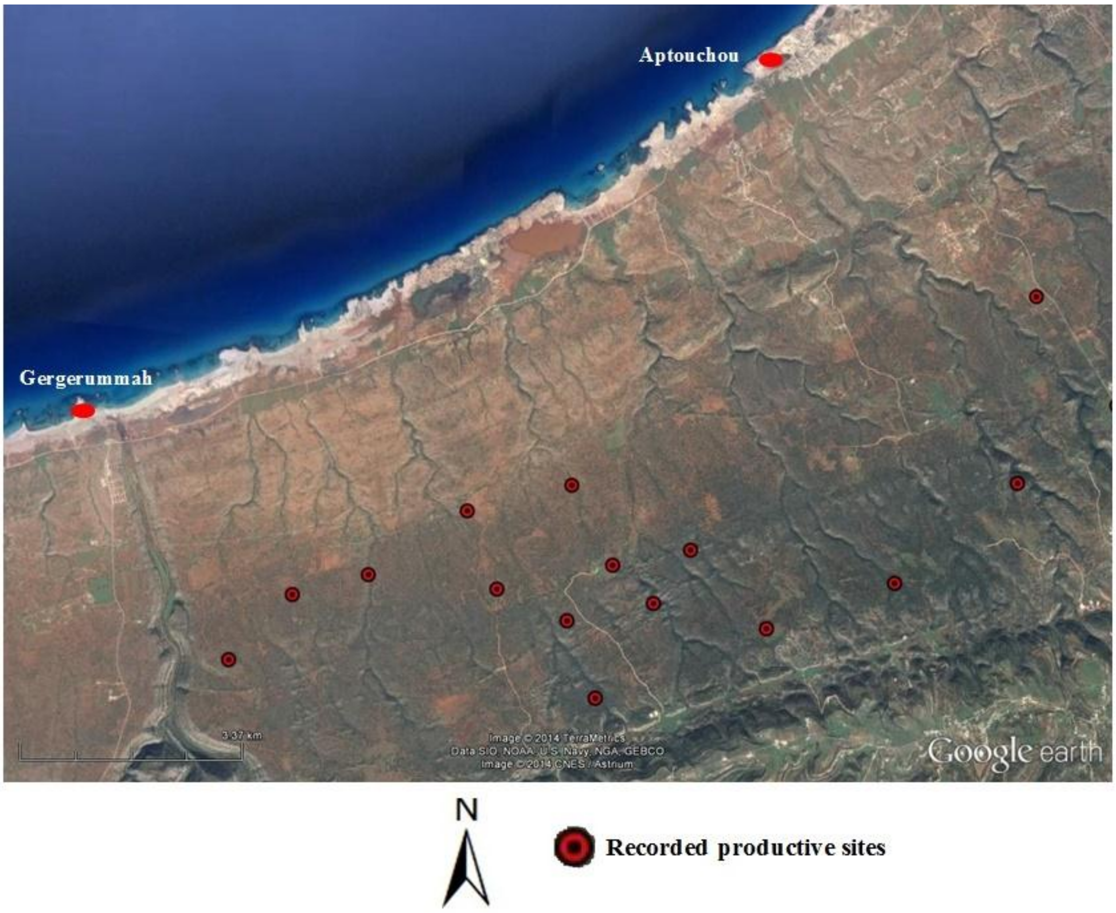


Figure 6-16: Productive sites recorded by the survey of the National Park of Wadi Al-Kuf.

	Productive features				Other features					
Site	Press	Lime kiln	Vat	Cistern	Aqueduct	Well	Fort	Church	Tomb	Cart ruts
Eblarad	√+		√+	√+						√
Magdub	√+	√		√+						
Elbaraem	√			√	√					
Elhanzuti			√+	√						
Bugassal			√+	√						
Gout Elhora										
Bratis	√+			√+				√		√
Ebletearish										
Bartamido	√+		√11							
Shnaidera	√						√			√
Elmaize	√+		√+	√+						
Karm Lwiba	√+		√+	√+						
Bar Borish	√+			√+						
Sirt Twashit	√+		√+	√+						
Elbraka	√+		√+			√+				
Nagim				√			√			√

Table 6-8: Productive sites that lie in the hinterland area located between the ports of Ausigda and Aptouchou, in the western part of el-Useita (√+ = more than one identified, but no specific number has been given; √+ number = the total identified number).

6.3.4 Routes and itineraries

There must have been a set of routes connecting the ports to the productive areas in the hinterland, to the middle or upper plateaus, and to urban cities and settlements. It is debatable whether the two types of routes in use in Cyrenaica were main roads and sub-itineraries. The main routes seem to have been those mentioned in the Antonine Itinerary and in Peutinger's map. Goodchild (1970) and Attiyah and Laronde (1999) succeeded in reconstructing these routes (Figs 6-15 and 6-16). They seem to have linked the main urban sites in the upper plateau, such as Cyrene, Balagrea and Barce, with the main harbour cities, including Apollonia, Ptolemais and other ports such as Phycus, Aptouchou and Kainopolis.

It is more likely that these ancient sources confined themselves to mentioning only the main routes linking the Pentapolis cities. However, there appear to have been other routes which this study will refer to as 'sub-itineraries'. Supporting this view, a number of cart ruts have been recorded in the middle plateau (el-Useita), in the hinterlands of the ancient sites of Kainopolis, Ausigda, Aptouchou, Phycus and Ras el-Hilal (Abdusid 1984). These cart ruts indicate the existence of a network of routes which played a substantial role in connecting the harbour sites in the coastal plains to the productive settlements, the sites in the middle plateau, and the other clustered areas on the upper plateau. Other substantial roads could have followed the main valley. Valleys could have supported major trade routes and networks in ancient times, especially if their outlets reached the harbours or productive sites. A valley that reached the sea would have had considerable commercial and strategic importance. A harbour could suffer economically if it lost its connection with its hinterland. Some harbours suffered from this type of crisis in Asia Minor (for more discussion see Blackman 1982b:188).

It is evident that the harbour sites within the study area and the industrial sites identified in the hinterlands of Aptouchou and Gergerummah are situated along the valleys, some of which physically connected the upper and medium plateaus (el-Useita) and the coastal strip (Sahel).

6.3.5 The role of Cyrenaican harbours

It is apparent that the five types of Cyrenaican harbours were organised and arranged according to the patterns discussed above. Their roles extended beyond simply providing ships with shelter and supplies, and they seem to have been managed deliberately and systematically and were well organised. Each type may have been assigned to a particular function according to its facilities and capacities. The major harbours were most likely involved in wider trade and connectivity, and their harbour infrastructures were enhanced with artificial elements to promote the accommodation and handling of good-sized merchant ships. They might have acted as emporia where imported commodities were redistributed and displayed for sale, while local produce was prepared for exportation outside the province.

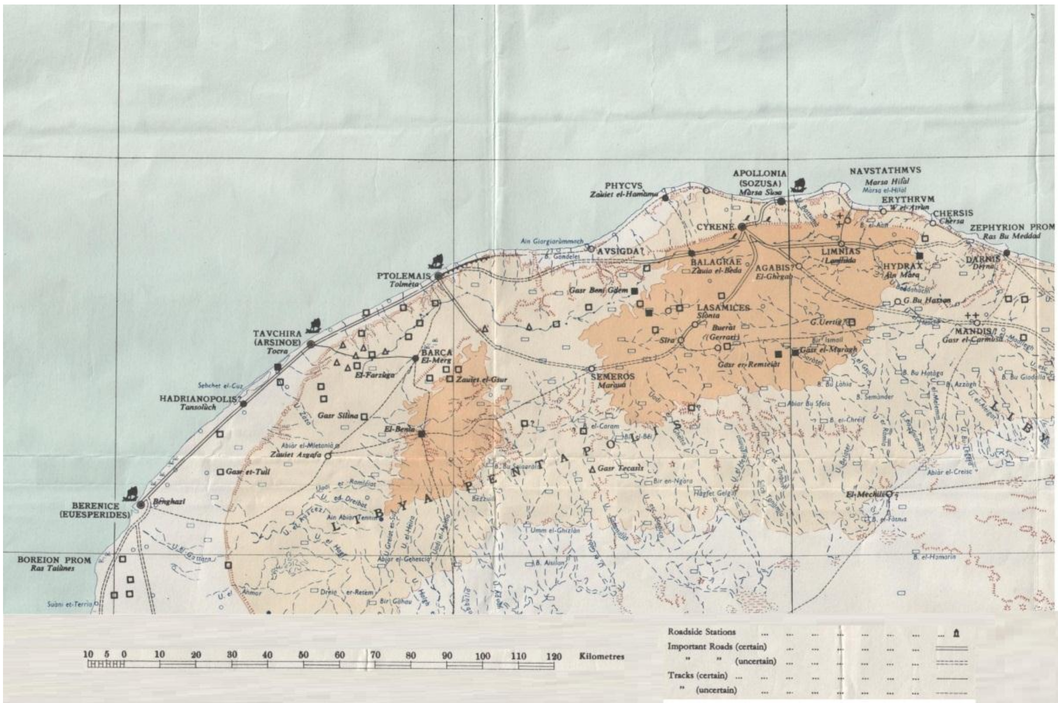


Figure 6-17: Ancient routes identified by Goodchild.

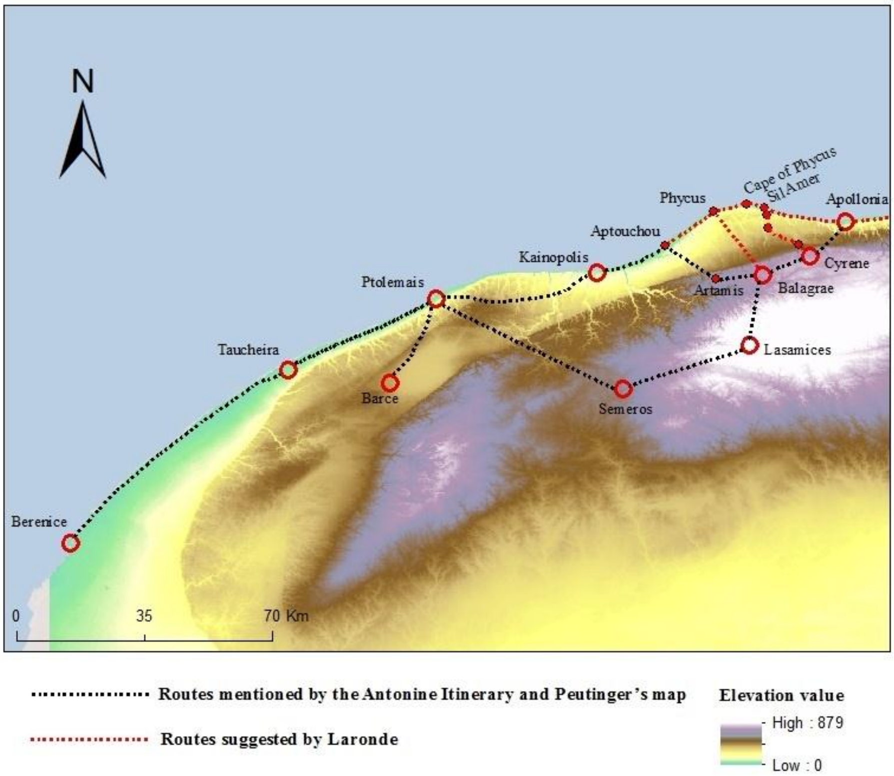


Figure 6-18: Ancient routes identified by Laronde.

The secondary or subsidiary harbours also seem to have played a significant role in facilitating the movement of goods. They seem to have acted as a bridge between their hinterlands where the productive sites were located and the main ports, where these products were then exported outside the province. The industrial sites in the hinterlands of Aptouchou and Ausigda discussed above are a clear example of this role. Their roles may not have been confined to the collection and distribution of goods from productive sites to the main ports in the region. They also acted as local re-distribution centres for local and imported goods. Harbours of this type were generally smaller than the major ports, although the underwater investigations carried out at a number of them have revealed some artificial elements. Their basin areas were adequate to accommodate small and medium ships, which could dock by the shore or in the shallow water where the stevedores could off-load the ship's cargo. It is worth mentioning that the mooring of small and medium-sized ships in the shallow water was a common practice not only in the antiquity but also in the pre-modern age. For more discussion of berthing ships near to the shore see (Wilson 2011; 2011b). The two small shipwrecks found at the ports of Ptolemais and Apollonia (Beltrame 2012; Laronde 1990) might have originated from one of the secondary ports, and may have been taking commodities to or from the main ports.

The third type of Cyrenaican harbour, the industrial ports, have also been recognised elsewhere in the Mediterranean basin (Blackman 1982b; Schörle 2011). In contrast to the examples elsewhere, it seems the examples in Cyrenaica were not involved in wider sailing traffic. The general character of those in Cyrenaica, generally of medium size, can be related to the production of pottery, fish and wine. These sites were usually attached to a small natural harbour. The role of these natural harbours was evidently to assist in the transfer and distribution of products from these sites to major or secondary ports. In terms of harbour facilities, it seems that these simple harbours were not equipped with any elaborate dock services. Small ships might be drawn to the beach and load or unload there.

Only three sites within the survey area seem to have been supervised anchorages: El-Hesi, Aluet Um-Elnamal, and Sil Amer. Their role seems more likely to have been as a supervision point, with the building acting as a watch tower controlling both sea and land traffic. For instance, Sil Amer's building was installed midway between a group of three industrial harbours and one major port to the east, and another group to the west consisting of two industrial ports and one major port. It was also situated on the land route that connected ancient Cyrene to Phycus (Fig. 6-16). Meanwhile, El-Hesi was situated midway between two secondary harbours, Aptouchou to the west and Ausigda to the east. It seems that it overlooked the industrial ports and the routes from these harbours into the hinterland.

However, another role that could be attributed to this type is the supply of shelter, water and food. Another type found in Cyrenaica is the private harbour. The role of this type is unclear as only two possible sites have been identified. The conditions of these sites are very poor, although they appeared to have associated farms. The clearest example of this was found 1.7 km to the east of Phycus, and consists of a building divided into two parts overlooking the sea with an artificial channel cut in the rock connecting it to the sea (see site gazetteer). The channel seems to have been a slipway or an anchorage suitable for a small ship. Similar examples of this cut can be found at Taucheira.

6.4 The Chronology of Cyrenaican Harbours

6.4.1 Ancient sources

Examination of the ancient sources is the obvious starting point for any assessment of the chronology of Cyrenaican harbours. Analysing these sources can provide a range of data about the harbours in terms of their first use, the period in which they saw service, and in some cases the period when they were shut down.

This study has traced certain Cyrenaican harbours through three different historical periods (Tables 6-9 and 6-10). These are: 1) the late sixth to the late fourth century BC; 2) the first century BC to the third century AD; 3) the fourth to sixth century AD. Some harbours are mentioned in all of these periods, indicating a long life. Other ports are mentioned in only one or two periods.

Apollonia seems to have been the first harbour established on the Cyrenaican coast (Laronde 1987). Herodotus (IV, 150) (late fifth to the early fourth century BC) is the first to mention the port of Cyrene, although Pseudo-Scylax also mentions it later in the fourth century BC (Pseudo-Scylax 108). These writes refer to another three major harbour sites, being Euesperides, Taucheira and Ptolemais (Scylax's Periplous 108 Herodotus IV: 150, 171, 204). Phycus is mentioned only in the later period by Pseudo-Scylax (Pseudo-Scylax 108).

A number of new harbours were created between the first century BC and the third century AD alongside Apollonia, Euesperides, Taucheira, Ptolemais and Phycus. Strabo (Strabo XVII, 3, 20-22) (writing at the end of the first century BC and early first century AD) referred to two new harbours, which were the Cape of Phycus and Naustathmos, and also recorded the name Berenice in place of Euesperides (Strabo XVII, 3, 20-22). Pliny the Elder wrote in the second half of the first century AD, and only mentioned previously known sites: Apollonia, Berenice, Taucheira, Ptolemais and Phycus.

The *Stadiasmus Maris Magni* (believed to date to the second century AD) listed a number of new harbours alongside the previous ones, including Ausigda and Erythron. Claudius Ptolemy lived in the early second century AD and confirms the list of harbours mentioned by the *Stadiasmus*, whilst also adding Cape of Phycus. In the third century AD only the main four coastal sites of the Pentapolis Berenice, Taucheira, Ptolemais and Apollonia were included in the *Antonine Itinerary*. The letters (3, 51, 58, 62, 79, 94 and 126) of the Bishop Synesius provide an early fifth-century eye-witness view of Berenice, Taucheira and Ptolemais, as well as Phycus and Erythron. The Peutinger map (based on information dating to the second or third century AD) was confined to the four main sites - Berenice, Taucheira, Ptolemais and Apollonia - in addition to a new site known as Kainopolis.

According to these ancient sources, Taucheira, Ptolemais, Phycus and Apollonia seem to have had a long life of around 11 centuries, probably from late sixth century BC to the sixth century AD. A number of other sites are noted in two separate periods. The Cape of Phycus, for instance, is mentioned in both the first century BC and the second century AD. Euesperides was only named in literary sources relating to the late sixth and fifth century BC. On the other hand Berenice, which replaced the ancient city of Euesperides, first appeared in ancient sources from the first century BC, and continued to appear consistently until the fifth century AD. Kainopolis meanwhile seems to appear only in *Peutinger's* map. Two other sites known as Ausigda and Naustathmos emerged in the ancient texts from the first century BC to the second century AD. Erythron on the other hand only appeared in the first and second centuries AD and the fifth century AD.

Harbour			Herodotus	Thucydides	Pausanias*	Scylax	Diodorus Siculus*	Strabo	Pliny the Elder	Stadiasmus	Ptolemy	Antonine Itinerary	Synesius	Peutinger's map
Ancient name	Modern name	Type of port	Late 5 and Early 4 BC	5 BC	5 BC	Late 4 BC	Late 4 BC	1BC/1 AD	1 AD	1?/2 AD	2 AD	3 AD	Late 4 and Early 5 AD	5 AD
Erythron	Lathrun	Secondary								√	√		√	
Naustathmos	Ras El-Hilal	Secondary						√		√	√			
Apollonian	Susa	Major	√			√	√	√		√	√			
?	Noat 1	Industrial												
?	Noat 2	?												
?	Mahel Mael	Industrial												
?	Sil Amer	Industrial												
?	Assa Mousa	Industrial												
Cape of Phycus	El-Mamluh	Industrial						√?			√?			
E-Phycus		Private												
Phycus	El-Hamama	Major				√		√	√	√	√		√	
Shaat marakeb	Shaat El-Marakeb	Private												
Aptouchou	El-Hanya	Secondary								√?	√?			
?	El-Hasi	Supervised												
Ausigda	Gergerummah	Secondary								√?	√?			
Kainopolis	El-Agla	Secondary												√
Ptolemais	Tolmeta	Major	√			√		√	√	√	√	√	√	√
Taucheira	Tocra	Major	√				√	√	√	√	√	√	√	√
Berenice	Benghazi	Major						√	√	√	√	√	√	√
Euesperdies	Benghazi	Major	√	√	√	√	√							

Table 6-9: Harbours of Cyrenaica according to ancient writers (*Pausanias was a second-century AD traveller, while Diodorus Siculus wrote in the first century BC. They mention Cyrenaican harbours in the context of events that occurred in the fifth and fourth century BC).

Harbour	Date										
	6 BC	5 BC	4 BC	3 BC	2 BC	1 BC	1 AD	2 AD	3 AD	4 AD	5 AD
Erythron							√	√			√
Naustathmos						√	√	√			
Appolonia	√	√	√	√	√	√	√	√	√	√	√
Noat1											
Mahel Mael											
Sil Amer											
Assa Mousa											
Cape of Phycus						√		√			
E-Phycus											
Phycus			√	√	√	√	√	√	√	√	√
Shaat el-Marakeb											
Aptouchou							√	√			
El-Hasi							√	√			
Ausigda											
Kainopolis											√
Ptolemais	√	√	√	√	√	√	√	√	√	√	√
Taucheira	√	√	√	√	√	√	√	√	√	√	√
Euesperdies	√	√	√								
Berenice						√	√	√	√	√	√

Table 6-10: The chronology of the ancient harbours of Cyrenaica according to ancient sources.

6.4.2 Chronology based on archaeological data

6.4.2.1 Chronology of major harbours

A considerable assemblage of datable ceramics and coins has been established from the major ancient Cyrenaican harbours. Large-scale excavations at the ancient sites of Apollonia, Ptolemais, Taucheira, Euesperides and Berenice have produced a massive amount of pottery in various forms and from different periods (Buzaian 2000; Laronde 1987; 1990; 1999; Lloyd 1979; 1998; Nowakowski et al. 2011; for Euesperides see excavation reports in Libyan Studies from 1995 to 2005). The presence of materials from the sixth century BC to the seventh century AD at the ancient sites of Apollonia, Ptolemais and Taucheira indicate activity occurred over a long span of time. However, the lack of coins or sherds from beyond the middle of the third century BC indicates the abandonment of Euesperides in favour of Berenice (Lloyd 1979). The latter site was occupied from the middle of the second century BC until the sixth century AD, as the ceramic assemblage indicates (Riley 1979a).

A number of varied pottery sherds associated with ancient Phycus have been collected either by the SCSC survey or by other scholars visiting the site (Jones and Little 1971a; Tusa 2010), which suggests the presence of an intensive settlement down to the later Roman period. Large quantities of African red-slip ware fragments dating from the late fifth to the early seventh century AD have been found, along with some examples dating to the mid-third century AD (Jones and Little 1971a). The pottery distribution and assemblages collected and noted by the SCSC survey from the ancient site of Phycus seem to be consistent with the materials noted by Jones and Little. The SCSC survey yielded materials dating from the fourth to seventh centuries AD, including substantial numbers of amphora sherds, coarse wares and African red slip ware. Two bronze coins were collected which probably date to the late mid Roman period. Tusa (2010) recovered fragments of attic and black glazed pottery dating to the fourth century BC from the most eastern part of the site. He also reports finding other pottery sherds believed to be from the third to fourth century AD (Table 6-11).

The overall shape of material distribution at the ancient site of Phycus seems to suggest peak settlement occurred in the late Roman period (Fig. 6-17). This has also been noted by Jones and Little, as they state that “almost all the surface finds made in 1969 belong to the last period of occupation” (Jones and Little 1971:79). They account for this by referring to the fact that the site has not been exposed to erosion, meaning that the last occupied strata has been preserved to a degree. Although the surface finds from Phycus do not support occupation in the Hellenistic or early Roman period, this phase of activity is confirmed by the ancient sources. However, it should be noted that most surveys produce materials from the most recent occupation of a site. For instance, the surface survey of ancient Leptiminus in Tunisia yielded a high percentage of late materials (Mattingly 1992; 2011b).

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Phycus	Jones and Little	ARS	3 to 7 AD	1969
	Tusa	Attic sherds	4 BC	2010
		Black Glazed	4 BC	
		Not Specified	3 to 4 AD	
	SCSC	Amphorae	4 to 7 AD	2012/2013
		CW	5 to 7 AD	
		ARS	6 AD	

Table 6-11: The archaeological materials collected from the ancient site of Phycus (el-Hamama).

Phycus clearly had a long life which most likely started in the fourth century BC, and reached its peak in the late Roman period. Integrating evidence from both the archaeological materials and ancient sources can provide us with a concrete chronology for the ancient harbours of Cyrenaica. The evidence for the chronology of the major Cyrenaican harbours yields only approximate dates (Table 6-13).

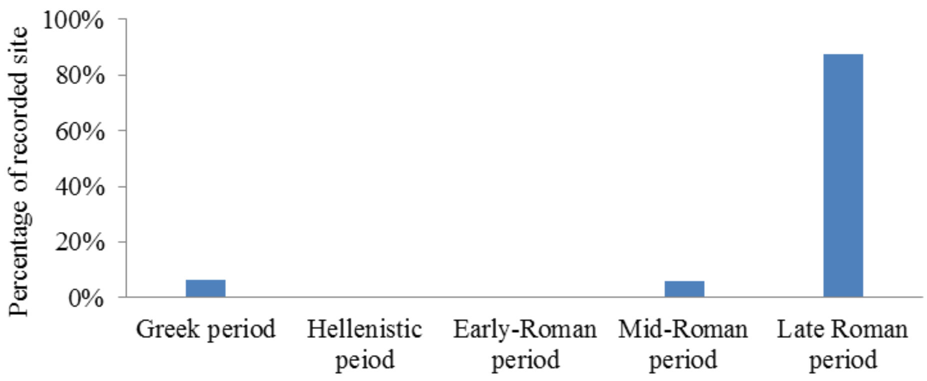


Figure 6-19: The chronology of Phycus based on the archaeological data.

Harbour	Date												
	6 BC	5 BC	4 BC	3 BC	2 BC	1 BC	1 AD	2 AD	3 AD	4 AD	5 AD	6 AD	7 AD
Phycus			√					√		√	√	√	√
Ptolemais	√	√	√	√	√	√	√	√	√	√	√	√	√
Taucheira	√	√	√	√	√	√	√	√	√	√	√	√	√
Berenice				√	√	√	√	√	√	√	√	√	
Euesperides	√	√	√	√									

Table 6-12: The chronology of the major harbours of Cyrenaica based on the archaeological data.

6.4.2.2 Chronology of secondary harbours

Two examples of secondary harbours have been systematically surveyed by the SCSC at Aptouchou and Kainopolis, from which a good range of datable materials were obtained (Tables 6-14 and 6-15). The earliest fragments recovered from the two sites appear to be black glazed wares attributable to the fourth or the third century BC. Jones and Little (1971a) and Laronde (1987) recorded similar fragments of black glazed pottery dating back to the same period.

Small quantities of early Roman materials (comprising 7% of the total recovered materials) were found at the ancient site of Kainopolis. Surprisingly, the pottery assemblage of early Roman period at Kainopolis seems to reach its peak among other materials from other periods. This forms approximately 29% of the total materials gathered by the SCSC. Sherds from the second to fourth century AD are represented in the material assemblages collected by the SCSC from both Aptouchou and Kainopolis (Fig. 6-18 and 6-19). In the former, mid Roman materials form 30% of the total quantity of pottery sherds gathered. This period at Kainopolis was represented by 19% of the total collected assemblage. Both sites show peak values between the fifth and seventh century AD. Late Roman amphora (L1 and L2) and coarsewares comprised 37% of the total material recovered by the SCSC from Aptouchou. Other sherds of coarsewares from the late sixth and early seventh century AD have also been reported by Jones and Little (1971a).

There is limited evidence for the chronology of the remaining three secondary harbours in Cyrenaica (Ausigda, Naustathmos and Erythron (Table 6-16 and Fig 6-20). Unfortunately, the SCSC team were unable to visit and survey them, as Naustathmos and Erythron are located outside the SCSC survey area. Although a French mission carried out excavation work at Erythron (Laronde and Michel 2004), no reports have yet been published about the materials found at the site. However, a recently published short report (Mazou and Capelli 2011) refers to a dump of kiln waste relating to amphorae and coarse wares found at the site. They are probably from the mid-Roman period.

In turn, the ancient site of Naustathmos suffers from a lack of systematic work. According to Jones and Little (1971a) the pottery found at the site can be attributed to a late period, most probably from the sixth century AD. The site of Gergerummah was visited in 1984 by a Libyan team from the Department of Antiquities in Cyrene (Abdulsid 1984). Only eight pieces of pottery were collected, which seem to date from between the fifth and sixth centuries AD.

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Aptouchou	Jones and Little	Black Glazed	4 BC	1971
		Coarse Ware	4 AD	
		CW	L6-E7	
	Laronde	Attic black Glazed	4 BC	1987
		Not specified	5 to 6 AD	
	SCSC	Amphorae	1 to 4 AD	2010/2012
		Coarse Ware	1 to 3 AD	
		Amphorae	6 to 7 AD	
		Amphorae	1 BC to 1 AD	
		Coarse Ware	4 to 2 BC	
		Black Glazed	4 to 3 BC	

Table 6-13: Surface materials collected from Aptouchou (el-Hanya).

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Kainopolis	Laronde	Black Glazed	4 BC	1983
	SCSC	Coarse Ware	1 BC ER	2010/2012
		Black-Glazed	5 to 3 BC	
		Amphorae	LR	
		Amphorae	MR	
		Red Slip	4 to 6 AD	
		Amphorae	1 BC to 1 AD	

Table 6-14: Surface materials collected from Kainopolis (el-Agla).

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Ausigda	Abdussid	Not Specified	5 to 7 AD	1984
Naustathmos	Jones and Little	Coarse Ware	6 to 7	1971
Erythron	Mazou and Capelli	MR Amphorae	2 to 4	2011
		Coarse Ware	2 to 4	

Table 6-15: Surface materials collected from Ausigda, Naustathmos and Erythron.

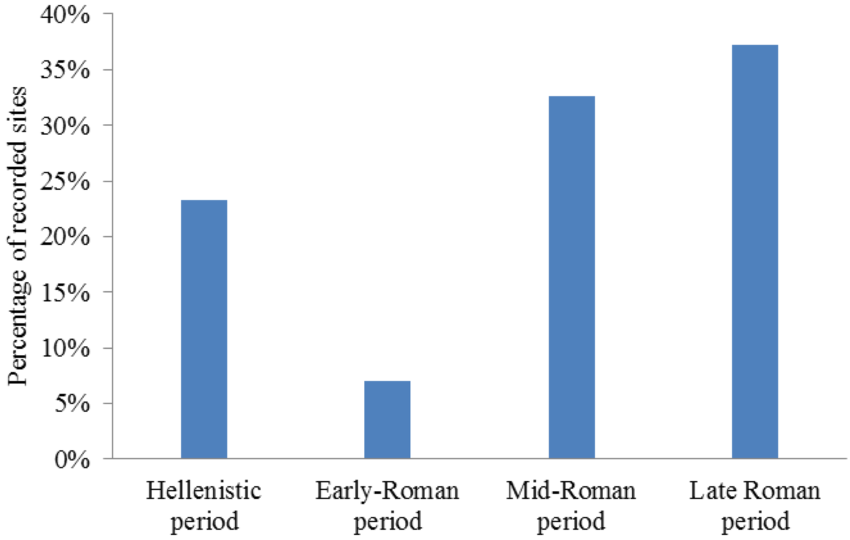


Figure 6-20: The chronology of Aptouchou based on the archaeological data.

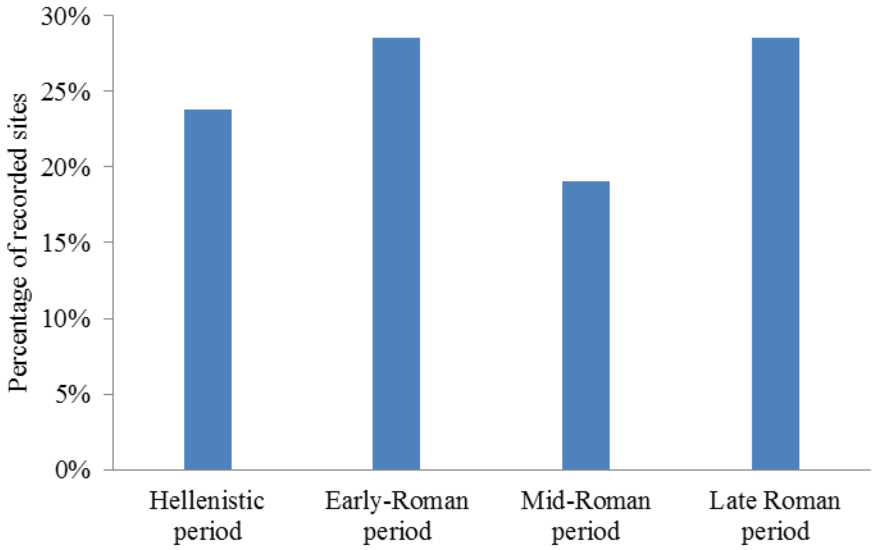


Figure 6-21: The chronology of Kainopolis based on the archaeological data.

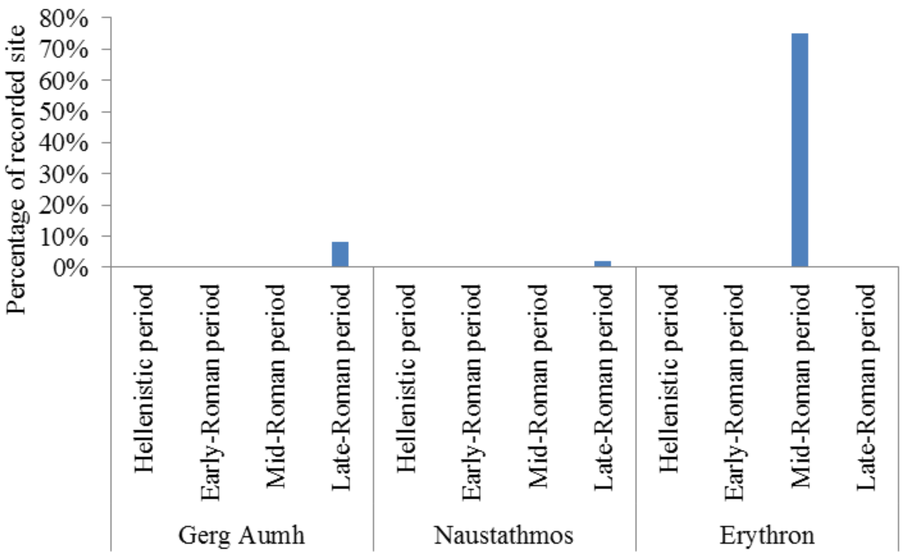


Figure 6-22: The chronology of Ausigda, Naustathmos and Erythron based on the archaeological data.

The overall chronology of the secondary harbours (Table 6-16) is clearest at the sites of Kainopolis and Aptouchou, which appear to have been occupied from the fourth century BC until the sixth and seventh centuries AD respectively. The picture is less clear for the other three sites. While further investigation at these three sites will surely increase our knowledge about their chronology, an initial chronology can be extracted from the ancient sources (Tables 6-9 and 6-10). They were most probably established from the first century BC and existed until the late period. Late-period activity was associated with several sites with churches.

Harbour	Date										
	4 BC	3 BC	2 BC	1 BC	1 AD	2 AD	3 AD	4 AD	5 AD	6 AD	7 AD
Erythron						√	√	√	√	√	
Naustathmos										√	√
Aptouchou	√	√	√	√	√	√	√	√	√	√	√
Ausigda											
el-Agla	√	√		√	√	√	√	√	√	√	

Table 6-16: The chronology of secondary harbours of Cyrenaica based on the collected surface pottery.

6.4.2.3 Chronology of ancillary harbours (industrial harbours)

Five harbour sites have been classified as the third type (industrial harbours) (Table 6-17). Two of these sites (the Cape of Phycus (el-Mamluh) and Mahel Mael) have yielded huge quantities of materials dating from the second to the fourth century AD (Figs. 6-21 and 7-22). At the Cape of Phycus, the mid-Roman material comprises 68% of the total collected pottery sherds, while at the latter sites it forms 75%. However, late Roman materials appear to be less common here than mid-Roman finds. Nonetheless, both sites have yielded fifth to sixth century materials, primarily amphorae and coarseware sherds. Only one sherd from an earlier Roman amphora has been found at Cape of Phycus. As noted above, this site (if it is indeed the harbour mentioned by Strabo) may have been operational by the early first century AD. No materials belonging to the Hellenistic era have been found among the assemblage at either site.

The samples collected from Noats 1 and 2 are too small for useful analysis due to the scarcity of pottery sherds around the sites. Perhaps the effects of sand and high waves in winter are among the reasons leading to the shortage of pottery sherds at the ancient site of Noat 1, where only four pottery sherds have been collected. Three of them dated from the second to the fourth century AD, while the other dates to the late Roman period, most likely from the fifth to the sixth century AD. Another three sherds from Noat 2 also seem to date from the fifth to the sixth century AD. However, the site might have been occupied since the first or second century AD, as the outer walls of the main building (sections A and B) was built from large rectangular ashlar masonry while the walls of section B were built in a different style using rough and unshaped limestone pieces. This suggests that they were added during a later period. However, the date of the site of Assa Mousa is unknown at present. The sites consist of a set of vats cut in the rock located by the shore, and no pottery sherds exist in situ.

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Noat 1	SCSC	Amphorae	2 to 4 AD	2013
		Amphorae	5 to 6 AD	
Noat 2	SCSC	Amphorae	5 to 6 AD	2013
		Amphorae	2 to 4 AD	
Mahel Mael	SCSC	Amphorae	5 to 6	2012
		Coarse Ware	2 to 4 AD	
Assa Mousa		?	?	
		Amphorae	2 to 4 AD	
		Amphorae	5 to 6 AD	
Cape of Phycus	SCSC	Coarse Ware	1 to 4 AD	2012
		Coarse Ware	5 to 6 AD	
		Amphorae	1 AD	

Table 6-17: Surface materials collected from the Cape of Phycus, Mahel Mael, Noat 1 and Noat 2.

In general, the amount of datable pottery gathered from the ancillary or industrial harbours in Cyrenaica is relatively small. This is especially the case for the finds from Noats 1 and 2, the main body of which dates from the second to fourth centuries AD. However, the lack of materials from earlier periods is not evidence that these harbours were built from the second century AD. Nonetheless there are hints that activity at this type of harbour was more intensive during the mid-Roman period than any other Roman period (Table 6-18).

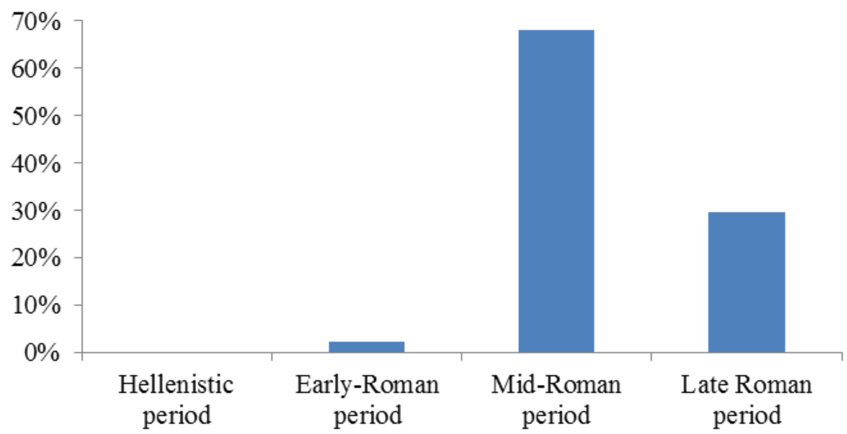


Figure 6-23: The chronology of Cape of Phycus based on the archaeological data.

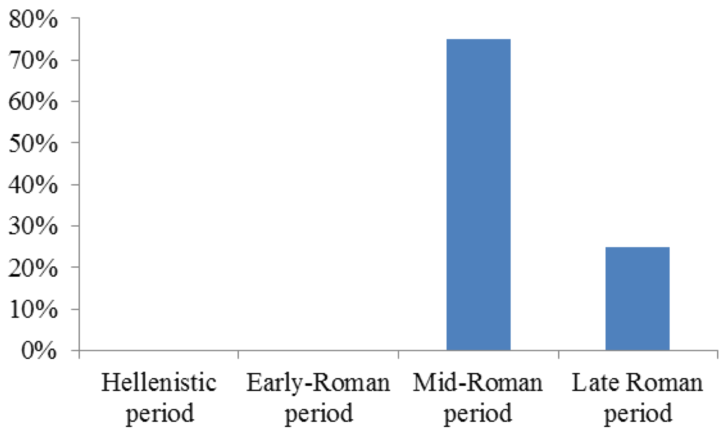


Figure 6-24: The chronology of Mahel Mael based on the archaeological data.

Harbour	Date						
	1 AD	2 AD	3 AD	4 AD	5 AD	6 AD	7 AD
Noat 1		√	√	√	√	√	
Noat 2					√	√	
Mahel Mael		√	√	√	√	√	
Assa Mousa							
Cape of Phycus	√	√	√	√	√	√	

Table 6-18: The chronology of the ancillary Cyrenaican harbours (industrial harbours) based on collected assemblages.

6.4.2.4 Chronology of supervised anchorages (watching harbours)

No pottery has been found in the area of the two examples of this type of harbour, so it is not possible to propose a chronology of these harbours using such evidence. However, Attiyah and Laronde (1999) suggests that the site of Sil Amer dates back to the Hellenistic period on account of the building types present and the masonry techniques used. However, the site seems to have been used until after the fourth and fifth century AD, as the outer walls were supported by revetments. This method of supporting walls was widely used to treat cracked buildings after the AD 365 Cyrenaican earthquake (Kenrick 2013). El-Hesi seems to have had a similar history to Sil Amer. A trench dug by a local peasant at El-Hesi led to the discovery of a number of small jars, and a complete terracotta piece of a woman's hollow left foot (see Figure 9, appendix I). Similar pieces have been found at the ancient site of Euesperides (Bennett et al. 2000) dating to the late Hellenistic period.

Going by the above evidence, this type of site could date from the Hellenistic or earlier Roman period to the late Roman period. In support of this view, both sites are located on the main roads connecting Cyrene with Phycus (Sil Amer) and Ptolemais (el-Hesi), which would have been used by Greek and Roman settlers (Attiyah and Laronde 1999; Laronde 1987; 1999). The existence of both sites over on extended period is thus both logical and plausible.

6.4.2.5 Chronology of private harbours (maritime villa)

In the case of the chronology of this type of site, it is clear that the pottery samples from both sites suggest a Roman date as the earliest period of occupation. At the site of Shaat el-Marakeb, amphora sherds dating from between the first century BC and the first century AD have been identified. Sherds of coarse pottery from the second to fourth centuries AD are also represented among the assemblages. Other late amphorae sherds from the fifth to seventh centuries have also been identified. On the other hand, few pottery sherds have been collected from the ancient site of East-Phycus. These sherds seem to be from the second to fourth centuries AD (Table 6-19 and 6-20).

Site	Source	Type of Pottery		Date of observation
		Type	Date	
Shaat el-Marakeb	SCSC	Amphorae	1 BC to 1 AD	2010
		Coarse Ware	2 to 4	
		Amphorae	5 to 7	
E-Phycus	SCSC	Amphorae	2 to 4	2013
		Coarse Ware	2 to 4	

Table 6-19: Surface materials collected from Shaat el-Marakeb and E-Phycus.

Harbour	Date							
	1 BC	1 AD	2 AD	3 AD	4 AD	5 AD	6 AD	7 AD
El-Marakeb	√	√	√	√	√	√	√	√
E-Phycus			√	√	√			

Table 6-20: The chronology of private Cyrenaican harbours (Maritime Villa) based on collected surface finds.

To conclude, the ancient sources sometimes seem to expose only one side of the story. In order to obtain a wider picture, it is necessary to integrate the archaeological evidence based on surveys and excavations with the ancient literature. In the study of the chronology of harbours of Cyrenaica, this thesis has aimed to obtain an initial chronology for these sites by analysing both the texts of ancient writers and the surface materials collected during this study's field survey.

The overall chronology extracted from the ancient literary sources relates mainly to the major ports, including Apollonia, Phycus, Ptolemais, Taucheira, Berenice and Euesperdies. However, other secondary and small harbours have also been referred to. These references usually discuss the cities or harbour sites in relation to a wider event or role. For instance, Phycus was mentioned by Lucan for its relationship with Cato the Younger during the civil war. However, there was a total absence of references to sites such as Mahel Mael, Noats 1 and 2, Assa Mousa, and Sil Amer in the ancient sources. This is not evidence of a lack of activity, though it may reflect the different internal roles of these sites. The chronology of these sites relies entirely on the surface data, in contrast to the major and secondary harbours.

It is also important to stress that the surface materials are sometimes biased in favour of the last period of occupation. Most of the material collected by the SCSC team and by Jones and Little at Phycus, for example, relates to the late Roman period. However, we know that the site was occupied over a long time span, probably from the fourth century BC or even earlier. At Aptouchou meanwhile materials have been which date from the fourth century BC to the seventh century AD. Such a variety of materials have been found due to erosion at the site exposing material from different periods. This was also noticed in 1969 by Jones and Little (1971a).

Jones and Little state that little from the early Roman period is identifiable at the Cyrenaican harbour sites (Jones and Little 1971a). This has been confirmed by the material assemblage of the SCSC survey. This is likely due to the general recession and instability of the coastal area during the Roman civil war. However, the materials found at Kainopolis show a peak in earlier Roman sherds, amongst other materials. This might be due to its location between Ptolemais and Cyrene in the middle of an ancient land network.

In conclusion, this study argues that the initial chronology of the major Cyrenaica harbours started in the Archaic Greek period and continued until the seventh century AD. The one exception to this is Phycus, which may have been founded at the end of the fifth or the beginning of the fourth century BC. The secondary harbours also seem to have been in operation from the fourth century BC until the seventh century AD, while the industrial harbours appear to have functioned from the Hellenistic era, in the case of Noat, or throughout the Roman period. The fourth type also dates from between the Hellenistic and late Roman periods. The private harbour is the final type, and seems to have been used from the first century BC (that is, in the Roman period) (Table 6-21).

6.5 General Conclusion

The evidence from this chapter suggests that six types of harbour existed in Cyrenaica. The investigation of their function has shown that their presence were not random or unintentional. The ancient inhabitants seem to have established and organised these ports in a deliberate fashion, so that they worked together as a package and delivered the optimum benefits and revenue. Each type was assigned a particular role; some served as inter-provincial bridges, while others had an intra-provincial role and acted as internal conduits to facilitate the movement of goods and products. These commodities were not necessarily imported from overseas, however, and could be local produce which needed to be delivered to another city or area within Cyrenaica.

Shipping by sea was preferred to transportation by land, as it was faster and easier. The latter seems to have been more expensive and exposed the products to possible loss, whether by theft or damage during the course of travelling over the region's rough roads (Blackman 1982b). In general, the typology of Cyrenaican harbours seems to be consistent with the typologies of Roman harbours suggested by other scholars (Blackman 1982a; Schörle 2011; Stone forthcoming). However, this study's typology aims to emphasise and highlight the role of the secondary harbours which were not examined in the other typologies.

The urban cities located in the upper plateau in the Greek and early Hellenistic periods seem to have been served only by major ports. For instance, Apollonia served Cyrene, Ptolemais acted as an outlet to Barce, and other ports such as Phycus and Naustathmos served Balagrae and Lamloda respectively (Laronde 1987; Jones and Little 1971a). In the Roman period, particularly after the first century AD, the ports seem to have flourished and new and more organised ports emerged. Generally, the chronology of Cyrenaican ports seems to have started in the sixth century BC and continued until the seventh century AD.

Harbour	Date												
	6 BC	5 BC	4 BC	3 BC	2 BC	1 BC	1 AD	2 AD	3 AD	4 AD	5 AD	6 AD	7 AD
Erythron							√	√	√	√	√	√	√
Naustathmos						√	√	√	√	√	√	√	√
Apollonia	√	√	√	√	√	√	√	√	√	√	√	√	√
Noat 1				√	√	√	√	√	√	√	√	√	√
Mahel Mael													
Sil Amer				√	√	√	√	√	√	√	√	√	√
Assa Mousa													
Cape of Phycus						√	√	√	√	√			
E-Phycus								√	√	√			
Phycus		√	√	√	√	√	√	√	√	√	√	√	√
Shaat el-Marakeb						√	√	√	√	√	√	√	√
Aptouchou			√	√	√	√	√	√	√	√	√	√	√
El-Hasi				√	√	√	√	√	√	√	√	√	√
Ausigda						√	√	√	√	√	√	√	√
Kainopolis			√	√	√	√	√	√	√	√	√	√	√
Ptolemais	√	√	√	√	√	√	√	√	√	√	√	√	√
Taucheira	√	√	√	√		√	√	√	√	√	√	√	√
Berenice				√	√	√	√	√	√	√	√	√	√
Euesperides	√	√	√	√									

Table 6-21: The initial chronology of the harbours of Cyrenaica.

Only excavation works can produce a solid chronological sequence of a site. However, in the absence of excavations on the sites within the study area, this study aimed to integrate evidence from both ancient sources and surface data to obtain such information. This approach enabled a provisional chronology of Cyrenaican harbours to be established.

Chapter 7: Cyrenaican Ports: Long-distance Trade and Connectivity

7.1 General Introduction

This chapter evaluates the role of Cyrenaican ports in terms of long-distance trade and inter-provincial connectivity. This evaluation is based on the ceramic assemblages collected during the field survey from Phycus (el-Hamama), Aptouchou (el-Hanya), Kainopolis (el-Agla) and Cherronesus (Ras et-Tin). It also re-evaluates the ceramic assemblages recorded from sites along the Cyrenaican coast, most notably Berenice and Ptolemais. This chapter makes an initial estimate of the quantity of imported amphora-borne products such as wine, oil and fish sauce brought to Cyrenaica by gauging the volume of known amphora types (see below for the method of calculation).

This chapter aims to reassess the trends identified by other scholars. Some archaeologists and historians believe that there were two separate trade networks in the Mediterranean. Sites to the east of the Mediterranean were primarily linked in trading relationships with other eastern sites, while sites to the west primarily traded with other western sites (Fulford 1987). Other scholars believe the opposite, claiming that the whole Mediterranean region traded together as a single unit (Wilson 2013).

In this chapter there is a significant bias towards the amphora and fine ware data obtained from the excavation work at Berenice (Riley 1979a) and the fine ware assemblage from Ptolemais (Domżalski 2012). This cannot be overcome, as the pottery data collected from this study's field survey is relatively small in quantity and biased in many cases to the later periods of occupation at the sites surveyed. This is normal for surface surveys, as explained in the previous chapter. Additionally, the fact is that quantification methods work better with large quantities of pottery recovered from excavation work covering long chronological spans, rather than the smaller assemblages recovered by a survey with an over-emphasis on one era.

The possible bias in the Berenice data and the fine ware from Ptolemais is difficult to remedy, given the current state of ceramic reporting from other parts of Cyrenaica.

As stated above, quantified studies have not yet been adopted widely by the archaeological missions working in the region or by Libyan archaeologists. Many surveys still seem to follow the old research tradition of considering and studying the most complete and decorative pots.

It is worth mentioning that the assemblages of pottery obtain from the excavations at Berenice (Riley 1979a) have been studied before in comparison with other sites. In 1987 Fulford, as already mentioned, examined amphora assemblages from Berenice, Carthage and Ostia in order to explore the connectivity between the east and west Mediterranean (Fulford 1987). Two years later, he published another article comparing assemblages from Cyrenaica and Tripolitania that suggest the two regions belonged to distinct trade networks (Fulford 1989). Meanwhile, Tomber (1993) conducted a similar study to Fulford's. However, she extended her case study to include two new sites (Caesarea and Naples) alongside Berenice, Ostia and Carthage. Rice (2011); 12) is a third example, as she builds on the work of Fulford and Tomber by adding an additional five sites to her study.

The reader should be aware that the figures used regarding Berenice's pottery seem to be higher than those provided by the above scholars. This is for two main reasons. Firstly, when analysing Riley's data, the researcher did not quantify the intrusions and residual pottery of another period with the pottery found within a particular dated context. For instance, late Roman amphorae 1 have been found in the Hellenistic deposits as intrusions within this context. In this case, these materials have been counted with the late Roman period sherds. Where residual material is present, as in the late first century AD deposits where Hellenistic amphorae have been found, these materials have been counted with the Hellenistic period pottery.

The second reason is that this study has focused on the imported materials only when comparing the trade suppliers, ignoring the local and miscellaneous (origin not identified) pottery. The reader should be aware that the statistics presented in this chapter are only rough estimates and may be inaccurate. This is because the data sets produced from the field survey were usually small compare to the data yielded from excavation. In other words, the information presented here reflect patterns of collected pottery sherds rather than trade routes and movements of goods, as they might present a small percentage of trade and commerce mechanism carried out at the port sites.

However, the aim of quantification is to obtain data about the broad trends of trade routes and the commerce of Cyrenaican ports, and to establish when periods of boom and decline occurred in the region.

The chapter is divided into two main sections following this general introduction (7.1). Section 7.2 will discuss the ceramic assemblages (amphorae and fine wares) from the SCSC surveyed sites, Berenice and Ptolemais. It will examine these pottery assemblages from different angles to expand our knowledge about the origin and sources of these products, and will also evaluate the most common types of products imported into Cyrenaica. Section 7.3 is a general conclusion and discussion. This section will discuss the mechanisms of trade routes between Cyrenaica and different regions around the Mediterranean. It will assess whether these products could have come to Cyrenaica directly from their sources, or by redistribution mechanisms from different *entrepôts* around the Mediterranean region.

7.2 Ceramics as Evidence of Long Distance Trade and Connectivity

7.2.1 Introduction

> *In the past the main thrust of ceramic research has been directed towards the classification and identification of pottery so that we have been much preoccupied with naming, dating and determining the origin of different wares. Obviously, this is virtually important and must continue to receive priority, but the study has now developed to a level where broader synthesis and evaluation is not only possible but essential* (Peacock 1982:3-4).

The last two centuries have witnessed a growing interest in the study of pottery, as it is the most durable and abundant artefacts to be found at ancient sites. However, until the first half of the twentieth century study concentrated on the most decorative and complete pieces of vases or wares (Peacock 1982). In reaction a number of systematic approaches emerged in the second half of the twentieth century. Two distinct types of research appeared, which can be termed the micro and macro approaches. The former is concerned with local and regional pottery in terms of classification (type, form and chronology) and identification (in terms of fabric and sources) (Peacock 1982). The macro approach emphasises quantification and the study of pottery as evidence of wider concepts relating to economic patterns and long-distance trade and connectivity (Peacock and Williams 1986; Tomber 1993).

Numerous research projects have attempted to quantify the ceramic assemblages found at ancient sites in order to assess their levels of interconnection and connectivity. For instance, Fulford is indisputably a pioneer in changing the concept of studying ceramic assemblages. He used pottery quantification studies to make a considerable amount of inferences about wider trade networks and connectivity (Fulford 1975/87/89). Fulford notably quantified and compared the pottery assemblages from the excavation works at Ostia, Carthage and Berenice in order identify the different sources of imports and connectivity (Fulford 1987). He also conducted a similar study devoted to researching ceramic assemblages from Cyrenaica (based on Berenice) and Tripolitania (based on Sabratha) (Fulford 1989).

However, it is clear that it is only possible to extract such information when systematic and quantified methods have been used in the excavation work. In addition, the pottery must be identified in terms of typology, fabric and classification, and a chronology in relation to each deposit of a given site must be acquired (Riley 1979a).

Unfortunately, only a limited number of Mediterranean excavations have had their ceramics studied in sufficient detail to allow full quantification of their data. The application of this approach is still rare in the eastern Mediterranean, but it is starting to see use in the north-west, where some steps towards the adoption of these methods have been taken (Wilson 2009). Taking Cyrenaica as an example, only one site (Berenice) to date has been subjected to a full quantified analysis (Kenrick 1985b; Riley 1979a). Meanwhile other major sites in the region, such as Apollonia (which has been subject to constant excavation work since 1980, see Chapter 1), have not received similar attention.

However, in recent years there has been increasing competition between Roman archaeologists and historians to quantify Roman commerce. A number of approaches and theories have emerged to gauge trade and long-distance connectivity during the Roman period (Bowman and Wilson 2009; Scheidel 2012). Since a significant proportion of ancient trade was based on perishable goods, which cannot be traced archaeologically, pottery has risen as the undisputed default proxy for measuring the scale of inter-provincial commerce. There are two important reasons for the predominance of pottery in such studies: 1), it is the most durable, widespread and abundant material found at ancient sites; 2), it is easy to track using petrological analysis, which can often pinpoint its area of origin (Wilson 2009; 2012).

It must be stressed that pottery was of less importance to the economy than many other commodities, and we must remember that it is only an ancillary and proxy factor which allows us to understand commerce, long-distance trade and connectivity. The importance of pottery thus depends on the fact that it acts as a mirror, reflecting the extent of trade rather than promoting it (Tomber 2012b). In other words, the value of pottery was well below that of the products carried in ceramic containers (Tomber 1993; Wilson 2009). From such a perspective the term 'amphora-borne products' has emerged in recent studies as an indicator of the products themselves, rather than the containers or amphorae.

The significance of pottery and particularly amphorae is not confined to defining trade routes and connectivity, but lies in the fact that it might also be an indicator of the type of foodstuffs being traded. The efforts of scholars to assign each type of amphora to a particular type of product has assisted in obtaining an initial perception of the scale of traded products (Bonifay 2004). For instance, an average Dressel 1 amphora contained about 27 litres of wine, and an average Tripolitania 3 amphora about 60 litres of olive oil (Wilson 2009). With this sort of knowledge it is easier to estimate the capacity of commerce involved in long-distance interconnectivity.

Is the data recovered from a site or region sufficient to build a solid base of knowledge about interconnections and trade? We should bear in mind that the general evaluation of the economic level that we can recover from a particular site remains only a rough estimation. The data may represent a small proportion of the actual range and level of trade and connectedness. As Wilson (2009) argues convincingly,

> *…what proportion of the traded total do the goods we have found represent? There is simply no way of extrapolating from recovered assemblage to the original total. This means that we cannot hope to recover full figures; we cannot produce a series of data points representing absolute quantities of a commodity imported to a region over time* (Wilson 2009: 217).

7.2.2 Methods of quantification and analysis

The amphora assemblages (BRH) discussed here is quantified and analysed in four different ways, in order to explore the wider concepts of trade patterns and connectivity.

However, this does not apply to the discussion of the data obtained from the SCSC survey as there is no large quantity of sherds representing the different chronological sequences. Nonetheless, the data is broadly discussed the four themes where possible.

Firstly, the imported amphora sherds will be quantified by date (this is mostly done by century, although the Hellenistic period is examined as a whole). However, the data yielded from this study’s field survey will tend to be biased towards the late Roman period (for reasons explained above), while there is a two-century gap in the data from Berenice during the fourth and fifth centuries AD. It was difficult to extract quantitative information from Riley’s work relating to these two centuries separately from the sixth century. However, the aim of this method is to detect the relative proportion of imported amphora in each time-span and broadly analyse how it changed over the early-to-late periods.

The second type of quantification is based on analysing the imported assemblages in terms of three regions – the east Mediterranean, the north-west Mediterranean, and North Africa. Here I have attempted to collate the percentage of imports from each individual area in order to compare the most connected areas and how this changed over time in Cyrenaica.

The third approach involves quantifying the imported samples from each individual source or location within the three main areas mentioned above. This approach aims to identify which city or province exported the most goods to Cyrenaica, and how this changed or was sustained over time.

The final technique is to evaluate the content and capacity of the imported amphorae, in order to start painting a picture of the volume of products flowing to Cyrenaica, and by implication the region’s demands. At the present time, obtaining such information is possible for many amphora types. Many ceramic specialists have attempted to analyse amphora assemblages to gain information regarding amphora contents and capacity (Bonifay 2004; key 1984; Peacock 1982; Peacock and Williams 1986; Peña 2007). For instance, Dressel 1 has been confirmed as having carried win (see table A-43 in appendix II) while Tripolitania I, as another example, is believed to have contained oil (Bonifay 2004; key 1984). Nonetheless, it should acknowledge the possibility of reuse amphora as that was widely suggested (Wilson 2009). However, the readers should be aware that this probability is not going to affect the argument of this chapter for two reasons. Firstly, the amphorae were usually reused as ultimate process, after consuming the original and main carried products. Secondly, only the amphorae with confirmed contents have been calculated in this chapter.

It is worth mentioning that the volume and capacity of amphorae is calculated according to the available (BRH) of amphora. In other words, each identified complete rim (or three-quarters of a rim's diameter) or base gives an indication of an amphora, and every two handles represent an amphora. For example, five rims of Hellenistic amphora 7 (Sicilian amphora), which had a maximum capacity of 26 litres of wine, were recorded in the Hellenistic context at Berenice. If we apply the above assumption, theoretically we have five Hellenistic amphorae 7, each with a maximum capacity of 26 litres. In this case, they could have contained a total volume of 130 litres of Sicilian wine. The same methods can be applied to the rim and handles.

Another point that should be clarified is that if there is a record of a rim and a large number of handles of the same amphora type, the calculation is based on the handles rather than the rims. For instance, eight rims ideally represent eight amphorae, while 20 handles ideally represent 10 amphorae, assuming each amphora had two handles, of Dressel amphora 2-4 from Campania recorded in the first century AD context. In this case, the calculation has been made according to the handles. So for this period there was a maximum capacity of 340 litres of Campania wine according to the number of handles, and so on.

For fine ware assemblages, I will follow the same approaches used for amphorae assemblages (except for the fourth method). First, the fine wares will be quantified by century in order to detect periods of boom and decline in trade and connectivity. The second is to analyse the material in terms of the three areas of supply - the east Mediterranean, the north-west Mediterranean, and North Africa - to identify which area had the closest relationship with Cyrenaica in each period. The third approach involves breaking down the three areas into sites in order to analyse which specific region or site had the strongest connection to Cyrenaica.

The relative proportion of amphora and fine ware sherds presented in this chapter can be misleading in suggesting growth and recession trends when we compare the percentages of a product from a particular source within two centuries. For example, Cretan amphora sherds were identified in the second and third-century contexts at

Berenice. These amphora sherds account for 69% (134 out of 194 sherds) in comparison to other imported amphora sherds identified in the second century AD, while in the third century AD it was about 53% (268 out of 507 sherds) compared to other imported amphora sherds belonging to the same period. A quick look at both proportions may lead to the suggestion that Cretan amphora sherds declined in the third century AD. However, looking at relative proportions in this way can be misleading. Looking at the number of identified sherds reveals a completely different picture, as we can identify an increase in the importation of Cretan amphora-borne products compared to the second century. To avoid such problems of interpretation, I include both percentages and the number of identified sherds for both amphora and fine ware assemblages.

7.2.3 Imported amphora-borne products as evidence of wider trade and long-distance connectivity

> *Amphorae are not an index but a direct witness of an important facet of commerce* (Peacock 1982: 155).

Unquestionably, amphorae attracted the attention of many scholars during the last century (Bonifay 2004; Peacock 1977; Peacock 1982; Peacock and Williams 1986). A considerable number of researchers have made efforts to provide us with typologies, classifications and chronologies, and also to assign each type of amphora to a particular product (Bonifay 2004; Keay 1984; Peacock and Williams 1986; Riley 1979a). There can be no doubt that investigation of amphorae can shed light on the trade and movement of certain products, such as wine, oil and fish sauce across long distances and between inter-provincial contacts. The importance of amphorae concerns their used as packages for traded products. Their numbers can thus reflect the scale of economy and connectivity between provinces and across borders. For these reasons, scholars have attempted to obtain information about amphora distribution and figures about the regional economies and trade networks.

7.2.4 Amphora from the SCSC Survey

The data from the SCSC survey is far less impressive than that usually produced from excavation works. Moreover, the data collected for this study is biased in favour of the later periods which are best preserved on the ground. As a result, attempts made to quantify materials based on surface surveys in order to obtain a wider knowledge about trade and connectivity are inevitably incomplete and patchy. However, they can provide us with a general view about the initial potential of the sites and their possible connectivity with the wider Mediterranean. Upon analysing the assemblages recorded by the SCSC survey, a number of patterns emerge which seem to be consistent with other harbour sites along the coast of Cyrenaica, as will be seen later.

7.2.4.1 Amphora from Phycus (as an example of a major Cyrenaican harbour)

As mentioned in an earlier chapter, the materials identified at Phycus mostly belong to the late Roman period. The general overview of Phycus is that there was a complete absence of imported amphora-borne products from Italy or other north-western Mediterranean sites, while amphora sherds have been identified from Tunisia, Chios, Cyprus, Cilicia and Samos. Small amounts of African amphora-borne products were present at the site. Eastern products seem to have predominated at the market of Phycus (Fig. 7-1). In numerical terms, the flow of products to Phycus during the late Roman period seems to have been dominated by materials imported from Cyprus/Cilicia (late Roman amphora 1) which comprised about 68% (23 out of 34 sherds) of the total recovered imported material. The second major source of amphorae identified at Phycus seems to be Chios (late Roman amphora 2), which made up 26% (7 sherds out of 34 total imported amphora sherds) of recovered imported materials. Amphora sherds from Samos meanwhile comprise 6% (only two sherds out of 34) of the total collected imported sherds at Phycus. The same proportion of Tunisian amphora sherds has been identified (one pottery piece of late amphora 8A, and another piece belonging to Keay 62A type).

It is difficult at present to detect which types of product these regions supplied to Phycus, particularly the late Roman amphorae 1 imported from Cyprus/Cilicia, as both wine and oil have been suggested as potential goods (see page 281 and 282 regarding the contents of amphorae). However, Samos amphorae seem to have carried wine products, Tunisian amphora (late Roman 8A) seem to have contained olive oil, while both fish sauce and wine have been suggested for the other Tunisian type (Keay 62A) (Bonifay 2004). According to the available collected data and the calculations described above, a rough initial picture can be drawn of the relative proportions of the products imported into Phycus. In terms of the supply of oil, Tunisian oil seems to have made up 1% of the total amphora-borne products found in this period. Another unknown

Tunisian product, which might have been wine or fish sauce (*garum*), seems to have made up about 12% of the total amphorae imports. Samos wine, on the other hand, made up 2% of all the wine imported into Phycus. The other products sources of Cyprus/Cilicia and Chios both wine and oil suggested. However, according to the current calculation they represented about 60% and 26% of total amphora sherds (Fig. 7-2)

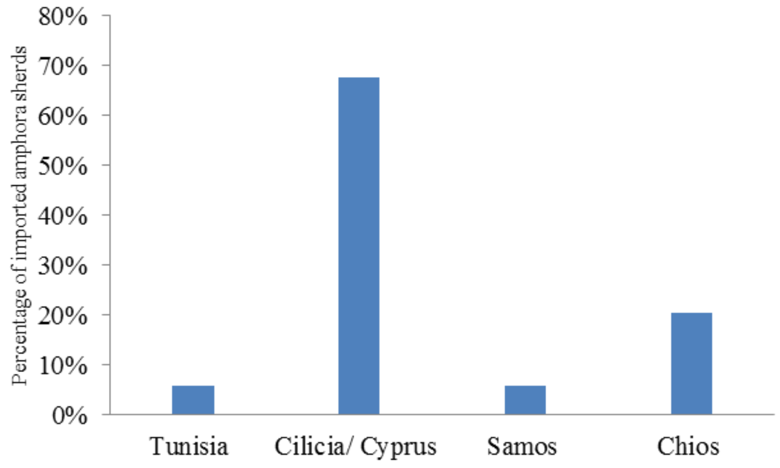


Figure 7-1: The proportion of imported amphora sherds (BRH) collected at ancient Phycus (see Table 4, Appendix II)

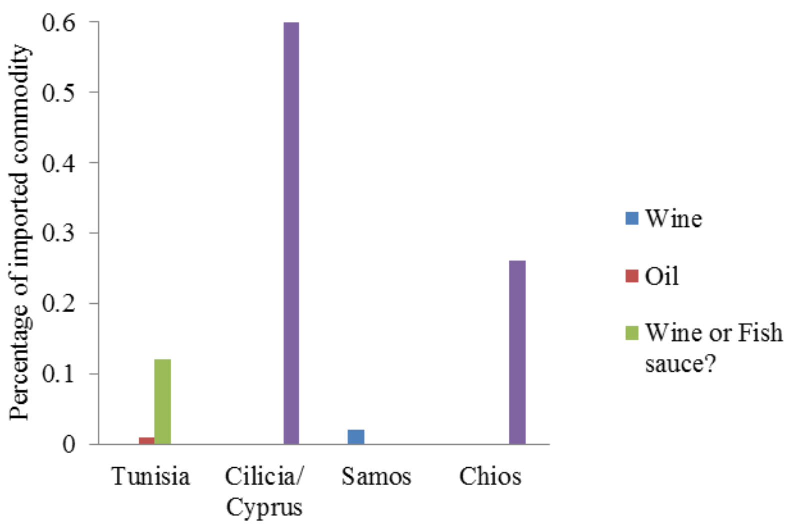


Figure 7-2: The proportions of products imported into Phycus according to the collected materials (see Table 5, Appendix II)

7.2.4.2 Amphora from Aptouchou and Kainopolis (as examples of secondary Cyrenaican harbours).

Unfortunately, little can be said about the trade routes, suppliers and connectivity of these two harbours. As they have been categorised as secondary harbours (see Chapter 5), they are likely to reflect similar materials as these found at the major harbours of Cyrenaica. The general trend seems to match with Phycus. Nearly 30 imported amphora sherds were collected from Aptouchou, of which 24 sherds are miscellaneous. However, 3 handles and 1 rim could be assigned to late Roman amphora 1 (Cyprus/Cilicia amphora). One rim belongs to Tripolitania III, and dates from the second to fourth century AD. In addition to Campanian amphora (Dressel 1) dating to the first BC. Kainopolis, sherds of Cyprus/Cilicia (late Roman amphora 1) and Chios (late Roman amphora 2) amphorae have been identified, as well as Dressel 2-4 amphorae from an earlier period. These amphora sherds could have been imported from Campania or Kos.

7.2.4.3 Amphora from Cherronesus (a harbour to the east of the SCSC surveyed area)

A further case study has been chosen from outside of the surveyed area, in order to give a wider understanding about the similarities and differences of trade routes and the connectivity of the Cyrenaican harbour sites (see chapter 3). The site of Cherronesus (Ras et-Tin) is located about 120 km to the east of Apollonia. The survey here yielded a number of amphorae similar to these found at Phycus. In terms of collected imported sherds, 74% of the sherds (14 out of 19 collected sherds) are late Roman amphora 1, possibly from Cyprus or Cilicia. Meanwhile about 11% (2 out of 19) sherds are from Gaza (late Roman amphora 3) (Fig. 7-3). However, sherds of Tripolitanian amphora (Tripolitania III) dating to the mid-Roman period were also collected from the site, along with a Dressel 26 which dates to the first century BC. In terms of products imported during the late Roman period at the site according to the collected sherds, as in the previous examples, it seems that wine and possibly oil from Cyprus/Cilicia formed the majority of imports, comprising about 88%. Meanwhile wine imported from Gaza made up the remaining 13% (Fig. 7-4).

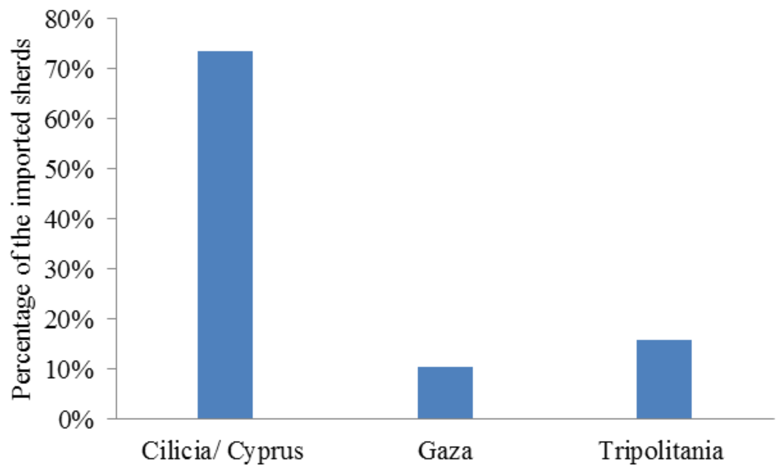


Figure 7-3: Percentage of amphora (BRH) yielded from the field survey at Cherronesus (see Table 6, Appendix II)

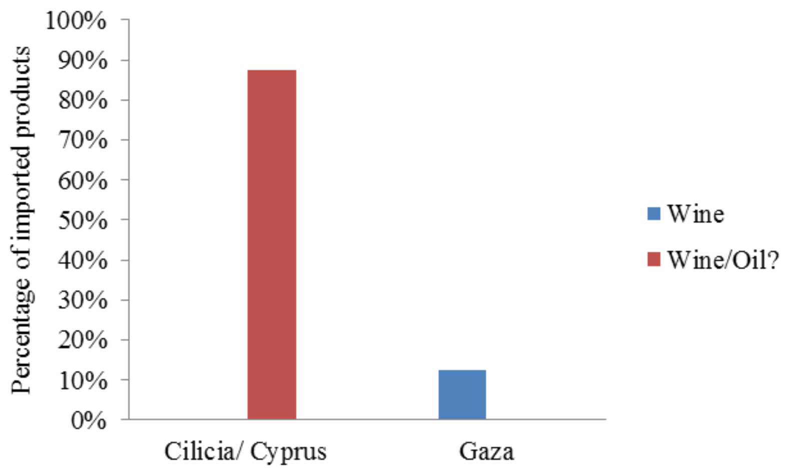


Figure -7-4: An estimation of the volume of wine, olive oil and fish sauce imported into Cherronesus the late Roman period (see table 7, appendix II)

7.2.5 Amphora from Berenice (as an example of a major Cyrenaican harbour)

7.2.5.1 Quantifying by century

Applying this method to the major harbour of Berenice allows the extraction of a general pattern of trade across seven centuries. Figures (7-5 a-f) show the percentage of imported amphora assemblages in relation to the local and miscellaneous amphora sherds. Figure (7-6) illustrate the percentages and numbers of imported amphorae from the Hellenistic period through to the sixth century AD. When the amphora are quantified in this way, a general view about the averages of imported amphorae can be obtained. It appears that there was an increase in imported amphora-borne products, with an average growth rate of 66% over the course of the seven centuries. Hellenistic amphora comprises only 1% (18 sherds out of 1305 imported sherds) of the total amphora imported into Berenice, while it forms about 11% (18 sherds out of 159) of the total amphora assemblage sherds recovered from the Hellenistic context. This figure appears to increase in the late first century BC, when the imported amphora-borne products rise by 2% (27 sherds out of 1305 imported sherds). Moreover, they comprise about 29% (27 out of 99 sherds) of the total amphora assemblages belonging to this period.

An immense boost in the rate of amphora-borne products imported into Berenice seems to have occurred in the first century AD. An average growth rate of 188% over the past century can be detected in the imported amphora assemblage from this century. However, the percentage of the assemblage of imported amphorae from this period is about 12% (160 out of 1305 imported sherds) and about 25% (160 out of 634 sherds) of the total amphora sherds collected from the first century AD layer. In the second century AD there was an average growth rate of 24% over the previous century. The percentage of imported amphora-borne products was about 16% (206 out of 1305 imported sherds), and 29% (206 out of 704) of the total amphora sherds recovered from the second century AD context.

Imports seem to have peaked in the third century AD. About 41% (529 out of 1305 imported sherds) of the total amphorae imported into Berenice is from this period, which also comprises about 43% (529 out of 1225) of the total amphora assemblage gathered from this period. The average growth rate of this century was about 77%, which is 55% higher than the previous century’s growth rate.

The out of 639) of the total amphora sherds recovered from this period.

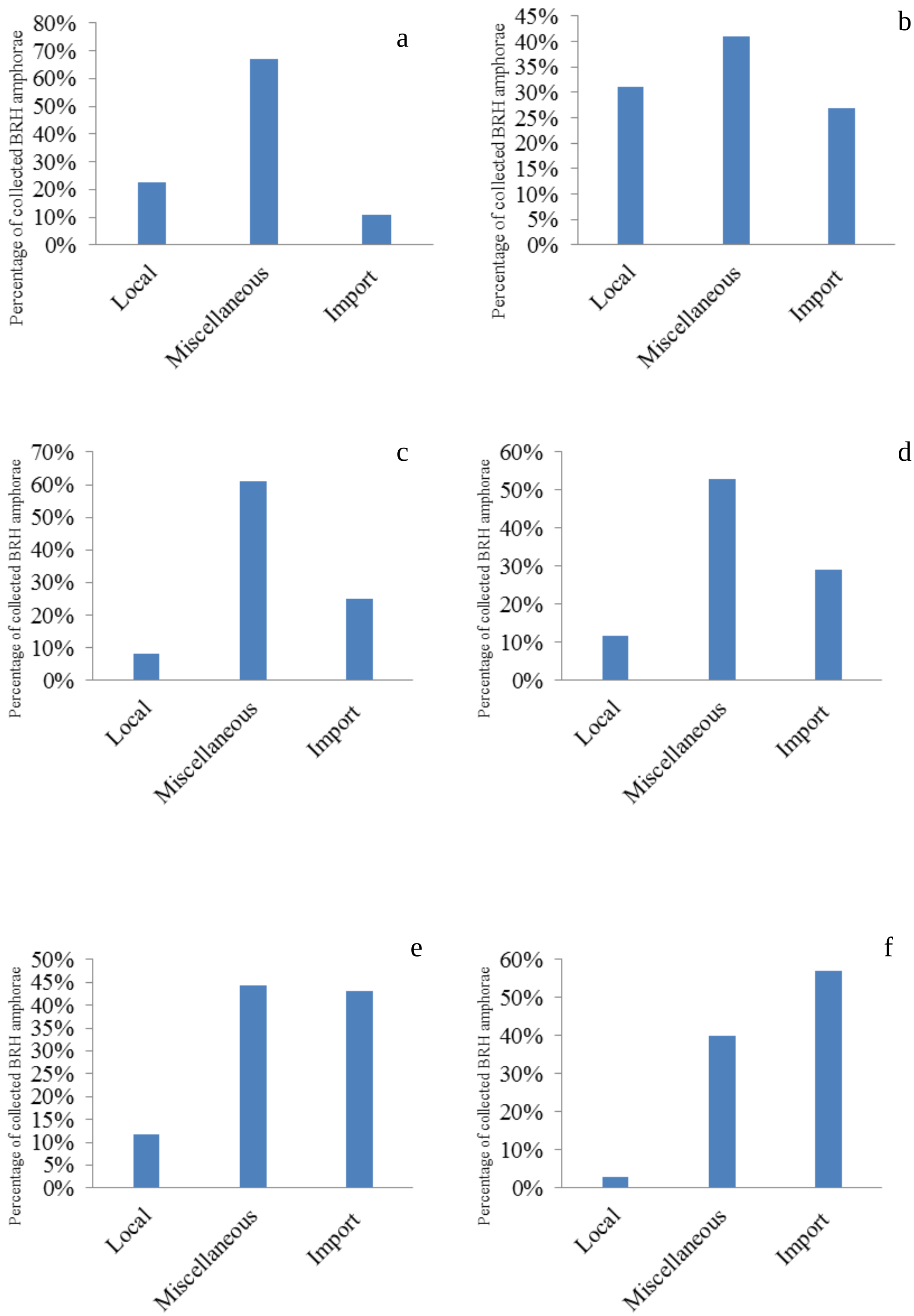


Figure 7-5: The relative proportion of the collected amphora sherds (BRH), from the excavation of ancient Berenice (author's graph, data from Riley 1979). Graph (a) presents the Hellenistic period, (b) the late first century BC, (c) the first century AD, (d) the second century AD, (e) the third century AD, and graph (f) the sixth century AD.

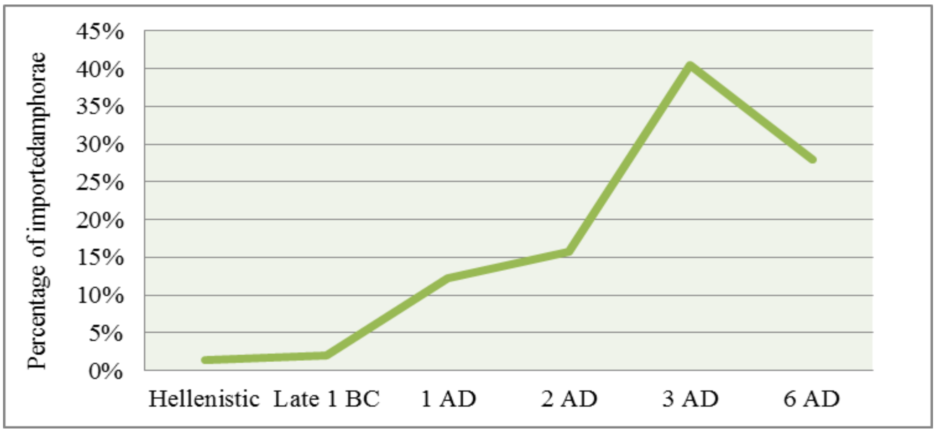
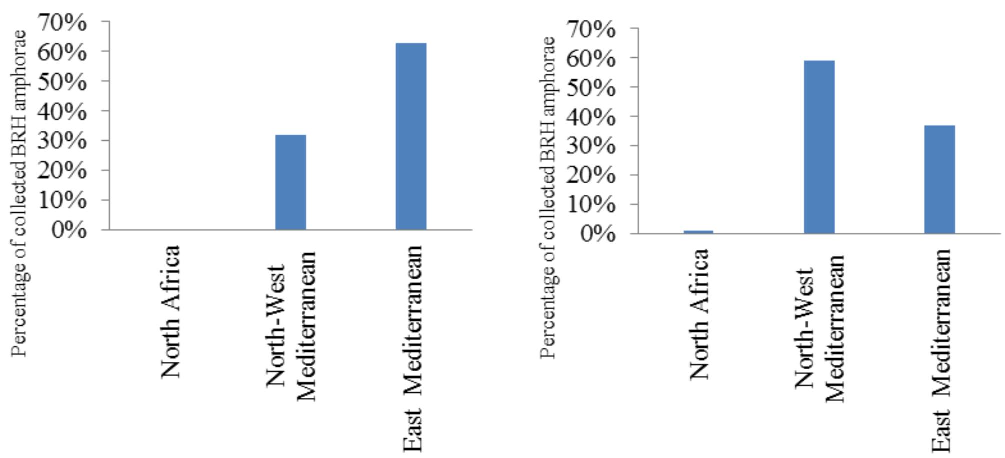


Figure 7-6: Percentage of total imported amphora sherds (BRH) from ancient Berenice from the Hellenistic period to the 6th century AD (author's graph, data from Riley 1979) (see Table 8, Appendix II).

7.2.5.2 Quantifying amphorae by area

The sources of amphora-borne products from the three geographical regions (North Africa, the north-western Mediterranean and the eastern Mediterranean) have been examined individually to estimate the scale of trade and connectivity with Cyrenaica. When the amphorae are analysed in this manner, a set of clear patterns appears (Figs. 7-7 a-f; Table 7-1). In the Hellenistic period most of the collected imported sherds seem to have come from the eastern Mediterranean region, as about 67% (12 out of 18 sherds) of the imported amphora-borne products originated there. The imported sherds from the north-west Mediterranean found at the site comprised only 33% (6 out of 18 sherds) of the total imported amphora sherds. No imported amphora sherds originating in North Africa were found from this period.

a b



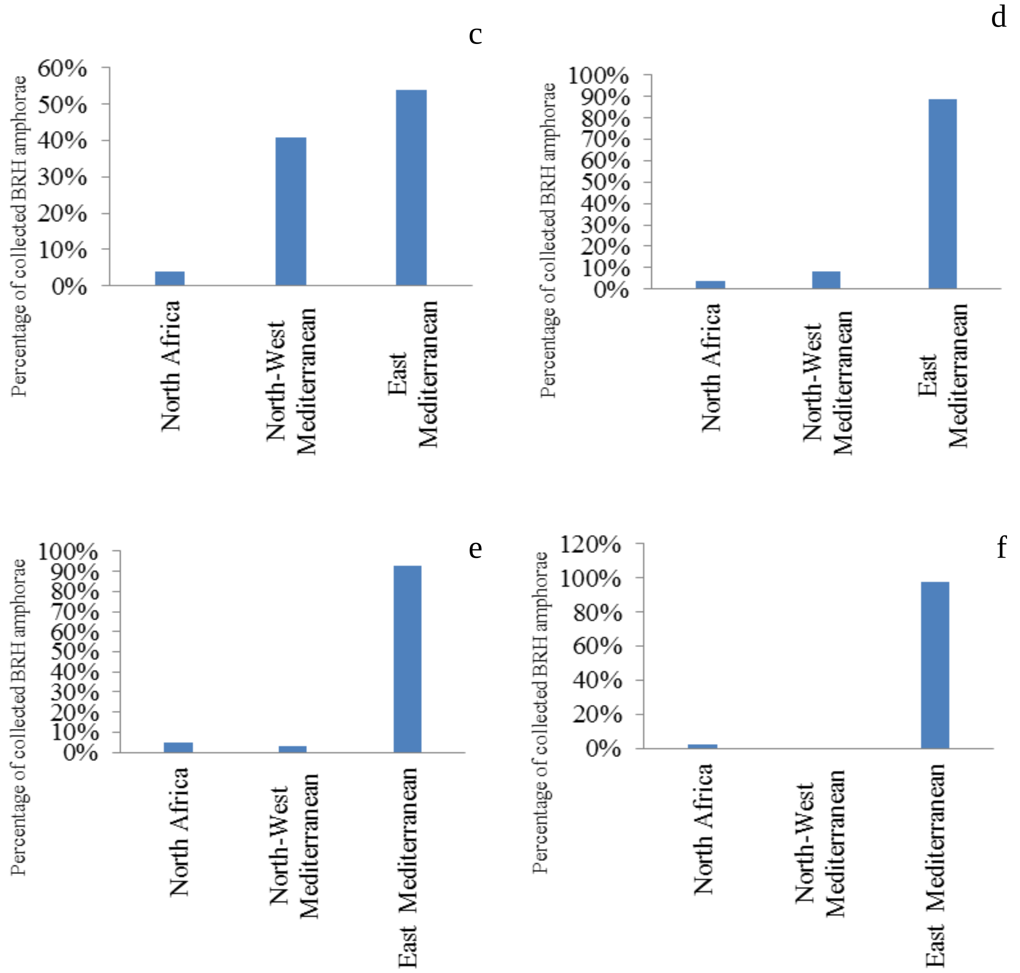


Figure 7-7: Imported amphora-borne products from North Africa, the north-western Mediterranean and the eastern Mediterranean (author's graph, data from Riley 1979). Graph (a) presents the Hellenistic period, (b) the late first century BC, (c) the first century AD, (d) the second century AD, (e) the third century AD and (f) the sixth century AD (see Table 9, Appendix II).

Period	Region		
	E Mediterranean	NW Mediterranean	N Africa
Late 1BC	↓	↑	↑
1 AD	↑	↑	↑
2 AD	↑	↓	↓
3 AD	↑	↓	↑
6 AD	↓	↓	↓

Table 7-1: The general trends in the percentage of imported amphora-borne products to Berenice through the time (red arrows represent decline and green arrows represent growth).

In the late first century BC, imports from the eastern Mediterranean seem to have declined by 10%, while imports from the north-western Mediterranean increased by 2%. A limited amount of North African amphorae now appear, representing only 6% of the total imported amphorae from this period. The amphorae from the eastern Mediterranean still comprises the majority (54%, or 87 sherds out of 160) of the total imported amphora sherds found in the context of the first century AD at Berenice. Imported amphora sherds from North Africa, meanwhile, represent only 4% (7 sherds out of 160) of the total. However, north-western Mediterranean amphora sherds rose this century by total sherds of 66 compared to previous periods. It comprises a total of 41% of imported amphorae found in this context.

The second century AD saw a huge rise in the proportion of imported amphora sherds from the eastern Mediterranean. They now comprised about 89% (171 sherds out of 193) of the total imported amphorae in this region. The importation of north-western Mediterranean amphorae, on the other hand, declined to only 8% (15 out of 193 imported sherds). This is a massive decline in imported sherds in comparison to the previous period, for which about 66 sherds from north-western Mediterranean sources were recorded. Imported amphora sherds from North African sources, on the other hand, seem to have been consistent with the previous period, comprising only 4% (7 out of 193 sherds) of the total amphorae imported into Berenice.

In the third century AD a significant change seems to have occurred, as there was an increase in the total number of imported sherds collected from this period with 507 imported sherds. The overwhelming majority of imports (93%, or 469 out of 507 imported sherds) to Berenice still consisted of eastern Mediterranean amphorae. North African sherds found at Berenice in this period exceeded those from the north-western Mediterranean, and although the totals from both regions are small, the former comprised about 5% (25 out of 507) and the latter about 3% (13 out of 507) of the total imported amphora-borne products. It is remarkable that there seems to have been a general increase in the number North African sherds found at Berenice compared to the previous periods, albeit a small one. Sherds generated from north-western Mediterranean sources, on the other hand, seem to have been in decline since the second century AD.

Fewer imported amphora sherds were identified at Berenice in the context of the sixth century AD than in previous centuries. However, the eastern Mediterranean amphora formed 98% (359 out of 365 sherds) of the total imported amphorae. North African amphora sherds make up the remaining 2%, while there were no north-western Mediterranean sherds found. This might be explained by the changing markets and power centres in the late Roman period, as these shifted from Rome to Constantinopolis.

The overall picture of the imported amphora sherds identified at Berenice in this manner suggests the existence of a similar pattern in the total number of imported amphora sherds from eastern Mediterranean and north-western Mediterranean sources from the Hellenistic to the first century BC (Fig. 7-8). This trend seems to have changed completely later on, as the number of amphora sherds identified at Berenice increase considerably from the first century AD to peak in the third century AD. While the number of amphora sherds imported from the north-western Mediterranean increased in the first century AD, they decline in the following periods. The number of North African pottery sherds recorded at the site was consistently low in all periods.

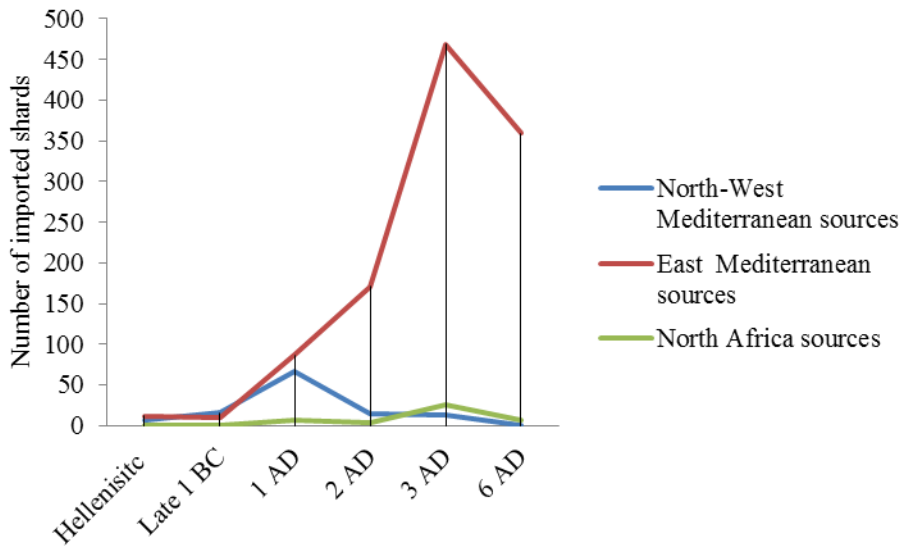


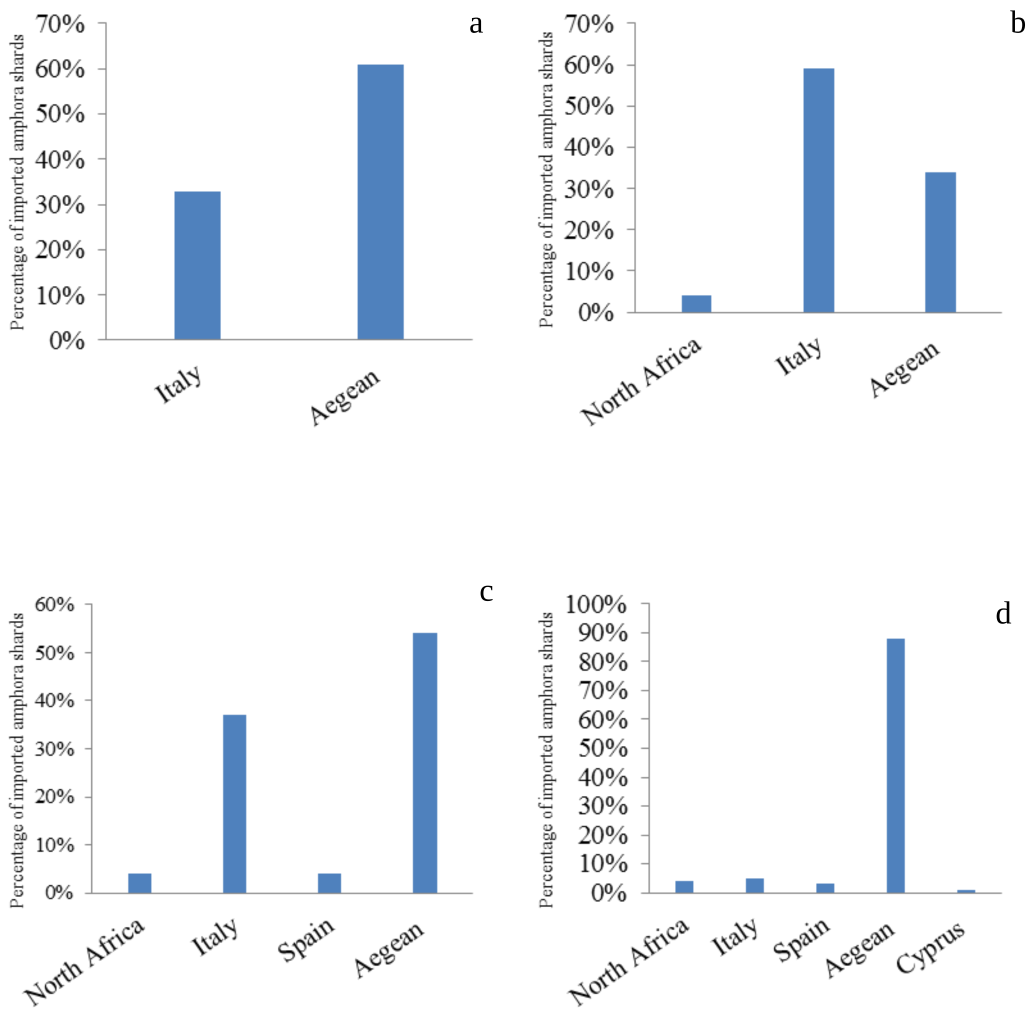
Figure 7-8: Number of identified imported sherds (BRH) at Berenice (author's graph, data from Riley 1979).

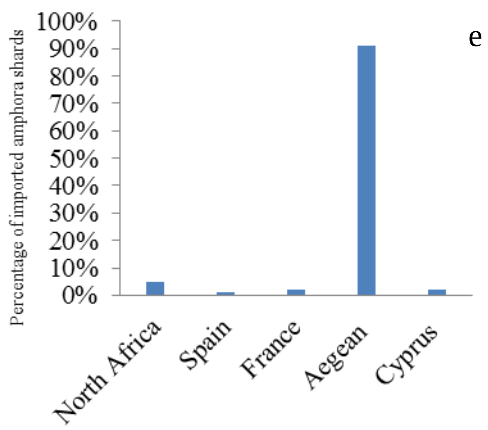
7.2.5.3 Quantifying amphorae by region and site

Analysing imported amphorae by region and area can provide us with a more detailed picture about economic patterns and how the sources of imported amphorae changed or declined over time (Figs. 7-9 a-f).

In the Hellenistic period (Fig. 7-9a), it is evident that two main areas of amphora sources could be identified at Berenice; these being Italy and the Aegean. The latter seemed to occupy the first rank with a percentage average of 67% (12 out of 18 sherds) of the total imported amphora-borne products. The second was Italy with 33% (6 out of 18 sherds). However, if we look closer, it seems that there were only four amphora sources identified Berenice at this period with Sicily, Rhodes, Kos and Knidos. The percentages of imported amphorae from these locations are 33% (six sherds), 50% (nine sherds), 11% (two sherds) and 6% (one sherd) respectively (Fig. 7-10).

However, the excavation at the Greek city of Euesperides revealed materials belonging to the Classical periods, which show slightly different trends from those identified at Berenice (Fig 7-11). For instance, the Rhodian amphorae which comprised the high proportion of amphora identified at Berenice, at Euesperides, they comprise along with other amphorae from south of Aegean area (*e.g.* Chios, Samos, Kos and Knidos) 14% (117 out of 818 sherds) of the total identified imported amphora-borne products. There is a similar scenario with Sicilian amphorae which ranked second, proportionately, for imports at Berenice, comprising 6% (49 out of 818 sherds) at Euesperides. Amphorae B (Corinth? / Corcyra?), on the other hand, which were not identified at Berenice, seemed to be the most imported amphorae to Euesperides with a percentage of 61% (498 out of 818) of the total imported amphorae. Surprisingly, Punic amphorae, in contrast to Berenice, appeared at Euesperides with 9% (72 out of 818 sherds) of the total imports found at the site. There seemed to be also other amphora sources found at Euesperides, such as Cyprus and France, although they were represented only in small percentage with less than 1% (two sherds) for both sources.





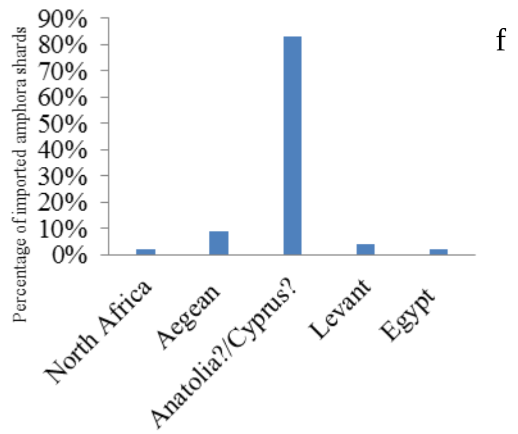


Figure 7-9 a-f: The percentage of amphora-borne products to Berenice by region (author's graph, data from Riley 1979). Graphs present (a) the Hellenistic period, (b) the late first century BC, (c) the first century AD, (d) the second century AD, (e) the third century AD and (f) the sixth century AD (see table 10, appendix II).

Figure 7-10: The sources of imported amphora-borne products to Berenice in the Hellenistic period (author's graph, data from Riley 1979) (see table 11, appendix II).

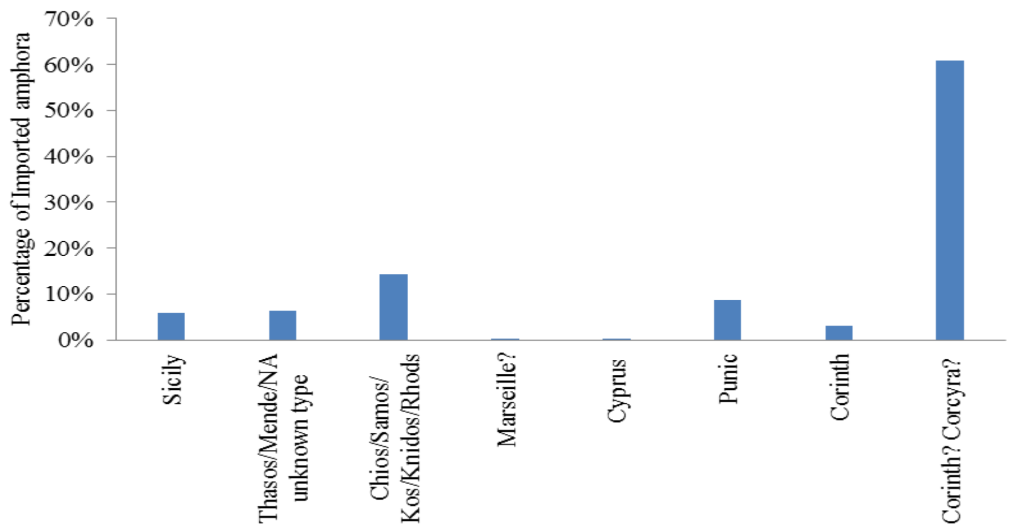


Figure 7-11: The relative proportion of imported amphora-borne products identified at Euesperides in the Hellenistic period (author's graph, data from Göransson 2007) (see table 12, appendix II).

By the late first century BC, it seems that there was a change in terms of origin of imported amphorae as we can identify a decline in some amphora sources and the appearance of a new one. However, the general picture illustrates that the rise in imports from Italy now surpassed the percentage of imported amphorae from the Aegean area. The former comprises about 59% (16 out of 27 sherds) of total imported amphorae while the latter 37% (10 out of 27) (Fig. 7-9b). This period, in close up view (Fig. 7-12), witnessed the emergence of new amphora source. There were now a small percentage of imported amphorae from Carthage (about 4% - only one sherd).

The appearance of imported amphorae from Sicily continued to be represented in this period but comprising only small proportion (7% - 2 out of 27 sherds). However, a new source of Italian amphorae entered Berenice's market from Campania, dominating the total proportion of imported amphorae (52% - 14 out of 27 sherds). Amphorae from Rhodes and Knidos still appeared in this period, with figures of 30% (8 out of 27 sherds) and 7% (2 out of 27 sherds) respectively. Imported amphora from Kos evidently disappeared from this period.

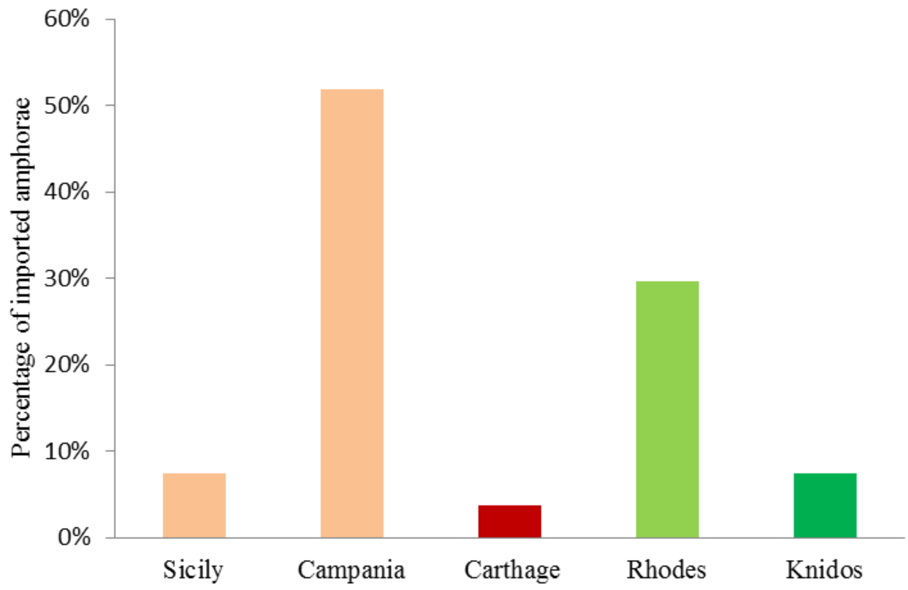


Figure 7-12: The sources of imported amphora-borne products to Berenice in the late first century BC (author's graph, data from Riley 1979) (see table 13, appendix II).

By contrast, in the first century AD we can observe a resurgence of imports of Aegean amphorae at the expense of amphorae from Italy. Amphorae from the Aegean region comprised about 54% (87 out of 160 sherds) of all the amphorae imported into Berenice, while those from Italy formed 37% (59 out of 160 sherds). Also, there was a limited appearance of amphorae from North Africa and Spain, at 4% (7 out of 160 sherds) each. A closer inspection of the data (Fig. 7-13) reveals that new Italian sources seem to have opened up from Istria, the source of 8% (13 out of 160 sherds) of the total imported amphora-borne products. The first Tripolitanian amphorae in Berenice were found at this time, although they were present in small numbers (only 7 sherds out of 160). Amphora sherds from two areas in Spain were found at Berenice, 3% (4 out of 160 sherds) from an unknown source in southern Spain, while 2% (3 out of 160 sherds) came from Baetica. This period also saw a rise in Rhodian amphora sherds compared to previous periods, which made up about 18% (29 out of 160 sherds) of the total imported amphora sherds collected at Berenice. However, the first rank of imported amphora sherds found at the site seem to be generated from the Aegean region, although the precise source could not be identified. These comprise about 36% (58 out of 160 sherds) of the total imports.

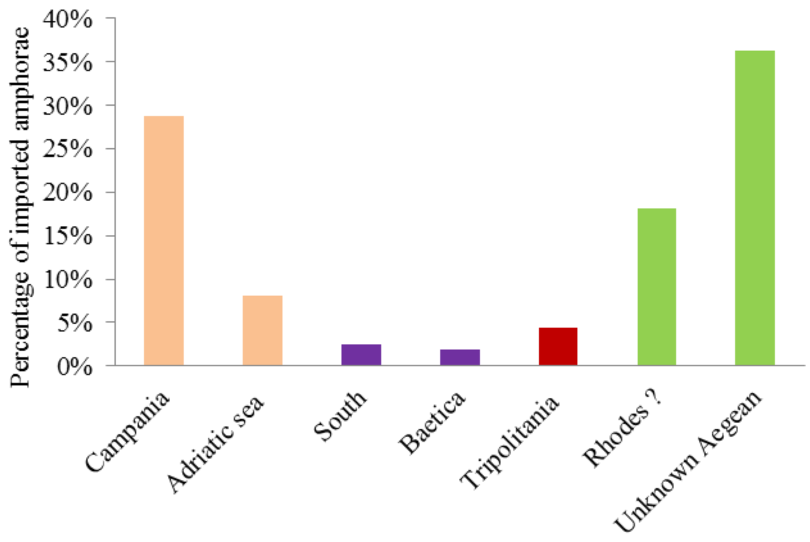


Figure 7-13: The sources of imported amphora-borne products to Berenice in the first century AD (author's graph, data from Riley 1979) (see Table 14, Appendix II).

The second century AD saw a sharp fall in the amount of Italian amphorae imported into Berenice (Fig. 7-9d). Indeed, these comprised only 5% (10 out of 193 sherds) of the total imported amphora sherds recovered from the site. This represents a decline of nearly 32% (or about 49 amphora sherds) in comparison of the first century AD. The pattern of trade routes seems to have changed considerably in this century, with a growing tendency towards accepting imports from Aegean markets (Fig. 7-14). The percentage of amphorae imported from this region increased sharply to approximately 88% (170 out of 194) of the total imported amphora sherds identified at Berenice in this period. Amphorae from Kos and Rhodes together comprised about 8% (17 out of 193 sherds) of the total amphorae imported from Aegean markets.

However, imported amphora sherds from Crete occupied the first rank, forming about 69% (134 out of 193) of the total imported amphora-borne products to Berenice. Tripolitanian and Spanish amphora sherds represented only 4% (7 out of 193) and 3% (5 out of 193) respectively. Cyprus appeared as part of a new trade pattern in this period, although Cypriot pottery made up only 1% (1 out of 193 sherds) of total imports.

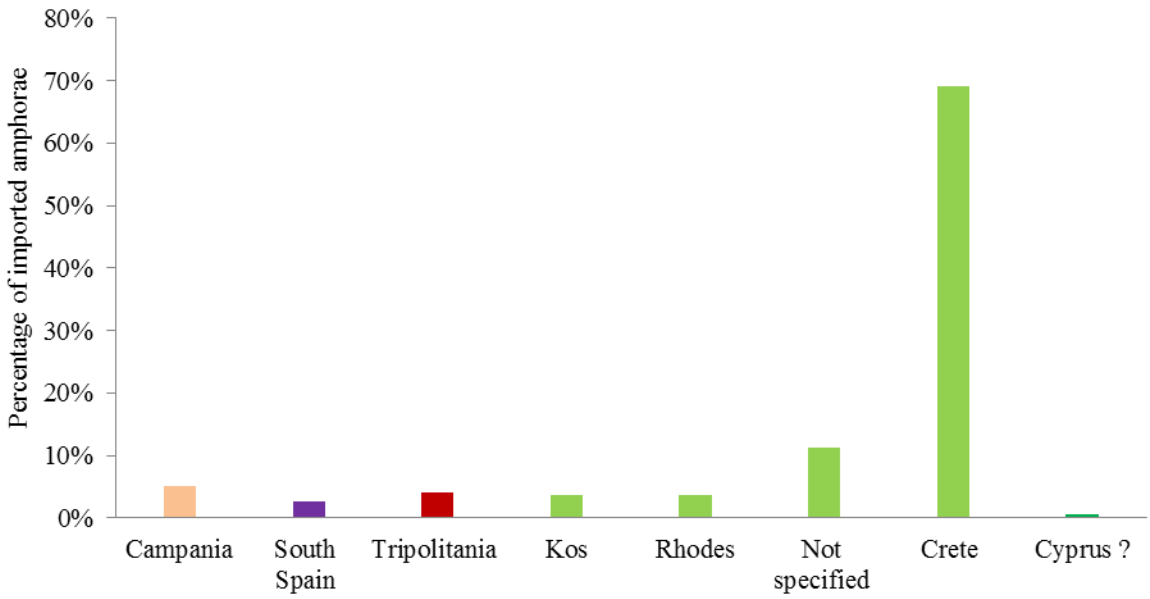


Figure 7-14: The sources of imported amphora-borne products to Berenice in the second century AD (author's graph, data from Riley 1979) (see Table 15, Appendix II).

We can still observe an increase in the rate of imports from Aegean markets in the third century AD, which comprised about 91% (459 out of 507 sherds) of the total amount of imported amphora sherds. This period is notable for the final disappearance of Italian amphora-borne products at Berenice. Other imported amphora sherds generated from the western Mediterranean include North Africa (5% - 25 out of 507) and Spain (1% - 4 out of 507), with now 2% (9 out of 507 sherds) of amphorae also imported from France.

Further details for this period (Fig. 7-15) show that amphorae were imported from three different sources in North Africa. These were Tripolitania, Tunisia and Algeria, comprising 1% (7 out of 507 sherds), 3% (15 out of 507 sherds) and 1% (3 out of 507 sherds) respectively. Meanwhile Gaulish amphorae formed only 2% (9 out of 507 sherds) of the total imported amphorae. Cretan amphorae were the dominant imports and comprised approximately 53% (268 out of 507 sherds) of the total, an increase over the previous period. Samos may have been a new amphora source, as pottery from this island makes up about 37% (188 out of 507 sherds) of total imports to Berenice. There was also an increase of 2% (10 out of 507 imported sherds) in amphorae imported from Cyprus compared to the previous period.

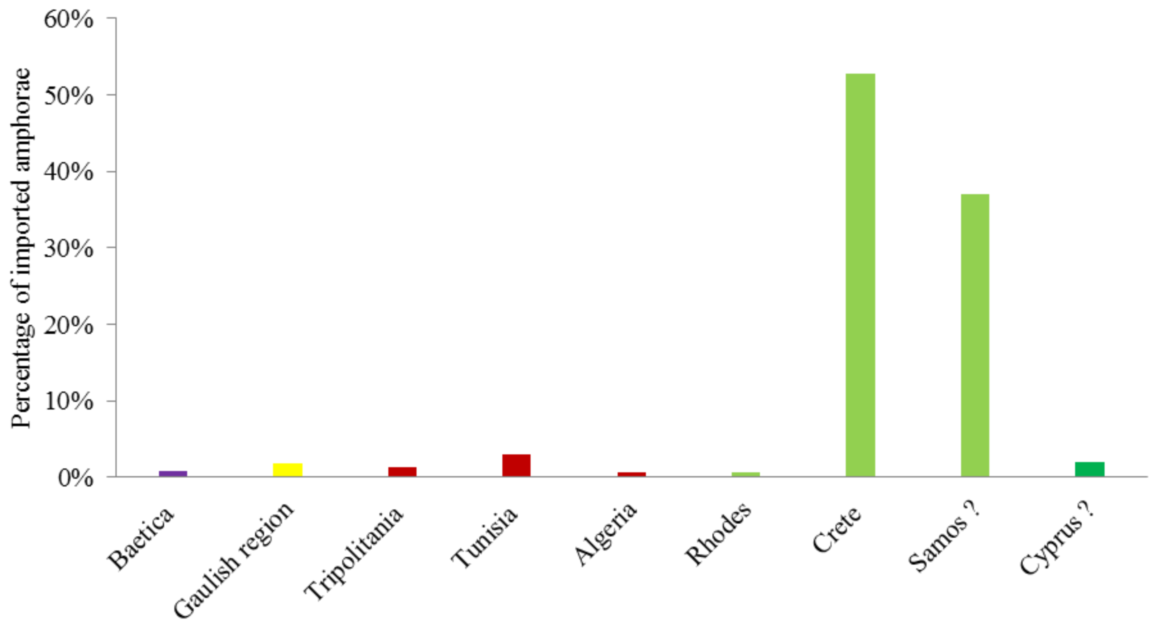


Figure 7-15: The sources of imported amphora-borne products to Berenice in the third century AD (author's graph, data from Riley 1979) (see Table 16, Appendix II).

The late Roman Period at Berenice seems to have followed the same trade encountered at the sites surveyed by the SCSC. Generally, there seems to have been a major alteration in the economic patterns and trade routes in Cyrenaica (Fig. 7-16). The general picture suggests that there was a huge drop in the amount of amphora supplied by Aegean sources. Amphorae from these markets now formed only 9% (32 out of 365 sherds) of the total amount imported, while 83% (304 out of 365 imported sherds) were from Anatolia?/Cyprus?.

In terms of trade sources, this is a fundamental change. For instance, all previous Aegean amphora sources of the pottery imported by Berenice, such as Rhodes, Crete, Samos and Kos, seem to have disappeared. The ancient site of Chios was the only new Aegean supplier trading amphorae to Berenice at this period. Amphorae imported from Chios comprises about 9% (32 out of 365 sherds) of the total imported amphora-borne products. Amphorae (late Roman amphora 1) imported from Cilicia?/Cyprus? Surpassed the other imported amphorae to reach about 83% (304 out of 365 sherds) of total imports. Amphora-borne products from new regions also featured in Berenice's markets at this period, including the Levant area. The relative proportions of imported amphorae from Gaza (4% -13 out of 365 sherds) and Caesarea (1% - 2 out of 365 sherds) were quite low. In this period we can also identify the appearance of a small percentage of Egyptian amphorae, comprising about 2% (8 out of 365 sherds) of total imports. Tunisian amphorae also had a minor presence, estimated at about 2% (6 out of 365 sherds).

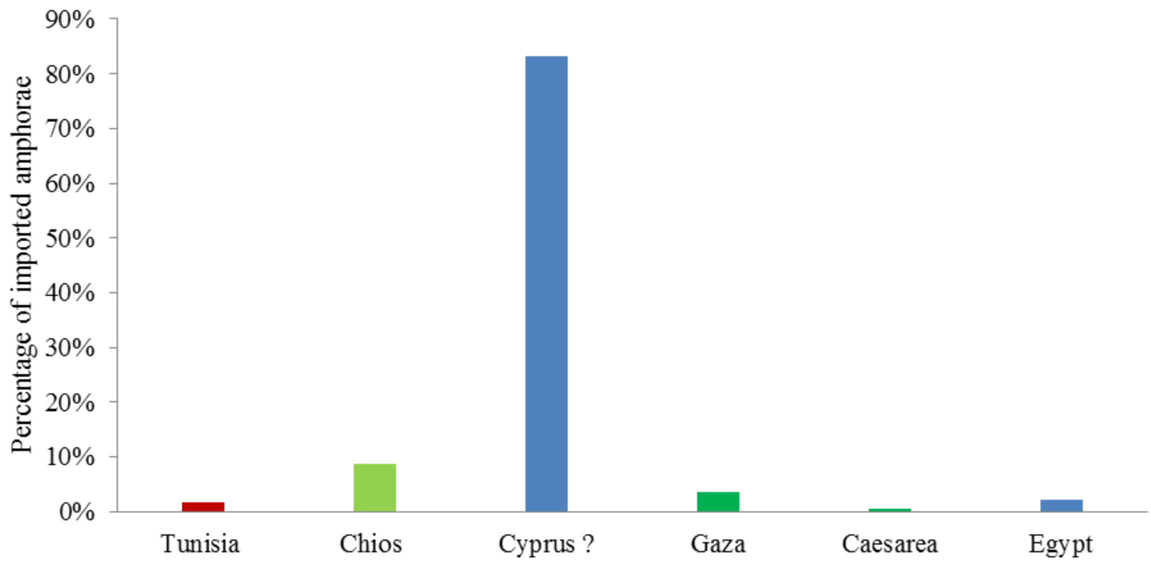


Figure 7-16: The sources of imported amphora-borne products identified at Berenice in the sixth century AD (author's graph, data from Riley 1979) (see Table 17, Appendix II).

7.2.5.4 Quantifying the contents of amphora-borne products

Estimating the average volume and content of amphora-borne products is very useful, as it allows us to build a comprehensive picture of the scale and nature of economic activities. However, this is not an easy matter unless we have information about the amphora's contents and capacity (see page 281 and 282). I have been able to assess the capacity and contents of a significant proportion of the amphora-borne products imported into Berenice thanks to previous research on the capacity and content of Roman amphorae (Bonifay 2004; Bonifay and Trcglia 2007; Peacock and Williams 1986).

However, the quality of the information available is variable. In some cases it was possible to verify the capacity of the amphora but not its contents, and vice versa. In a number of cases, neither capacity nor contents were identifiable.

In cases where information is incomplete, the name of the region that the amphora came from is included on the charts but with a value of zero. For instance, while Dressel 6a was imported from the Adriatic Sea and is known to have carried fish sauce, its capacity is still disputed. It has thus been included on the graph, but no value is attributed to it. The reader thus should be aware that the figures shown below are only rough estimations presenting the general trends of imported amphora-borne products, and are not to be considered authoritative.

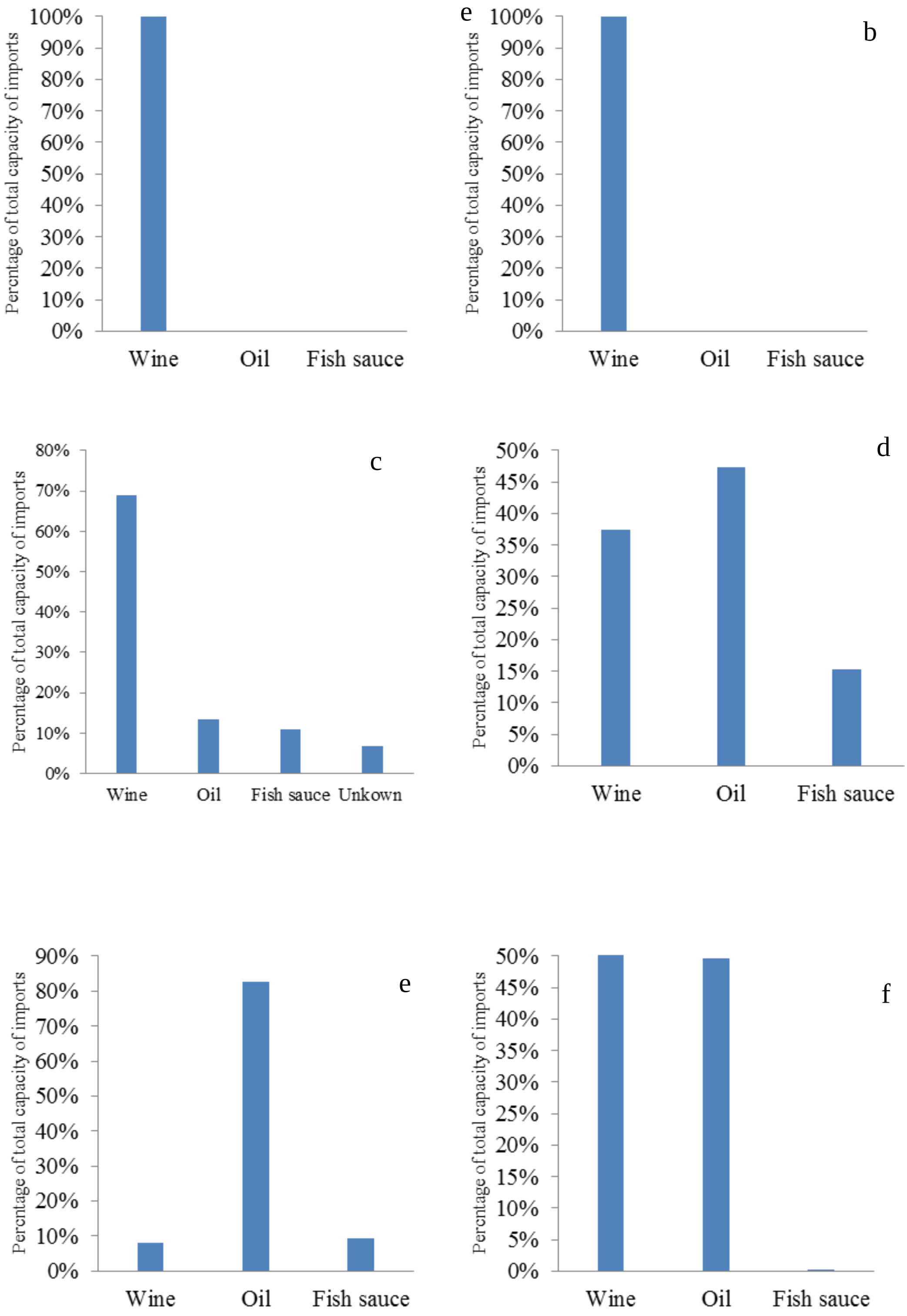


Figure 7-17: The percentage of amphora-borne product's volume imported into Berenice (author's graph, data from Riley 1979). Graphs present (a) the Hellenistic period, (b) the late first century BC, (c) the first century AD, (d) the second century AD, (e) the third century AD, (f) the sixth century AD (see Table 18, Appendix II).

The data from the Hellenistic period seems to be well-established, as it allowed for the identification of the capacity and content of the imported amphora-borne products. The imported products seem to have been mainly wine (Fig. 7-17a). 45% were imported from the Sicily region, while 55% came from Aegean areas such as Rhodes, Kos and Knidos (Fig. 7-18)

As with the preceding period, for the late first century BC most of the volumes of the imported amphora-products could be attributed, albeit with one exception (Fig. 8-17b). For the contents, the general trend seems to have been similar to the previous era, with the bulk of imports being wine. There was variety in the percentage of imports from site to site. Italian wines comprised 49% (172 out of 348 litres), while Rhodes and Knidos contributed to a combined total of about 51% (176 out of 348 litres). It seems that in this period fish sauce was imported from Tunisia. However the proportional volume represented by the Tunisian amphora could not be estimated, as the capacity of the amphorae carrying this product is still unknown (Fig. 7-19)

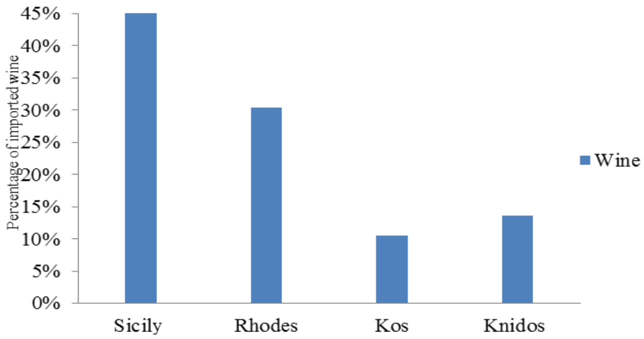


Figure-7-18: An estimation of the volume of wine imported into Berenice during the Hellenistic period (see table 19, appendix II).

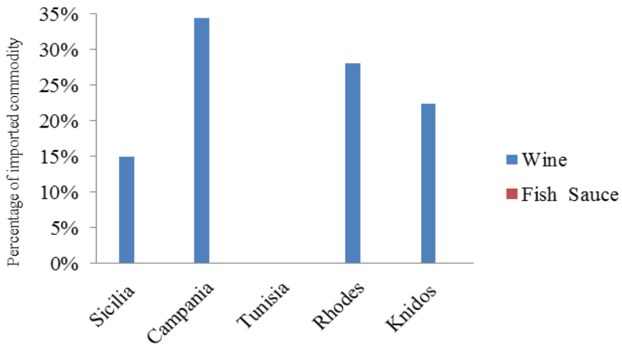


Figure 7-19: An estimation of the volume of wine imported into Berenice in the late first century BC (see Table 20, Appendix II).

The first century AD witnessed a growth in the range of imports including oil, which comprised about 12% (160 out of 1207 litres) of the total imported products, as well as fish sauce (*garum*), which comprised 10% (132 out of 1207 litres) of imports (Fig 7-17c). However, wine continued to dominate the import market at Berenice, as it formed 69% (833 out of 1207 litres) of the total imported products. The import market for wine in this period appears to have been dependent on Italian suppliers, with Campanian wine now comprising about 42% (510 out of 1207 litres) of the total imported products. There seems to have been a rise in the importation of Rhodian wine in this century, the main Aegean competitor to Campanian wine. I calculated that about 323 litres of Rhodian wine had been imported, a relative proportion of 27% compared to the Hellenistic and late first century BC, which had seen 87 litres and 98 litres imported respectively.

There were further Aegean imports from an identified source, with most probably carrying wine. Fish sauce (*garum)* meanwhile can be identified very clearly in this period. It comprised about 11% (132 out of 1207 litres) of the total imported products (Fig 7-20), and was evidently brought from southern Spain. However, the ratio of fish sauce may have been more than 11%, as another Italian area (the Adriatic Sea) seems to have supplied *garum* to Berenice. Unfortunately the volume it exported could not be assessed as the capacity of the amphora (Dressel 6) carrying this product has not been determined. It is worth mentioning that about 7% (82 out of 1207 litres) of the total amphora-borne products were imported from Tripolitania (Tripolitania amphora II). However, the contents of this amphora is still a subject for debate, with olive oil, wine and fish sauces all in contention (Bonifay 2004). Olive oil imports were dominated by Spanish sources, specifically from ancient Baetica, with its share of the local market at Berenice accounting for about 14% (160 out of 1207 litres) of the total imports.

Our knowledge about the capacity of imported products in the second century AD is patchy, as with the first century AD. However, the general trend seems to have been that imports grew and that olive oil was in high demand, as imports of this product increased by about 250 litres over the previous period. Imports of wine, previously the most precious imported commodity, now seem to have declined. By contrast, the market for fish sauce seems to have been consistent with the previous period, with 132 litres imported.

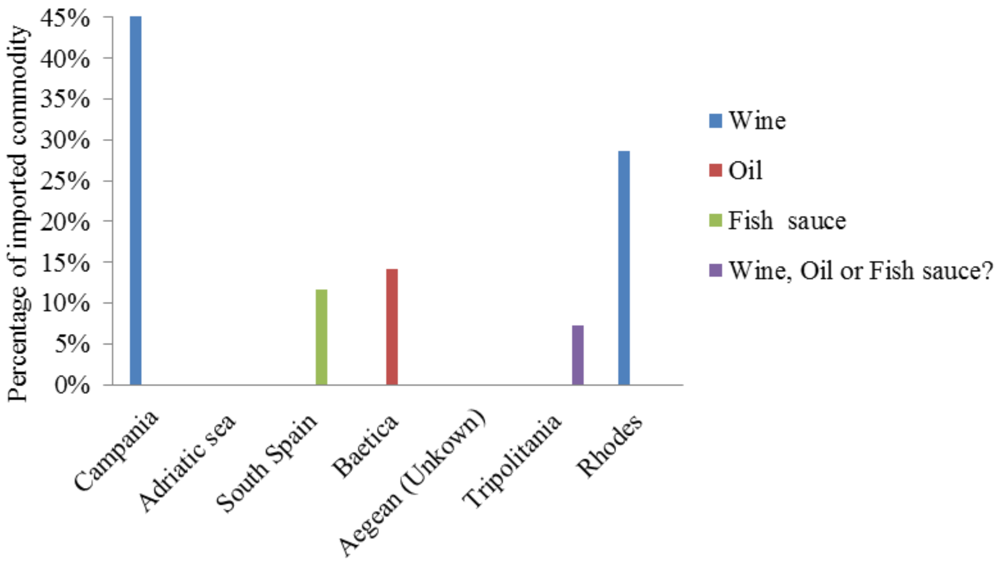


Figure-7-20: An estimation of the volume of wine, olive oil and fish sauce imported into Berenice in the first century AD.

This century (Fig. 7-17d) saw a drop in the proportion of wine imported from Campania, which now comprised only 12% (102 out of 867 litres) of total wine imports, a decline of over 400 litres from the last century. Imports of Rhodian wine surpassed Campanian wine by about 2% (121 out of 867 litres), but imports to Berenice dropped by 50% in comparison to the previous century. Wine was imported again from Kos after a long interruption. Two other sources from the Aegean (Crete and an unknown source) also supplied Berenice with wine, although the capacity of their carrying amphorae are still unknown. However, while it can be assumed that more than 48 amphorae from Crete can be identified (based on counting the number of BRH), their capacities remain unknown. Products from Cyprus also entered Berenice's market from this century, but unfortunately no information about their volume or product type has been obtained. Southern Spain was still the favoured producer of fish sauce, and in this period made up about 15% (132 out of 867 litres) of the total imported goods. However, imported oil trends seem to have changed, as Tripolitania replaced Baetica. Tripolitania seems to have supplied 47% (410 out of 867 litres) of the total imports of this product to Berenice according to the present calculation (Fig. 7-21).

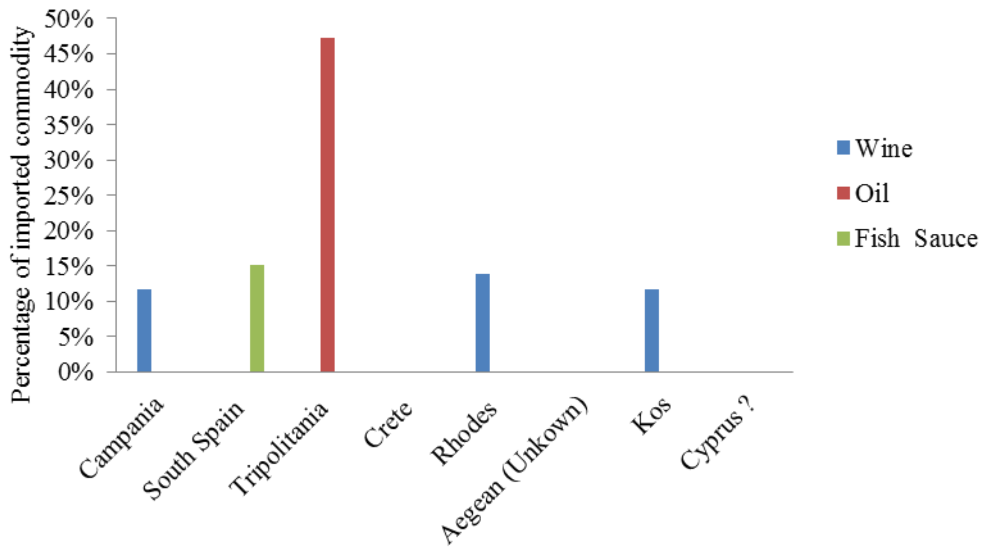


Figure 7-21: An estimation of the volume of wine, olive oil and fish sauce imported into Berenice in the second century AD (see Table 21, Appendix II).

A number of changes occurred in the third century AD in terms of shifting trade routes and product suppliers (Figs. 7-17e and 7-22). According to the available quantifiable amphora sherds oil imports peaked at this time, as they made up 83% (795 litres) of the total imported products. Tripolitania remained the main producers of oil, supplying 53% (510 out of 958 litres) of the total imported into Berenice. Tunisia also now appears to have contributed a substantial volume of oil (about 22% - 210 out of 958 litres - of total imports). Baetica was the supplier of a small part of Berenice's oil market, comprising only 8% (75 out of 958 litres) of total imports.

Wine comprised only 9% (98 of 958 litres) of quantified amphora sherds, shared equally between Rhodes and Samos. Southern Spain remained the main supplier of the fish sauce market, as it had been since the first century AD, although its proportion declined gradually in this period to about 4% (35 litres out of 958 litres). Two new sources also entered Berenice's market, being France (southern Gaul) and Algeria. Which products were imported from the former is unclear, though most were wine. Algeria most probably supplied oil products. For the other two sites, Samos and Cyprus, it is difficult to predict the volume and types of products they traded with Berenice.

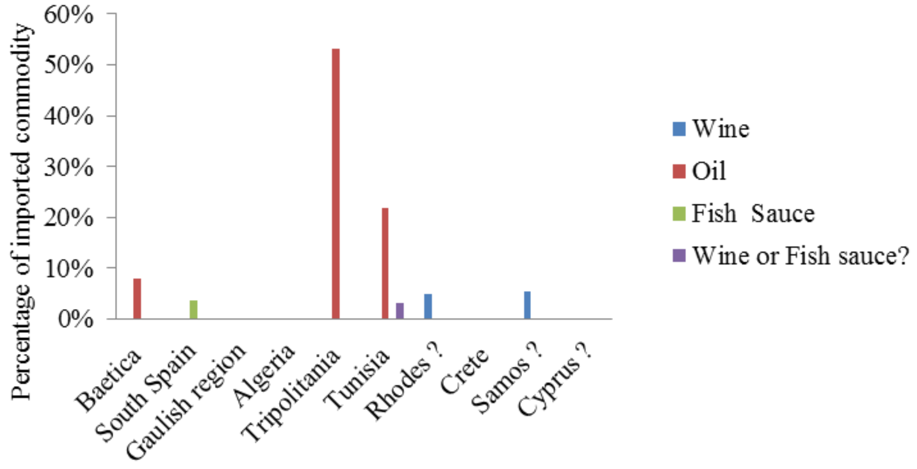


Figure 7-22: An estimation of the volume of wine, olive oil and fish sauce imported into Berenice in the third century AD (see Table 22, Appendix II).

Although it is possible to estimate the overall volume of products traded at Berenice in the late Roman period, it is difficult to assign figures to particular types of commodities (Figs. 7-17f and 7-23). However, significant changes in trade patterns and routes can be seen once more. Goods were mainly imported from the eastern Mediterranean in this period, with a very small percentage coming from Tunisia. In terms of eastern markets there was also substantial change, with new sources appearing in Egypt and the Levant area. Wine seems to have been imported in small amounts from both Caesarea and Egypt (about 1% - 50 out of 4129 litres - and 0.4% - 18 out of 4129 litres - respectively of the total imports). Gaza and Chios are recorded for the first time as suppliers of wine or fish sauce and wine or oil respectively to Berenice. It is estimated that 12% (495 litres) of imported products originated in Chios. One of the main drawbacks of this century is that nearly 98.5% of all amphorae-borne commodities cannot be assigned to a specific product, as mentioned above. These products were mainly imported; 12% came from Chios, about 86% (3710 litres) possibly came from Cilicia/Cyprus, and about 0.5% (21 litres) originated in Tunisia.

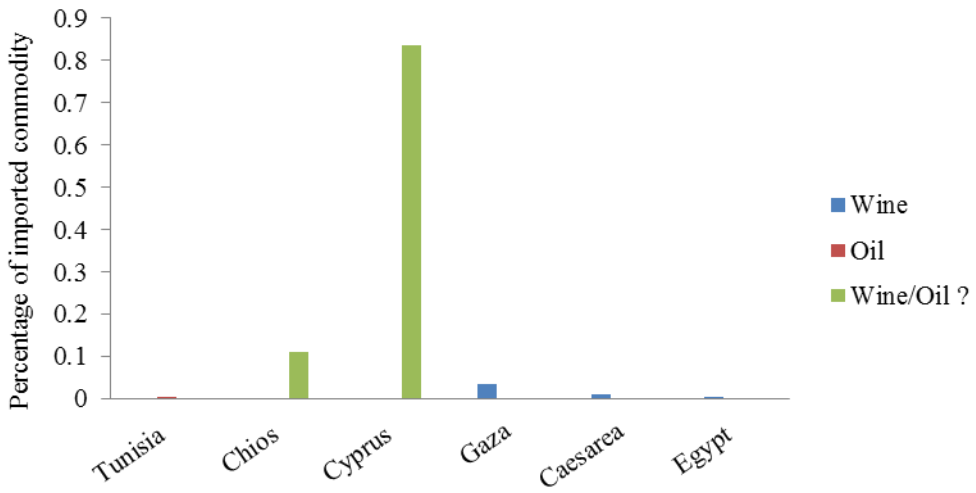


Figure 7-23: An estimation of the volume of wine, olive oil and fish sauce imported into Berenice in the sixth century AD (see Table 23, Appendix II).

7.2.6 Discussion and conclusion

In order to obtain a comprehensive picture of the trade routes and connectivity of the harbours of Cyrenaica and how the region interacted with the wider Mediterranean, I have considered in the above sections amphora-borne assemblages from my field survey and the excavation work at Berenice. A number of trends have been noted. Firstly, according to the estimation of the capacity of amphora sherds (BRH), it seems that the wine was in high demand from the Hellenistic period to the first century AD, and was the most common product imported into Cyrenaica (Table 7-2). This is not particularly surprising as wine was widely consumed and traded in antiquity. Various types of wine were known, as attested by a number of ancient historians (Pliny 14, Strabo 5.3.6).

The sources of the wine imported into Cyrenaica were varied, although Italian sources (Sicily and Campanian) seem to have been important from the Hellenistic period. Aegean suppliers such as Rhodes and Kos also contributed a non-negligible proportion. From the late first century BC, other amphora-borne products alongside wine amphorae seem to have been traded to Cyrenaica. Oil and fish sauce (*garum*) appeared to have been monopolised by sources in southern Spain and North Africa. However, oil and fish sauce products from both these regions have been well identified in different parts of the Mediterranean, and they appear to have been two of the most important producers of these type of products. Vast oil and fish processing installations have been recorded in both regions (Bonifay 2004; Slim et al. 2004).

In the second and the third century AD, importation and trade networks seem to have changed. Firstly, there was a total disappearance of Italian amphora-borne products in the third century AD, and new eastern Mediterranean sources appear to have been introduced, including Crete, Samos, and Cyprus/Cilicia. A number of new western Mediterranean suppliers were also introduced, such as southern Gaul and Algeria, although the total imports from these two areas remained small. Secondly, there appears to have been a higher demand for oil products, especially in the third century AD, as oil imports increased in this period.

The late Roman period seems to have been a turning point for trade networks, commerce and sources. There was a total disappearance of north-western Mediterranean amphora-borne products, and a major decline in North African products. Cyrenaica seems to have been well-connected with and totally reliant on their eastern Mediterranean sources. Products from the Levant area and Egypt appeared in Cyrenaica for the first time in this period, although they were initially a relatively small percentage. This period also saw the largest number of amphorae imported from Cyprus/Cilicia and Chios. This has been attested both by excavations at Berenice (Riley 1979a) and the SCSC field survey. This brings up a key question. Did these products come to Cyrenaican ports following the establishment of direct trade routes, or via some redistribution mechanism (see below).

Period	Main source	Main Product			
		Wine	Oil	Fish sauce	Undetermined
Hellenistic	Sicilia Rhodes Kos Knidos	100%			
Late first century BC	Campania Tunisia Rhodes Knidos	99%		1%	
First century AD	Campania Adriatic sea South Spain Baetica Tripolitania Rhodes	74%	14%	12%	
Second century AD	Campania South Spain Tripolitania Crete Rhodes Kos Cyprus/Cilicia	38%	47%	15%	
Third century AD	Baetica South Spain Gaulish region Algeria Tripolitania Tunisia Rhodes? Crete Samos? Cyprus/Cilicia	10%	83%	4%	3%
Sixth century AD	Tunisia Chios Cyprus/Cilicia Gaza Caesarea Egypt	0.50%	4.50%		95%

Table 7-2: The main Mediterranean sources of products supplied to Cyrenaica according to amphora sherds (BRH) recovered from Berenice and the SCSC survey.

7.2.7 Imported fine wares as evidence of wider trade and long-distance connectivity

Fine wares are considered to have been a secondary or supplementary cargo, shipped with major amphora-borne trade goods, other luxury staples, or grain (Bonifay 2003; Tomber 1993). However they can be used, like the amphorae, as an index for trade routes and connectedness. Unlike amphorae, fine wares have received little attention in terms of quantified studies and reports. Only a few sites have been studied in detail, such as Carthage, Elaiussa Sebaste and Emporiae (Rice 2012).

Few comprehensive and quantified studies of the fine-wares have been produced from the excavation works carried out in Cyrenaica. Only two archaeological missions so far have analysed and quantified their results in detail. In 1985, a complete and quantified study was published concerning the fine wares found during the excavation work at Sidi Khrebish, Berenice (Kenrick 1985b; 1985c; 1987). The other study focused on the fine wares recovered from Ptolemais (Domżalski 2012). However, the assemblages from both sites have not been assigned to their stratigraphic context.

7.2.8 Fine wares from the SCSC survey

As discussed above, most of the data collected during my field survey relates to the late periods, which is a normal result for a surface survey. However, in terms of the suppliers of fine wares, it seems that my area of study followed the same trade mechanisms and routes that have been illustrated at Berenice and Ptolemais.

7.2.8.1 Fine wares from Phycus (as an example of a major Cyrenaican harbour within the survey area)

The fine wares that have been gathered from Phycus (Fig 7-24), for instance, present a different trade mechanism for the amphora imported into Cyrenaica in terms of suppliers and sources. However, Tunisian Red Slip comprised 54% (7 out of 13 sherds) of the total fine ware collected during the field survey at the site. Late Roman C ware from Phocaea was the second-highest identifiable imported ware, with about 38% (5 out of 13) of the total gathered sherds. In addition there seemed to be only one sherd of Red Slip which generated from Egyptian sources. However, Egyptian imports to Cyrenaica in general and Phycus in particular seem to have been limited, and remained on a small scale compared to regions such as Tunisia and Phocaea.

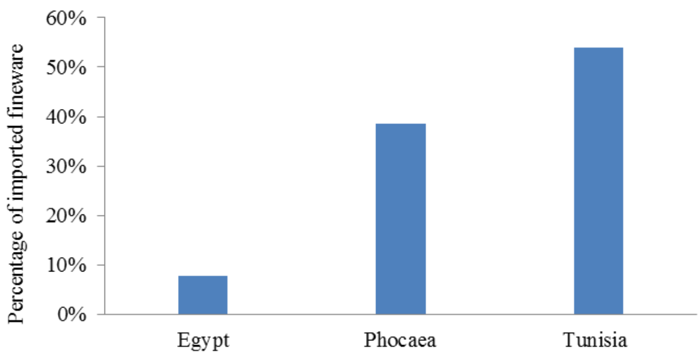


Figure 7-24: The imported fine wares identified at Phycus in the late Roman period (see Table 24, Appendix II)

7.2.8.2 Fine wares from Cherronesus (harbour from the east of SCSC surveyed area)

The ancient site of Cherronesus (Ras et-Tin) also conforms to the late-Roman-period pattern of fine ware imports to Phycus (Fig 7-25). Tunisian fine ware (African Red Slip) made up the majority (58%, or 7 sherds out of 12) of sherds collected from the site. Cypriot Red Slip imported from Southern Anatolia comprised 25% (3 out of 12 sherds), making it the second most common class of imported fine wares at the site. Phocaea appears to have been a third fine ware source (late Roman C wares). However, this latter ware was represented by a smaller number in the total fine-ware sherds collected from the site.

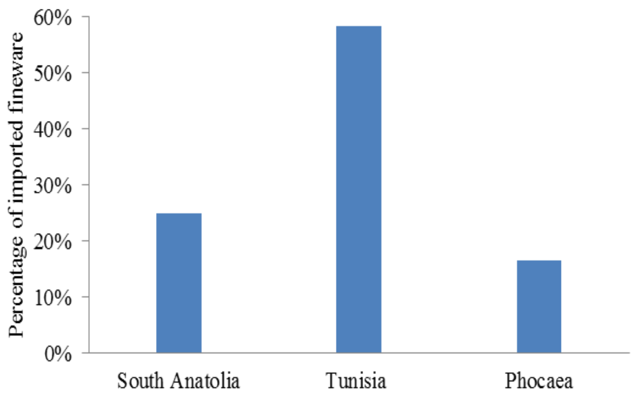


Figure 7-25: The imported finewares identified at Cherronesus in the late Roman period (see Table 25, Appendix II)

7.2.9 Fine wares from Berenice

7.2.9.1 Quantifying fine wares by century

The general conclusion from this quantification is that the pattern of imported fine ware suppliers seems to have fluctuated over time. In the Hellenistic period, imported fine wares comprised about 1953 sherds of the total recovered imported fine wares at Berenice (Kenrick 1987). This figure seems to have declined by more than half in the Augustan period. This could be expected as this period was less than 50 years long, compared to the Hellenistic period. Trade activity in fine wares seems to have peaked in the first century AD, as the figures for imports are nearly double those of the Hellenistic period. There seems to have been another decline in imports of fine-wares in the second century AD, when less than half the previous amount of materials was imported. The third century AD seems to have been the zenith of fine-ware imports overall. The imported wares reached a second peak with 3911 fine-wares sherds. Later, between the fourth and the seventh century AD, the imported fine wares reached their lowest point since the Augustan period (Table 7-3).

Period	Miscellaneous	Local	Imported	Total
Hellenistic	31	1035	1963	3029
Augustan	0	355	782	1137
First century AD	0	63	3761	3824
Second century AD	0	0	1574	1574
Third century AD	0	0	3811	3811
Fourth and Fifth centuries AD	0	0	1149	1149
Sixth and Seventh centuries AD	0	0	1206	1206

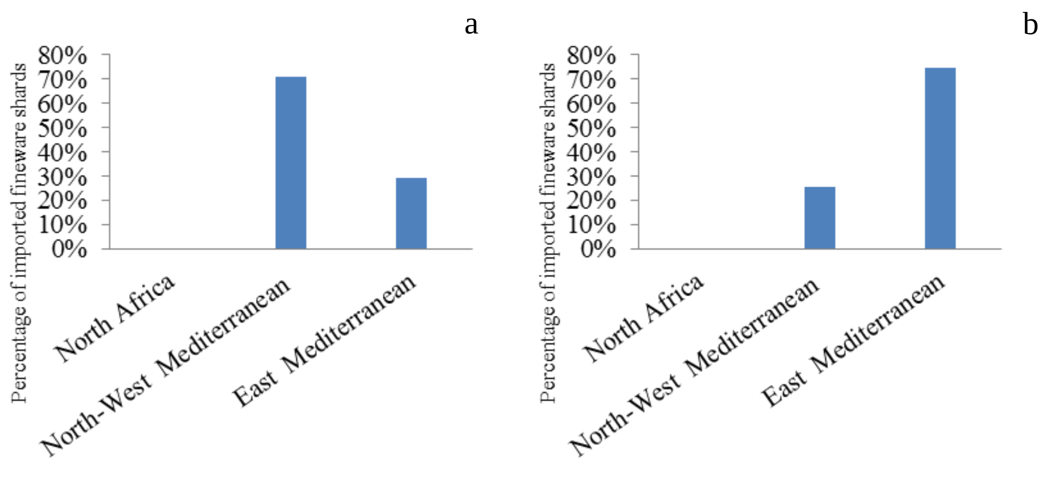
Table 7-3: Imported fine wares from the excavations at ancient Berenice (author’s table, data from Kenrick 1987)

7.2.9.2 Quantifying fine wares by area

Quantified fine wares of this manner reveal a set of changes in economic and route patterns over the centuries (Figs. 7-26a-g). In the Hellenistic period, more than 71% (1402 out of 1963 sherds) of total imported fine wares came from north-western Mediterranean sources, with 29% (561 out of 1963 sherds) of the total assemblage imported from the eastern Mediterranean. During this period there were no African products.

A significant change took place in the import market in the first century BC. The eastern Mediterranean fine wares now surpassed the north-western Mediterranean assemblages. The former made up about 75% (583 out of 782 sherds), while the latter made up only 25% (199 out of 782 sherds). Meanwhile, in the first century AD African fine ware products emerged as a competitor to the other fine ware found at Berenice's market, although its products comprised only 17% (615 out of 3697 sherds) of the total imported fine wares. The eastern Mediterranean fine wares imported into Berenice in this century seem to have risen sharply in this century, with 1735 sherds. The north-western Mediterranean imports seem to have been fairly equal with the proportion of the Hellenistic period, with 45% (1347 out of 3697 sherds) of the total recovered fine-ware assemblages at Berenice in this period.

The second century AD appears to demonstrate a growing demand for African fine wares. The assemblages of this region occupied the highest proportion of the total fine ware imports to Berenice's markets. It indisputably surpasses the imports from both the north-western and eastern Mediterranean.



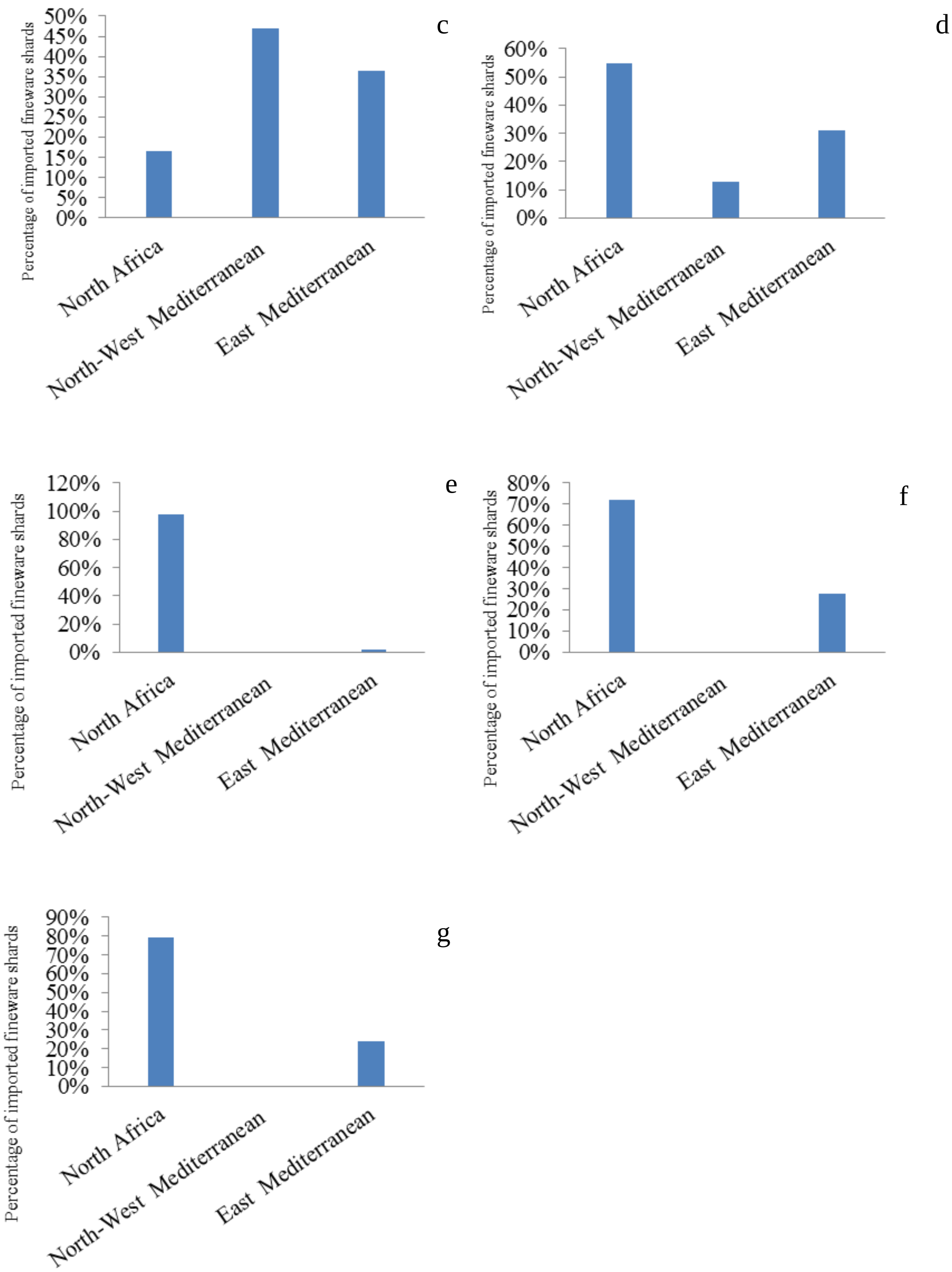
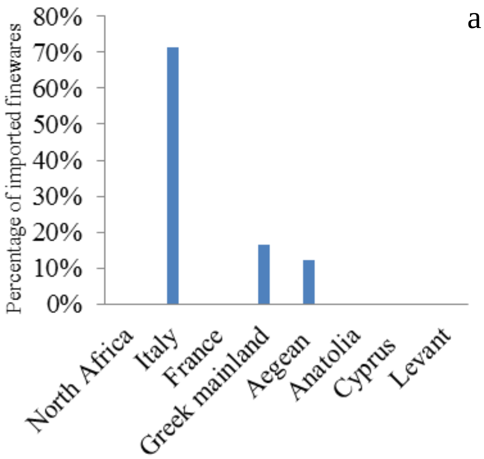


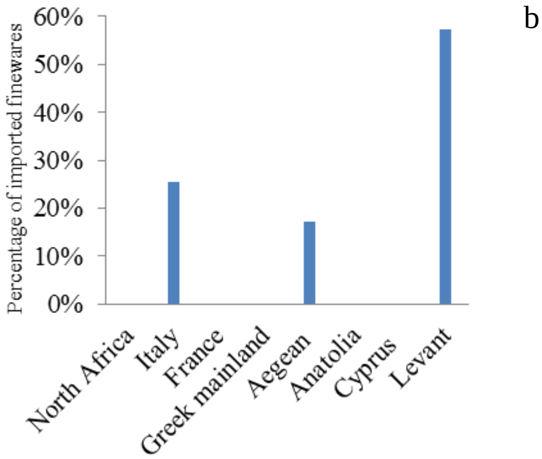
Figure 7-26: Imported fine-wares from North Africa, the north-western Mediterranean and the eastern Mediterranean (author's graph, data from Kenrick 1987). Graphs present (a) the Hellenistic period, (b) the first century BC, (c) the first century AD, (d) the second century AD, (e) the third century AD, (f) the fourth and fifth centuries AD and (g) the sixth and seventh centuries AD (see Table 26, Appendix II).

There seems to have been a further change in the trends of pottery imported into Berenice in the first half of the third century AD. The absolute disappearance of north-western Mediterranean fine wares was accompanied by a considerable decline in eastern Mediterranean imports. Berenice's import markets in this also century seem to have been dominated by North African products. The fourth to seventh centuries AD followed a similar pattern to the third century AD, with a constant dominance of African imports while eastern Mediterranean fine ware imports made up less than 30% (290 out of 1283 sherds) of the total.

7.2.9.3 Quantifying fine wares by region and site

Another question related to Cyrenaican trade networks (through Berenice) concerns the specific provenance of fine wares. In the Hellenistic period, three areas appear to have supplied Berenice with fine wares: Italy, the Aegean region, and the Greek mainland (Figs. 7-27a-g). Italy appears to have been the main supplier to Cyrenaica, with imports comprising about 71% (1402 out of 1963 sherds) of the total imports to the city. Two Italian sources seem to have supplied fine wares to Berenice. The first was Naples?/Ischia?, who provided 67% (940 out of 1402 sherds) of the total Italian assemblages found at Bernice, and 48% (940 out of 1963 sherds) of the total imported assemblages recovered from the excavations. The second area was Apulia, which supplied about 24% (462 out of 1963 sherds) of the total imports to Berenice.





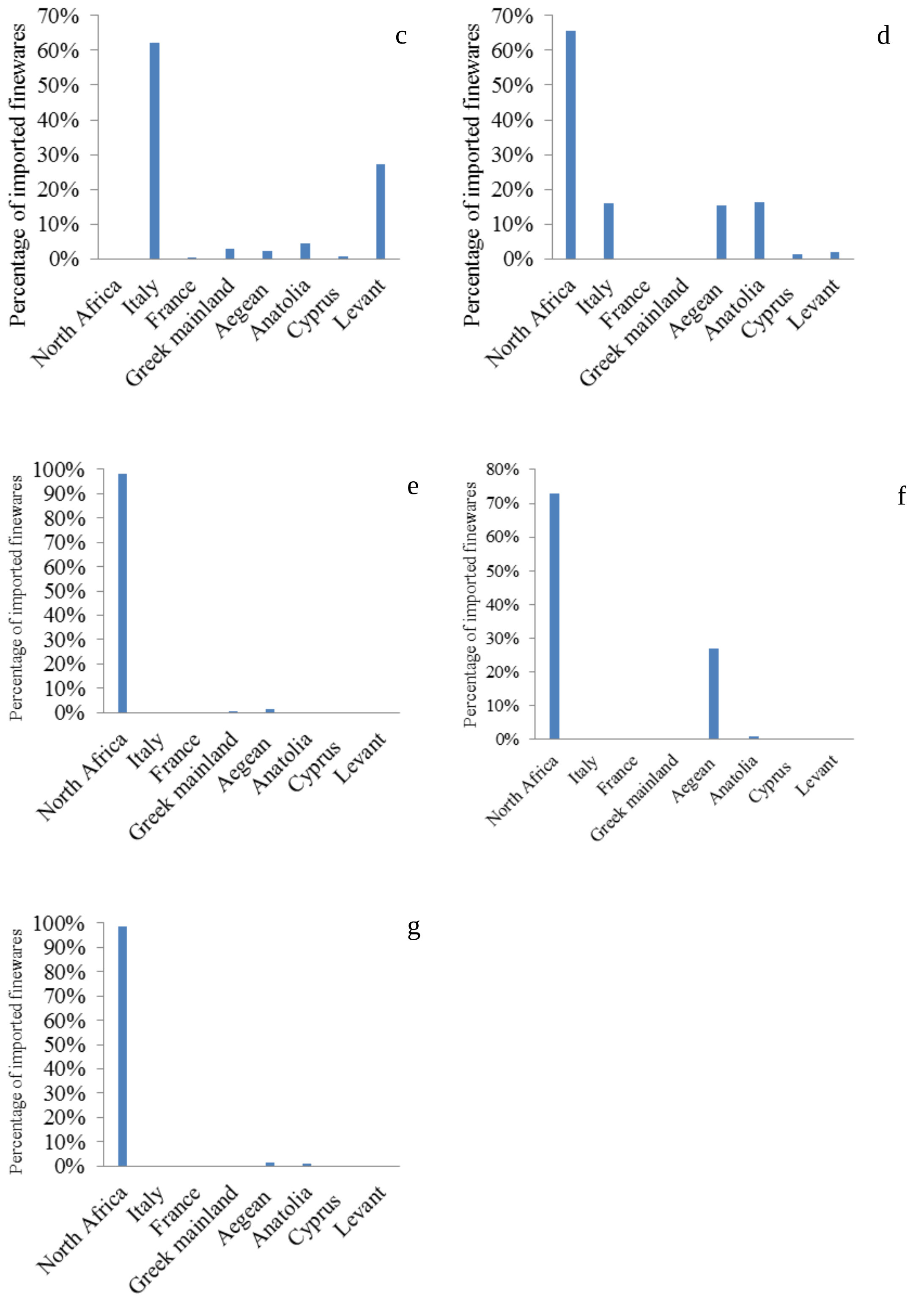


Figure 7-27: The percentage of imported fine wares identified at Berenice by region (author's graph, data from Kenrick 1987). Graphs present (a) the Hellenistic period, (b) the first century BC, (c) the first century AD, (d) the second century AD, (e) the third century, (f) the fourth and fifth centuries AD and (g) the sixth and seventh centuries AD (see Table 27, Appendix II)

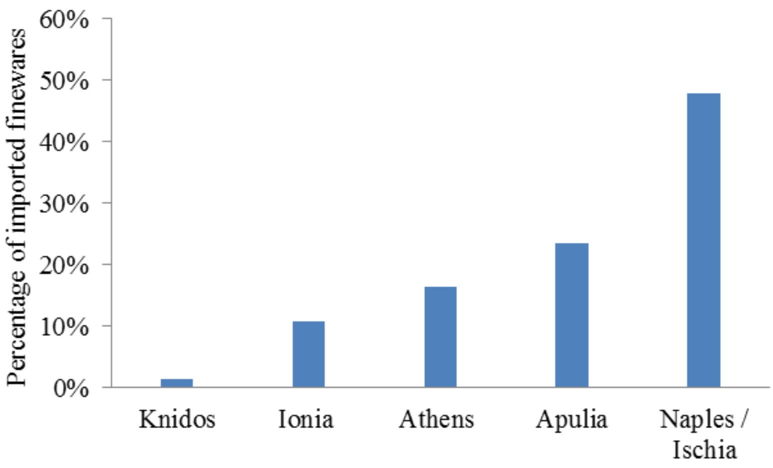


Figure 7-28: The sources of imported fine wares identified at Berenice in the Hellenistic era (author's graph, data from Kenrick 1987) (see Table 28, Appendix II).

Aegean fine ware sources found at Berenice, on the other hand, made up only 12% (561 sherds out of 1936) of the total. Two areas have been identified which supplied Berenice in this period: Knidos with 1% (27 out of 1936 sherds) and Ionia with 11% (211 out of 1936 sherds) of the total imported materials recovered from the site. The third area on the Greek mainland was Athens, which contributed 13% (323 sherds out of 1936) of the total imports of fine wares (Fig. 7-28).

The first century BC saw an apparent decline in imports of fine wares from Italy, with less than 25% (199 out of 782 sherds) of the total imports. This period also saw the disappearance of products from the Greek mainland. A new source of fine ware importation can be identified, with the Levant area providing the majority of imports during this period (Fig. 7-27b). The data for this period also allows the identification of continuous imports of fine wares from Knidos and Ionia, with a 7% increase in imports from the former, but a decline of 141 sherds compared to the previous period for the latter.

This period also witnessed changes in the supply of ceramics from Italy. Italian goods were replaced by products from Sicily and Central Italy products. The former contributed nearly 18% (142 out of 782 sherds) and the latter about 7% (57 out of 782 sherds) of the total imported fine wares. The highest proportion of fine ware imports this century came from Syria, with a percentage of 57% (448 out of 782 sherds) of the total imported fine wares assemblage found at Berenice for this period (Fig. 7-29).

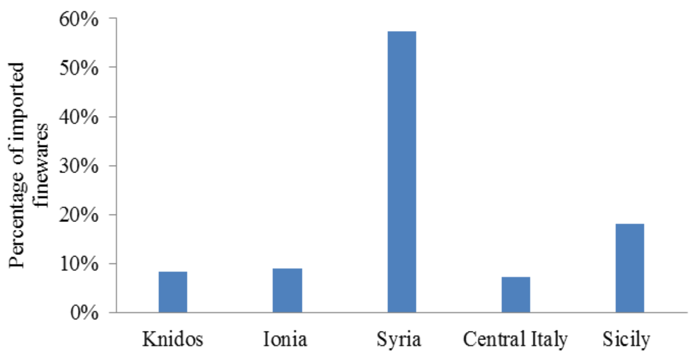


Figure 7-29: The sources of imported fine-wares to Berenice in the first century BC (author's graph, data from Kenrick 1987) (see Table 29, Appendix II).

The first century AD seems to have been a period of economic prosperity in Cyrenaica as new trade partners connected to Berenice. Three new sources of fine wares can be identified: France (Gaulish Sigillata), Anatolia (Eastern Sigillata B and Black Glazed C2 from Tralles and South-West Anatolia) and Cyprus (Cypriot Sigillata). However, their involvement was relatively small, contributing 6% (208 out of 3761 sherds) at most. Italian imports surpassed those from the Levant area at this time, with Italian Sigillata from Arezzo (62% - 2338 out of 3761 sherds) and Eastern Sigillata A from Syria (27% - 1020 out of 3761 sherds) (Fig 7-30). Aegean fine ware seems have been imported into Berenice from two sources: Knidos and Candarli. These provided 2% (64 out of 3761 sherds) and 1% (25 out of 3761 sherds) respectively. In this period Berenice also seems to have received fine wares from the Black Sea region (possibly south Russia, Romania'or Bulgaria).

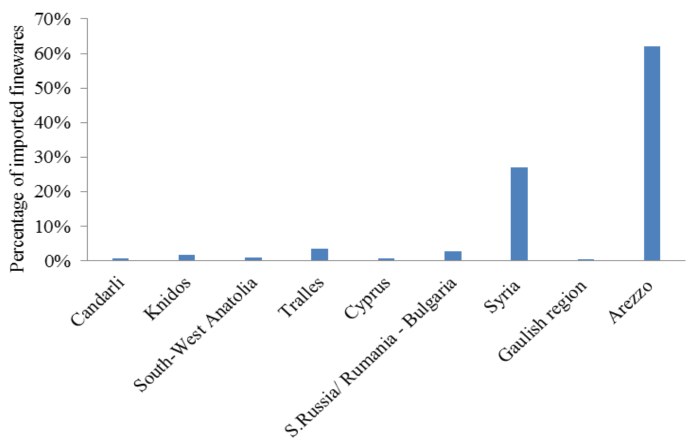


Figure 7-30: The sources of imported fine wares identified at Berenice in the first century AD (author's graph, data from Kenrick 1987) (see Table 30, Appendix II).

These trends continued in the second century AD, but with the significant addition of African Red Slip wares imported from Tunisia. This region's products made up the majority of the fine wares imported into Berenice, with a percentage of 55% (871 out of 1574 sherds) (Fig. 7-31). Although the third century AD was the peak period in terms of the number of fine ware sherds found at Berenice, only three regions seem to have supplied the city. The dominant contributor was African Red Slip imported from Tunisia, which comprised about 98% (3739 out of 3811 sherds) of the total assemblage (Fig 7-32). The remaining 2% were imported from Candarli (1.5% - 59 out of 3811 sherds) and Corinth (0.5% - 13 out of 3811 sherds).

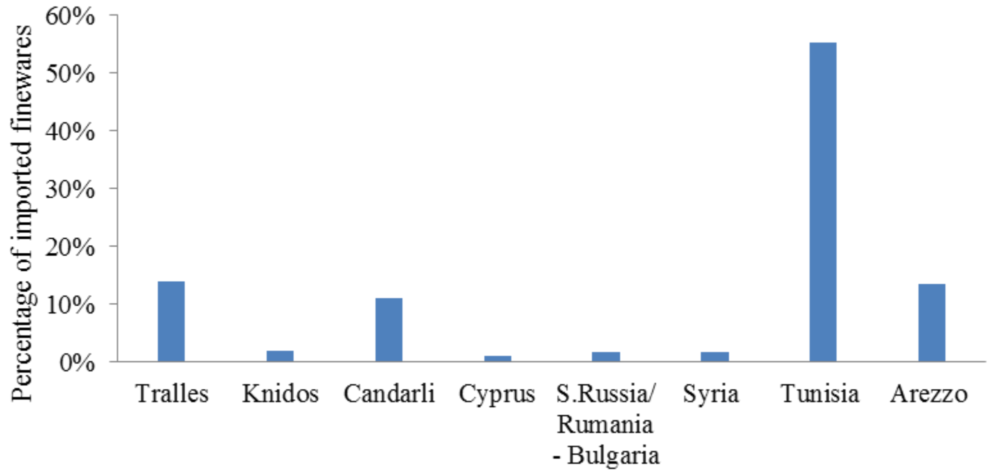


Figure 7-31: The sources of imported fine wares identified at Berenice in the second century AD (author's graph, data from Kenrick 1987) (see Table 31, Appendix II).

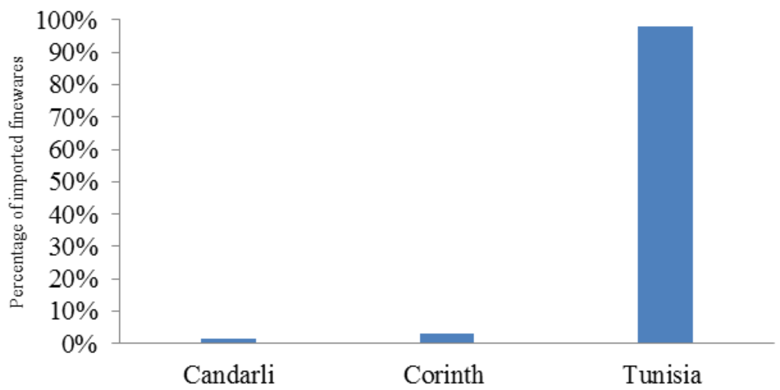


Figure 7-32: The sources of imported fine wares identified at Berenice in the third century AD (author's graph, data from Kenrick 1987) (see Table 32, Appendix II)

Trade patterns seem to have been similar from the fourth to the seventh centuries AD. Four sources appear to have supplied Berenice with fine ware (Figs. 7-33, 7-34). The bulk of imports came from Africa, with more than 50% (713 out of 1194 sherds) from Tunisia and between 9 and 13% (152 out of 1194 sherds) from Tripolitania. However, Phocaean fine ware imports (late Roman C) comprised about 27% (319 out of 1194 sherds) of the total assemblages recovered from the fourth and fifth centuries AD, and about 1% (10 out of 1194 sherds) between the sixth and seventh centuries AD. The third source supplying Berenice between these periods was Cyprus (Cypriot Red Slip), which provided a very small proportion estimated to be about 1% (7 out of 968 sherds) of total imports. In general, the later centuries seem to have witnessed a decline in imports compared to the third century and earlier periods.

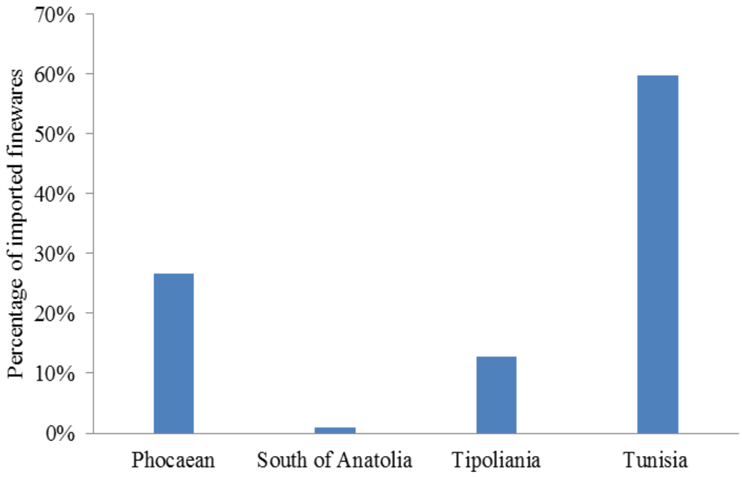


Figure 7-33: The sources of imported finewares identified at Berenice in the fourth and fifth centuries AD (author's graph, data from Kenrick 1987) (see Table 33, Appendix II).

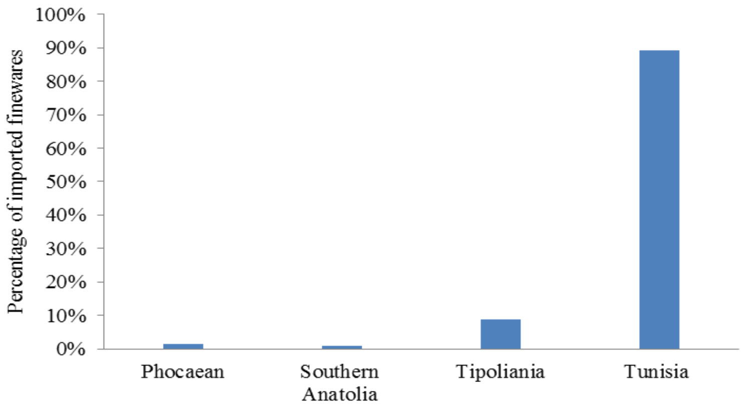


Figure 7-34: The sources of imported finewares identified at Berenice in the sixth and seventh centuries AD (author's graph, data from Kenrick 1987) (see Table 34, Appendix II)

7.2.10 Fine Wares from Ptolemais

7.2.10.1 Quantifying fine-wares by century

The figures of imported fine wares at Ptolemais (Table 8-4) reveal a general decline in imports of fine ware over time, although the number of identified sherds is quite small. However, the dip after the fourth century AD corresponds with the general trends of Cyrenaican commerce. Furthermore, the period between 100 BC and 100 AD, which recorded the highest and peak number of imports to Ptolemais, could be deceptive to an extent. The 18 fine ware sherds recorded actually relate to a two-hundred-year period, and it is unclear what proportion dates to the late first century AD (Domżalski 2012). I believe there was an increase in importation from the first century AD, which continued up until the fourth century AD. The increase of imported fine ware in this period corresponds with the pattern recorded at Berenice in the same period. After this date, there seems to have been a sharp decline in imports, falling to 71 sherds in the second half of the fifth century and the first quarter of the sixth century. This drop appears to have continued at later periods.

Period	Identified quantity
100 BC-100 AD	181
101 AD-200 AD	80
201AD-300 AD	117
301AD-450 AD	149
451AD-525AD	71
526AD-650AD	63

Table 7-4: Quantities of imported fine ware from the excavation at Ptolemais (author's table, data from Domżalski 2012).

7.2.10.2 Quantifying fine ware by area

As at Berenice, trends in the maritime trade of fine wares changed over time. For the first two centuries (100 BC to AD 100), the fine ware market at Ptolemais was served by north-western Mediterranean sources (Fig. 7-35a-f), which contributed about 51% (92 out of 181 sherds) of the total imports to Ptolemais. Eastern Mediterranean wares, on the other hand, contributed 46% (84 out of 181 sherds) of the total fine ware imports in the same period. North Africa provided relatively few imports (3% - 5 out of 181 sherds).

This situation changed in the second century AD. The north-western Mediterranean wares were replaced by eastern Mediterranean fine wares, which counted for more than 50% (43 out of 80 sherds). Adding North Africa's share in this period rose to about 46% (37 out of 80 sherds).

Further changes apparently occurred in the third century AD. More than 90% (106 out of 117 sherds) of fine wares were now imported from North Africa, while the rest came from the eastern Mediterranean, and north-western Mediterranean products completely disappeared. This phenomenon has also been noted at Berenice (Kenrick 1985b; Riley 1979a). Sources continued in a similar fashion in the fourth century, with North African imports maintaining their dominant position and the remaining proportion of imports coming from the eastern Mediterranean.

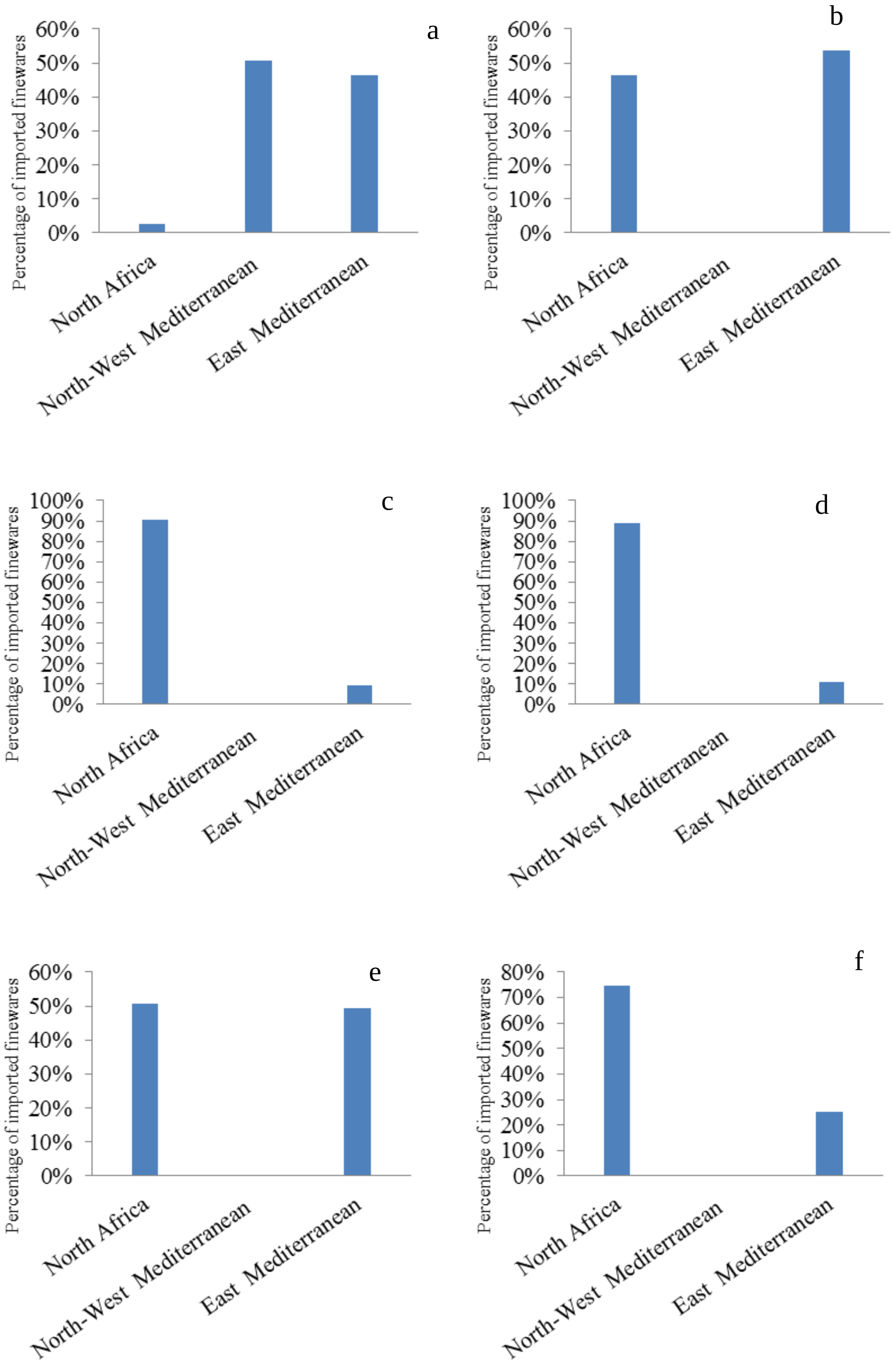


Figure 7-35: Imported fineware from North Africa, the north-western Mediterranean and the eastern Mediterranean (author's graph, data from Domżalski 2012). Graphs present (a) the period between 100 BC - 100 AD, (b) the period between AD 100 – 200 AD, (c) the period between 200 AD – 300 AD, (d) the period between 300 AD – 450 AD, (e) the period between 450 AD – 525 AD, (f) the period between 525 AD – 650 AD (see Table 35, Appendix II)

As mentioned above, there was a general decline in imports from the fifth century AD. However, in this period fine ware imports came from North African and eastern Mediterranean sources in fairly equal proportions. The former comprised about 51% (36 out of 71 sherds) and the latter 49% (35 out of 71 sherds) of the total imports. In the sixth century AD, on the other hand, African fine wares once again made up the highest proportion of imports (75% - 47 out of 63 sherds), with the remainder being eastern Mediterranean fine wares.

7.2.10.3 Quantifying fine wares by region and site

Quantifying the fine wares by region and sub-area can provide us with a more detailed picture about the trade routes that supplied this part of Cyrenaica. It is interesting that similar trade patterns have been noted for different Cyrenaican regions. The general picture of fine ware sources for the period between 100 BC and 100 AD is that six regions seem to have supplied Ptolemais with fine ware products. These areas were Tunisia, Italy, the Aegean, Anatolia, Cyprus and the Levant (Fig 7-36a-f). The most significant contribution was made by Italian sigillata, with more than 51% (92 out of 181 sherds) of the total fine wares imported into the city. The second biggest quantity was Levant's share, with 35% (63 out of 181 sherds). The other areas altogether contributed between 3% and 6% (11-15 out of 181 sherds) of the total imports. A closer look at this period reveals detailed information about these changing supply points (Fig 7-37).

Campania was the Italian supplier of fine wares, whereas the imports from the Levant were supplied by Syria. In the later periods (AD 100-200), we find that Tunisian Red Slip replaced Italian sigillata. The former now comprised about 46% (37 out of 80 sherds) of the total imports. Syrian (Eastern Sigillata A) and Cypriot (Cypriot Sigillata) fine wares formed 16% (13 out of 80 sherds) of imports. The fine wares imported from the Aegean, specifically from Candarli, contributed 21% (17 out of 80 sherds). The Tralles region in Anatolia, on the other hand, appears to have supplied Ptolemais with 16% (13 of 80 sherds) of the total fine wares recovered at the city (Fig. 7-38).

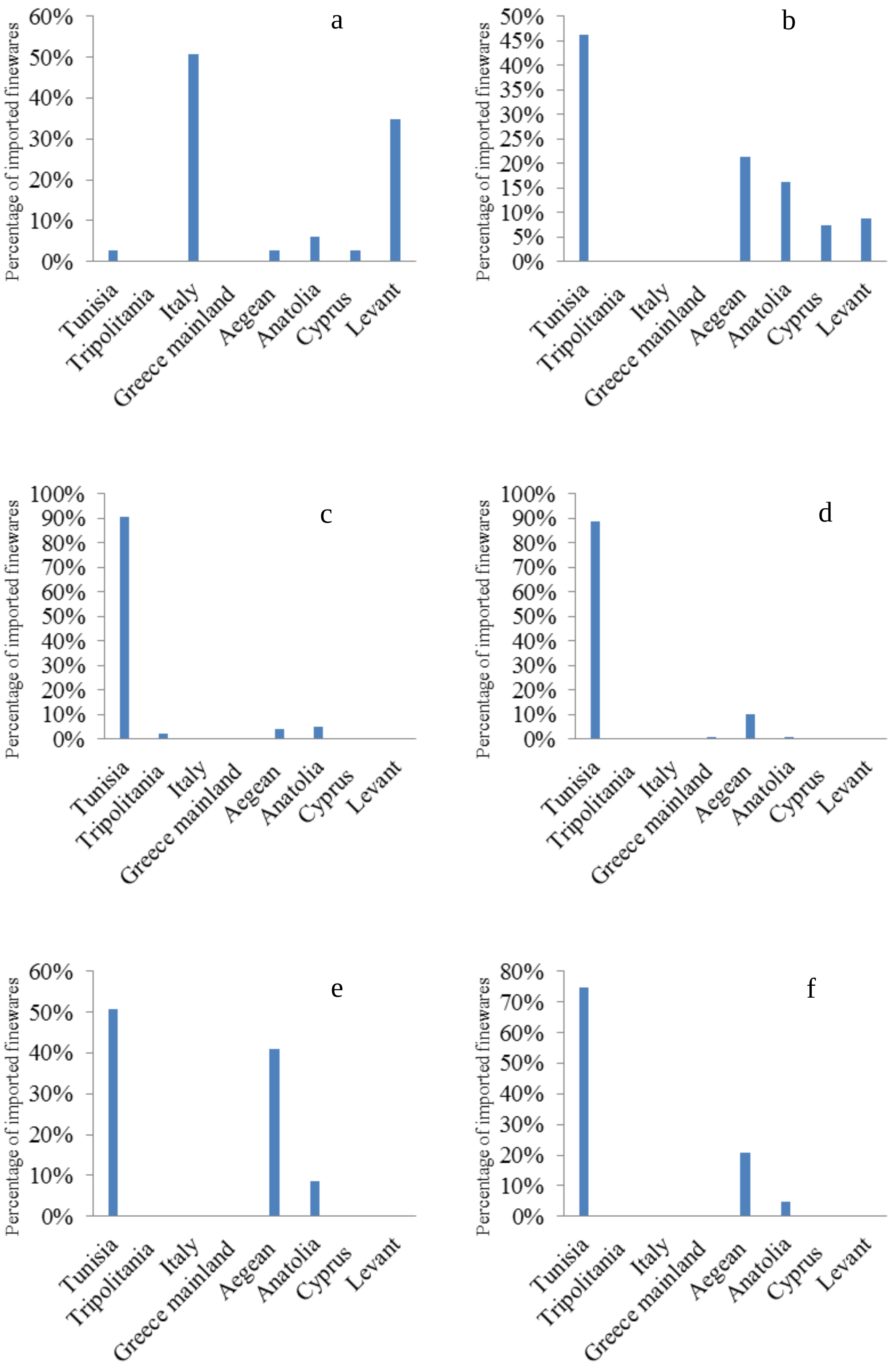


Figure 7-36: The fine wares imported into Ptolemais by region (author's graph, data from Domżalski 2012). Graphs present (a) the period between 100 BC and 100 AD, (b) the period between 100 AD and 200 AD, (c) the period between 200 AD and 300 AD, (d) the period between 300 AD and 450 AD, (e) the period between 450 AD and 525 AD, (f) the period between 525 AD – 650 AD (see Table 36, Appendix II).

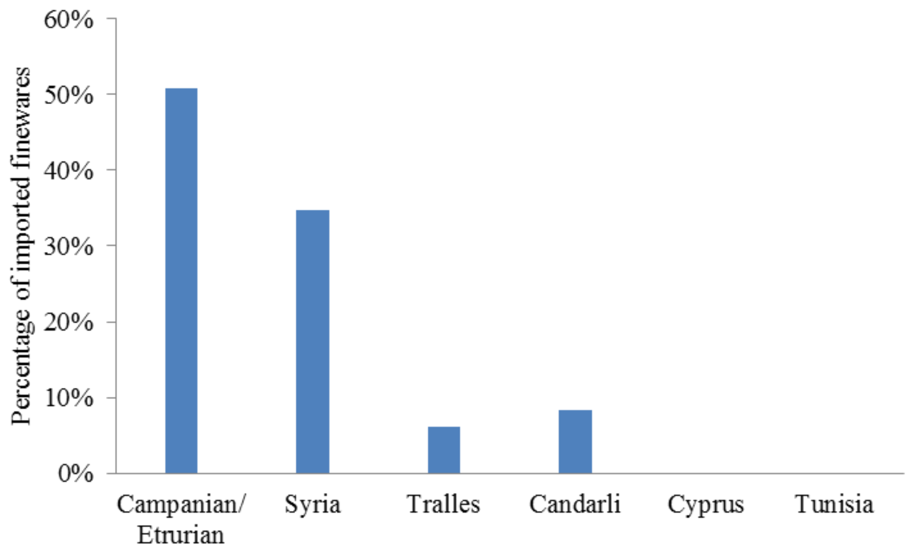


Figure 7-37: The sources of fine wares imported into Ptolemais between 100 BC and 100 AD (author's graph, data from Domżalski 2012) (see Table 37, Appendix II)

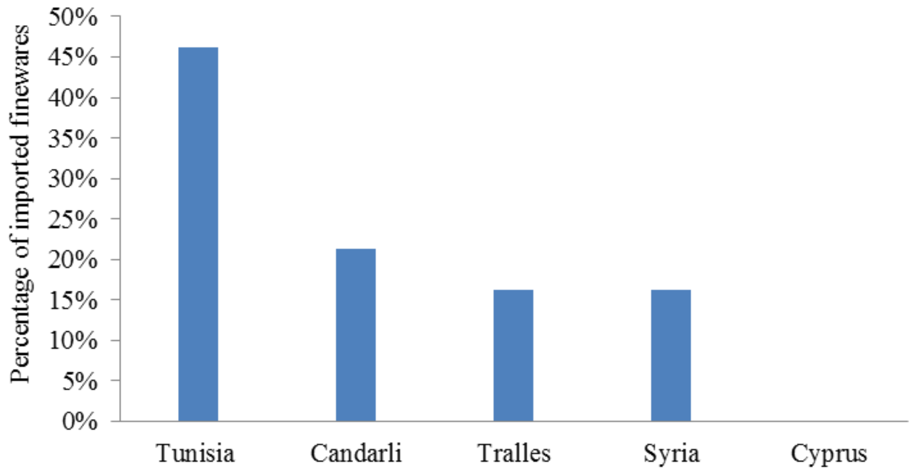


Figure 7-38: The sources of fine wares imported into Ptolemais between 100 AD and 200 AD (author's graph, data from Domżalski 2012) (see Table 38, Appendix II).

Three areas seem to have supplied Ptolemais with fine wares in the third century AD. Tunisian fire ware was the most common, with 91% (106 out of 117 sherds) of the total imports. The remaining 9% (5 and 6 sherds) came from Tralles in Anatolia and Candarli in the Aegean. This period witnessed the total disappearance of Cypriot and Syrian fine wares (Fig. 7-39). The fourth century AD was one of the most prosperous periods, and a variety of new supply sources can be identified at this period. Tunisia continued as the main supplier, with 87% (132 out of 152 sherds). A new Aegean source of fine ware appeared (Phocaea), which supplied Ptolemais with 10% (15 out of 152 sherds) of their late Roman C wares. The remaining 5% was distributed amongst Cypriot Red Slip (LRD) from southern Anatolia. It is worth mentioning that it was widely believed that Cypriot Red Slip was produced in Cyprus (Hayes 1972/1980). However, new research (Jackson et al 2012) reveals that Cypriot Red Slip wares were manufactured in the south of Anatolia. Tripolitanian Red Slip and Athenian Red wares were imported from Athens (Fig. 7-40).

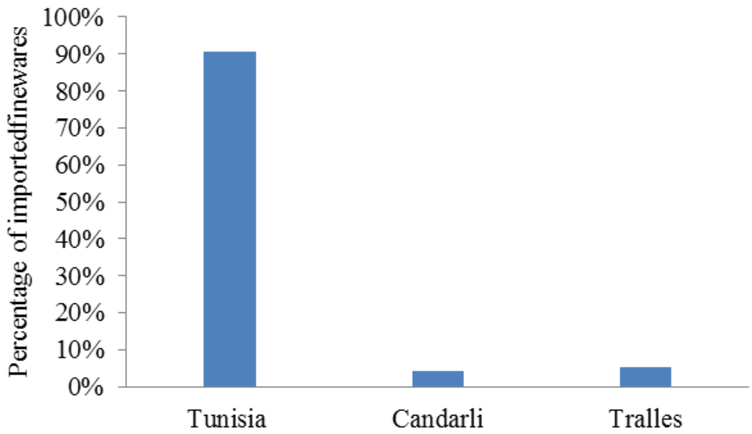


Figure 7-39: The imported fine wares identified at Ptolemais in the third century AD (author's graph, data from Domżalski 2012) (see Table 39, Appendix II)

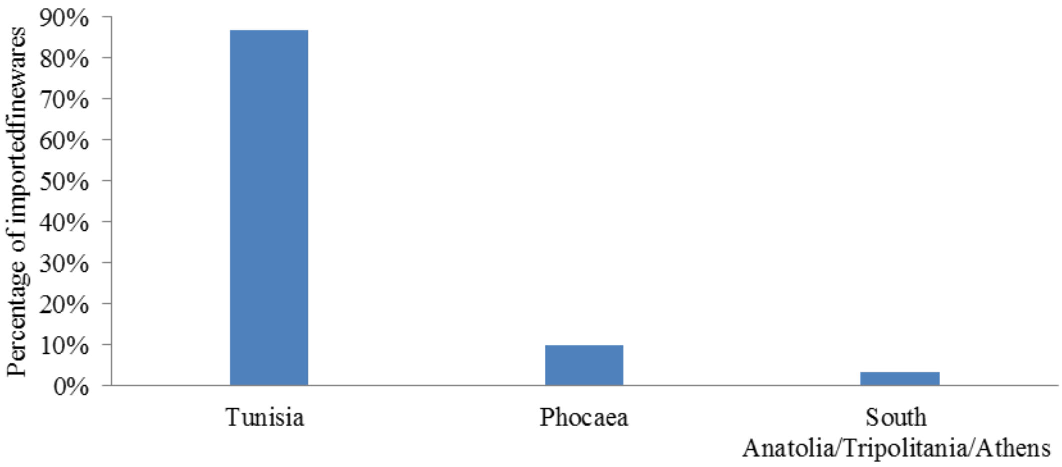


Figure 7-40: The fine wares imported into Ptolemais in the fourth and first half of the fifth century AD (author's graph, data from Domżalski 2012) (see Table 40, Appendix II)

From the second half of the fifth century to the seventh century AD, Cyrenaica seems to have experienced a general economic recession. Fewer imported fine wares were recovered in this long period, over two hundred years, than in the fourth century alone. However, the dominant supplier was still Tunisia with African Red Slip, which counts for about 51% (36 out of 71 sherds) of imports in the period of the second half of the fifth century to the first quarter of the sixth century AD (Fig. 7-41). In the later period until the first half of the seventh century AD the total was over 73% (47 out of 64 sherds). The other Aegean imports from Phocaea (late Roman C wares) and Knidos (late Roman light-coloured wares) formed 39% (28 out of 71 sherds) and 1% (one sherds) respectively of all imported fine wares in the second half of the fifth century AD. In the sixth and seventh centuries AD, late Roman C wares from Phocaea comprised about 20% (13 out of 64 sherds), while Knidos wares now ceased to be imported. Some Egyptian Red Slip arrived at Ptolemais in this period. However the percentage is very small, being less than 2% or only one sherd (Fig. 7-42).

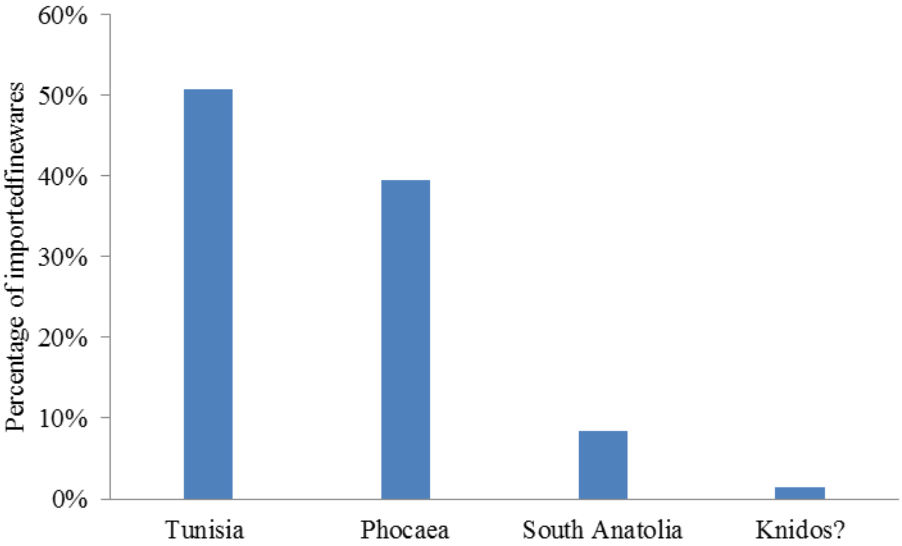


Figure 7-41: The imported fine-wares identified at Ptolemais in the second half of the fifth century and the first quarter of the sixth century AD (author's graph, data from Domżalski 2012) (see Table 41, Appendix II)

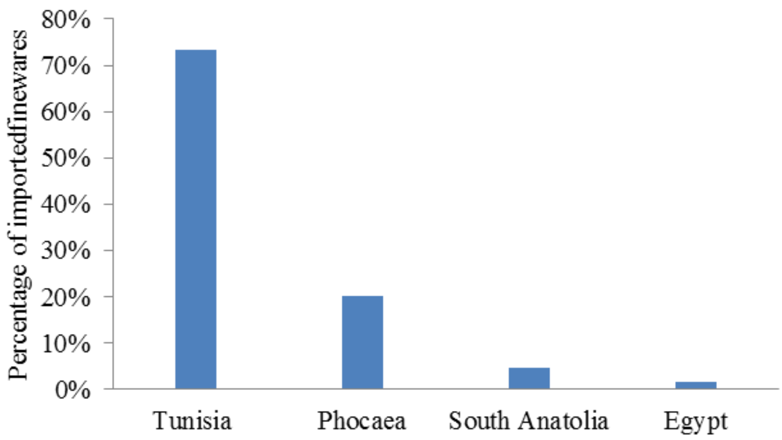


Figure 7-42: The imported finewares to Ptolemais after the first quarter of sixth century AD to the seventh century AD (author's graph, data from Domżalski 2012) (see table 42, appendix II).

7.2.11 Conclusion and discussion

Although fine wares are considered to be subaltern traded products, they can provide us with an initial picture of the trade networks and connectivity of Cyrenaican ports with the wider Mediterranean. The general picture of the fine ware assemblage identified in the above Cyrenaican sites implies that there was a common trade mechanism operating across several Cyrenaican ports. Various sources from the north-western Mediterranean, the eastern Mediterranean and North Africa have been identified.

However, there is a logical argument that must be raised concerning whether these products were transported to Cyrenaica directly from the production area, or whether they were traded via intermediate ports or a redistribution mechanism (see the general discussion below). The main point that can be extracted from the above discussion is that the fine ware trade fluctuated over time. Fine ware imports evidently flourished from the first century AD until the fourth century AD, after which the proportion of imports declined to a low percentage of the figures recorded in the earlier periods. Between the first century BC and the first century AD, Cyrenaican markets were saturated with Italian Sigillata and Eastern Sigillata A from Syria, although the Italian Sigillata dominated. There was a major turning point in the trends of imported fine wares in Cyrenaica from the beginning of the second century AD. Italian sigillata and Eastern Sigillata A wares declined sharply to a lower percentage among other imported fine wares. This accompanied a rise in imports of African Red Slip wares, which now made up more than half of all the fine wares traded in Cyrenaican markets. It is noticeable that from the third century to the early fifth century, African Red Slip remained very popular and in high demand across the whole of the Eastern Mediterranean. It has been found in significant amounts surpassing other fine wares not only in Cyrenaica, but also in the Aegean area, Anatolia and the Levant, Egypt (Bonifay 2003; 2005) and also in the western Mediterranean at sites such as Emporia and Ostia (Rice 2012). After the fifth century AD a general decline in African fine ware imports has been recorded, both in Cyrenaica and other parts of the eastern Mediterranean. This was accompanied by a rise in other eastern Mediterranean forms, such as Late Roman C (Phocaean sigillata) and Cypriot Red Slip.

7.3 General Discussion and Conclusion

> *The pattern of evidence that has emerged from each of the two regions [Tripolitania and Cyrenaica] is remarkably consistent throughout antiquity. Rather than look to each other for mutual support, both regions engaged with communities to their north* (Fulford 1989:188).

> *Cyrenaica was the most distant region in the eastern part of the Mediterranean so intensively supplied by the Italian producers. It can be explained by economic ties and personal contacts between the population of Cyrenaica and the western centres, stronger than those between Cyrenaica and the Levantine coast or the Aegean (*Domżalski 2012:322).

Before discussing the amphorae and fine ware data presented above, current trends among scholars concerning how sites in the Mediterranean interacted and traded shall be reviewed. There are two main academic arguments about the pattern of connectivity of the ancient Mediterranean. The first was pioneered by Michael Fulford, and later adopted by other scholars (Bonifay 2005; Fulford 1987; 1989; Tomber 1993). This view presents the Mediterranean as divided economically into two trading routes and circuits. Sites in the western Mediterranean, on the one hand, were involved and traded together. Meanwhile, sites in the eastern Mediterranean were connected in a separate network, and operated with each other. Bonifay (2005) argues that the only real commercial connectedness between the western Mediterranean, represented by Tunisia, and the eastern Mediterranean occurred between the fourth century AD and the earlier fifth century AD. This is the period in which we can record the huge amount of African Red Slip ware that permeated widely in the markets to the east.

However, a second school of thought has recently arisen in opposition to the model of separate east and west trade networks (Domżalski 2012; Quinn 2011; Rice 2012; Wilson 2013) . This theory argues that the eastern and western Mediterranean were actually much more connected than previously thought. This view relies upon the large number of western fine wares recorded in many harbour cities in the eastern Mediterranean (Rice 2011; 2012). Wilson (2013) argues that there was not only trade connectivity between the eastern and western Mediterranean regions, but also intellectual and technological exchange from the Hellenistic period. Wilson seems to base his conclusions upon the materials yielded from the recent excavations at Euesperides (Wilson 2013).

Returning to the data produced from Cyrenaican harbours, there seems to be a clear difference in the pattern of trade trends between amphora-borne products and fine wares. If we compare our data for amphorae and fine wares from Berenice according to the origin of the imports, for instance, we will reach a different conclusion about the region's trade mechanisms.

Quantifying the amphorae imported into Cyrenaica based on its eastern and western origins, it can be concluded that amphora-borne products from the east clearly surpassed those imported from the west in all periods. For instance, in the Hellenistic period imported amphora-borne products from the eastern Mediterranean comprised 67% of total imports. This coincides completely with Fulford's analysis. However, if we quantify the fine ware imports of the same period in the same manner, we could conclude that western imports made up more than 70% of the total imports of fine wares.

However, I argue that if we want to obtain a comprehensive picture of trade movement and connectivity, the traditional divisions (between the eastern and western Mediterranean) adopted by scholars should be avoided. In other words, we should not compare trade routes and connectivity based on these two different geographical regions. We should start by tracing the scale of the imported products by their point of origin (region and site) as individual elements, rather than as parts of a wider concept.

As soon as this information is obtained, the trade routes and connectivity between particular regions and sites can be examined. We also need to consider the main factors that might have played a key role in changing economic trends and trade networks, such as political and geographical issues. This will allow a clear picture of trade routes and connectivity to be drawn. Moreover, the data on imports (amphorae and fine wares) should be seen as complementary rather than contradictory. The next stage is then to consider how these materials were transported, whether directly from the source of origin or via redistribution mechanisms from other ports of trade.

7.3.1 Mechanisms of trade and connectivity

It is worth mentioning that the shipwreck evidence clearly shows that fine wares were a minor element within ship's cargoes, and did not exceed more than 20% of their total burden (Fulford 1987; Parker 1984). Fine wares were always traded on the back of the principal commodities, whether amphorae, luxury products, or grain (Bonifay 2003; 2005; Fulford 1989; Rice 2012; Tomber 1993). Nevertheless, the fine ware imports to Cyrenaica can unquestionably provide us with a complementary picture of the imported amphorae, rather than being merely a discrepancy as was long thought.

Examining the sources of the amphorae imported into Berenice, for instance, shows that in the Hellenistic period there were two main sources of amphora-borne wine. The main source was Rhodes, followed by Sicily, while Kos and Knidos also made a small contribution. It is worth mentioning that Rhodian wine was very famous in ancient times, and Rhodian amphora-borne wine was common across the Mediterranean area (Riley 1979a).

The major fine-ware exporters, on the other hand, were central Italy (Naples or Ischia), followed by Apulia, another Italian region. Other sites such as Knidos, Ionia and Athens provided the remaining imports. In this case, a set of assumptions have to be addressed. Firstly, three Italian regions seem to have contributed the goods traded with Cyrenaica in this period. How did their products reach Cyrenaica? Did they come through a direct network set up with these regions, or via a middleman as part of a redistribution process?

Fulford (1987) suggests that these Italian products reached Cyrenaica due to a mechanism of redistribution rather than via a direct route linked to Cyrenaica. Fulford implies that Sicily played a crucial role in ancient trade routes, and argues that Sicily acted as a bridge connected to Italy on one side and to the Aegean and Cyrenaica on the other. As he writes, ‘One suspects that traffic came from Italy via Sicily, the west coast of Greece and, perhaps, Crete, returning in the same way’ (Fulford 1989:179).

Although Sicily could indeed have played an important role in ancient maritime trade and connectivity, I disagree with Fulford regarding his proposed trade routes. This is because from the Hellenistic period to the first century AD, Sicily was linked by a direct route and connection with Cyrenaica, and acted as a redistribution centre for the Italian products received by Cyrenaican harbours.

This hypothesis is supported by the inscriptions and pottery materials found at Cyrenaica. The first is a Hellenistic inscription honouring two proxenoi from Sicily (more precisely from Syracuse) found at Euesperides (Fraser 1951; Wilson 2013). A second inscription has been found at Cyrene dating from the first century BC. The inscription mentions a number of Italian traders who operated in Cyrenaica during this period (Reynolds 1968).

In terms of pottery evidence, in the Hellenistic period amphora-borne wine from Sicily formed about 30% of the total imports. Other Italian fine-wares in the same period came from three different regions (Naples or Ischia and Apulia), and comprised more than 70% of the total received fine ware imports. These were most likely shipped as complementary products, with the principal cargoes being Sicilian wine. However, it seems that Italian products were important in Cyrenaican markets from the Hellenistic period, peaking in the late first century BC and the first century AD.

Sicily also seems to have played an important role in the trade of other western products to Cyrenaica. A small proportion of Spanish amphora-borne products can be detected in the first century AD, consisting of 5% of all imported amphorae alongside less than 0.5% of Gaulish Sigillata. It is unlikely that these result from direct trade routes set up with Spain and France to import this negligible proportion. The alternative suggestion is that they were received by a redistribution mechanism, most likely through Sicily.

Cyrenaica seems to have been well connected, possessing a number of trade routes with Aegean sites such as Rhodes, Kindos, Kos, and Crete, among others. Fulford (1987) argued that Rhodian wine was very famous in ancient times and was distributed widely across the whole Mediterranean region. It might therefore have reached Cyrenaica as part of a redistribution process rather than through a direct trade connection.

In this respect, I suggest that Crete might have played a similar role to that of Sicily. Although potentially Cyrenaica might have had a direct maritime trade connection with many different parts of the eastern Mediterranean, Crete seems to have been the single most significant Aegean region to develop a strong relationship and trade network with Cyrenaica. There are many reasons to believe this:

1- The geographical proximity of Crete to the Cyrenaican coast (only two days voyage) would have provided a firm basis for commerce and exchange between the two regions (Strabo 10.475).
2- The presence of Cretan fishermen in Cyrenaica was recorded from the founding of the oldest city at Cyrene (Gill 2004).
3- Furthermore, Cretan settlers in Cyrenaica seem to have formed a significant proportion of the inhabitants at Cyrene since the reign of Arkesilaos (Herodotus 4:161).
4- Additionally, the fact that Crete and Cyrenaica were part of a single unified province from the early Roman period (and thus part of a single customs region) surely cemented the commercial connectivity between the two regions (Goddard 1884; Harrison 1985; Laronde 1987).

The strong commercial relationship between the two regions has been proven by archaeological evidence. The importation of Cretan amphora-borne products grew considerably, to the extent of dominating the Cyrenaica market for amphora-borne products, especially during the second and third centuries AD.

7.3.2 Commerce and Connectivity between Cyrenaica, Egypt and North Africa (Tripolitania and Tunisia)

> *La difficulté des communications avec l'Égypte est grande, que ce soit par terre, à travers les plateaux arides de la Marmarique, ou par mer, sur les hauts-fonds qui bordent cette côte inhospitalière, qui s'étend sur 800 km de Darnis à Alexandrie. Les communications avec la province d'Afrique n'étaient pas moins incommodes, le long des rivages désolés de la grande Syrte, sur plus de 900 km entre Bérénikė et Lepcis Magne* (Laronde 1988a:1014).

> *The general direction of the prevailing wind from the north-west quarter makes navigation along the North African coast difficult in both directions. To sail eastwards from a Tripolitanian port would have run the risk of being driven into the Gulf of Sirte. A risk of being driven on-shore between Cyrenaica and Egypt would have made sailing in sight of land very dangerous in that direction. Voyaging in*

> *the reverse direction from Alexandria towards Cyrenaica would also have difficult, for it would have meant sailing straight into the prevailing wind* (Fulford 1989:171).

In the following discussion I will analyse the available data and examine the economic interaction and exchange between Cyrenaica and its two neighbouring regions (Egypt and Tripolitania). I shall consider whether the navigational conditions were, as often believed, a barrier to these trade routes, or whether they actually encouraged a degree of connectedness.

7.3.2.1 Commercial connectivity with Egypt

Although Synesius referred many times (*e.g.* letter 50) to the fact that ships were sailing from Cyrenaica to Alexandria (the sailing took four full days), he seems to hint that the return voyage might be longer and more difficult. Furthermore, navigation from Alexandria to Cyrenaica also had a bad reputation in the Early Modern period. It has been described as difficult and barely safe for sailing due to the north winds, the shallow waters and the strong currents. It required a crew knowledgeable and experienced in seasonal sailing and navigation (Caillou and Mazou 2012 who discribe travellers' accounts of these routesin the early Modern period).

In spite of the archaeological evidence recovered so far, it is not yet possible to draw a clear picture about the scale of the direct and intensive trade which took place between Cyrenaica and Egypt. Some scholars argue that the economic and intellectual connection between Cyrenaica and Egypt was strong and continued to be maintained over time (Habsburg von 1985).

Theoretically, the commercial connections and intellectual influence between the two regions cannot be denied. There are clear signs of religious inspiration of Egyptian divinities in Hellenistic-period Cyrenaica. Three temples have been found in Cyrene dedicated to Isis and Serapis (Habsburg von 1985; Stucchi 1975). A few examples of Egyptian monuments have also been found at Ptolemais in the Palazzo delle Colonne (Kenrick 2013; Stucchi 1975), indicating that there was an artistic influence.

In Roman period, granite seems to have been the most visible and traceable article imported from Egypt. Several Aswan granite blocks have been found at Apollonia and Ptolemais (Habsburg von 1985; Montet 1954; 1955). von Habsburg argues that other materials might have been imported from Egypt as well, such as papyrus and luxury wares (von Habsburg 1985).

It is worth mentioning that a number of the later sources refer to perishable goods being imported from Egypt. Fish sauce seems to have been one of these products, according to Synesius (Letter 148). Wine also seems to have been imported from Egypt, as a papyrus has been found indicating that wine sold by the monastery at Hermopolis was sent to Cyrenaica (Hardy 1931; Riley 1979a).

However, Egyptian amphorae at Berenice seems to have comprised only a small proportion of the total amphora-borne products. It has been found only in late contexts, where it makes up less than 3% of the total imported pottery assemblage. The same scenario has also been recorded at Ptolemais. Egyptian fine-wares have only been found in the sixth-century AD levels, where they comprise a proportion of less than 2%. At the ancient site of Phycus, only one Egyptian Red Slip sherd has been identified amongst the other imported fine wares. However, the recent excavation work by the French mission at the ancient sites of Apollonia and Latrun (Caillou and Mazou 2012) seems to shed new light on their trade routes with Egypt. Some types of Egyptian amphorae have been identified in the Hellenistic-period context from the excavations at the Kallikrateia (a rocky area east of the Eastern Church at Apollonia), including amphorae AE 2 produced in the Lake Mareotis area in Egypt. Another type of Egyptian amphorae (amphora AE 3) seems to appear in the context of the third and fourth centuries AD (Caillou and Mazou 2012). Unfortunately, no quantified study has yet been published regarding this finding, so the scale of commerce between the two regions cannot be estimated.

At Latrun, located nearly 30 km east of Apollonia, this type of amphora evidently comprised 3.5% (14 out of 397 amphora sherds that have been found). In the Byzantine period contexts at Latrun, Egyptian amphorae comprised about 12.5% (8 out of 63 imported amphora sherds). This assemblage seems to have been associated with the fine wares imported from Aswan. The latter formed about 9% (3 out of 33 fine ware sherds) (Caillou and Mazou 2012). The numbers are small, but indicative of contact.

In the absence of quantified studies of finds from systematic excavations at Apollonia, the lack of excavations on other sites along the Cyrenaican coast, and the small percentage of Egyptian products recorded so far, it cannot be argued that there was a large-scale trade connection between the two regions. For the moment it seems plausible that trade with Egypt was modest at best, if not small. The difficulty of navigation between the two areas seems to have been a major factor in limiting the flow of materials to Cyrenaica. For the above reasons, it can be assumed that Egyptian products reached Cyrenaica in two ways. The first and most convincing is that ships launched from Cyrenaica and headed towards Alexandria by the direct route. The return voyage would then have been via Crete and then to Cyrenaica, in order to avoid the prevailing winds and currents mentioned above. The second route could have been by land.

7.3.2.2 Commercial connectivity with Tripolitania and Tunisia

In a similar way navigation from Cyrenaica to Tripolitania was not an easy matter. The Gulf of Syrtis seems to have been the most serious obstacle to maritime movement between the two regions.

Strabo (17.836) states that,

> *The difficulty with both this Syrtis and the Little Syrtis is that in many places their deep waters contain shallows, and the result is, at the ebb and the flow of the tides, that sailors sometimes fall into the shallows and stick there, and that the safe escape of a boat is rare. On this account sailors keep at a distance when voyaging along the coast, taking precautions not to be caught off their guard and driven by winds into these gulfs.*

Whether from Tripolitania or Tunisia, the archaeological material seems to have been traded in much higher quantities than that imported from Egypt. (Wilson 2013) argues that Cyrenaica was more closely connected to Tripolitania and Tunisia than previously thought. He claims that Cyrenaica had a strong relationship with the Punic world from the fifth century BC. He also argues that the relationship between Cyrenaica and its western neighbours was not only about commerce, but also involved intellectual influence (Wilson 2013).

Wilson seems to base his argument on the recent materials revealed through his excavation work at Euesperdies. These materials consist of: 1) five Carthaginian coins in contrast to one from the Aegean, one from Athens, and one from Croton; 2) 5% of the total imported amphora-borne products; 3) 11-12% of the total coarse pottery at Euesperides. In addition, he has proposed that the technological influence of Carthage on Cyrenaica can be seen in the techniques used to build the bedding of mosiacs (Wilson 2013).

It is worth mentioning that the percentage of amphora-borne products recorded at Euesperides in the Hellenistic context is to an extent similar to that found at Berenice from the early Roman to the third century contexts, with a drop to 3% in the late Roman contexts. North African products were identified along the harbour sites of Cyrenaica as far as Ras et-Tin; about 114 km to the east of Apollonia (see amphora assemblage above).

It is clear that North African products have been attested in Cyrenaica. The question is: to what extent can we confidently assume that African products were traded to Cyrenaica via the direct trade routes across Syrtis? Did ancient traders sail from Cyrenaica to Tripolitania or Tunisia (and vice versa), ignoring the bad reputation of the Gulf of Syrtis and the prevailing winds (Fulford 1989), in order to import or export this tiny proportion of commodities?

The low levels of amphora imports leads me to believe that these reached Cyrenaica most commonly through the redistribution process. Sicily might have again played a role in redistributing North African products, alongside those from Italy to Cyrenaica from the Hellenistic period to the first three centuries AD (see the discussion above).

The dominance of Tunisian Red Slip from the second half of the third century AD on the Cyrenaican fine wares markets is not an argument for an increase in direct trade between Cyrenaica and North Africa. The African sigillata trade flourished and permeated the whole Mediterranean (Rice 2011). Large numbers have been attested in many eastern sites across Greece, Turkey, Syria and Egypt. The same degree of diffusion can be seen in non-Mediterranean regions, or in cities connected to the Mediterranean by a navigable river, such as Lyon or Zaragoza (Bonifay 2005).

In addition, we should take into consideration that major changes in trade routes occurred after the founding of Constantinople. The route of Egyptian grain, for instance, changed from Rome to the new capital. Bonifay (2005) argues that even North African products, and especially grain, seem to have been used to supply Constantinople and other major eastern emporia such as Thessaloniki and Antioch. This might explain why the bulk suppliers of African sigillata were distributed so widely amongst many eastern coastal cities during the late period. Again, it is possible that harbours in Crete were the new redistribution centres of these products.

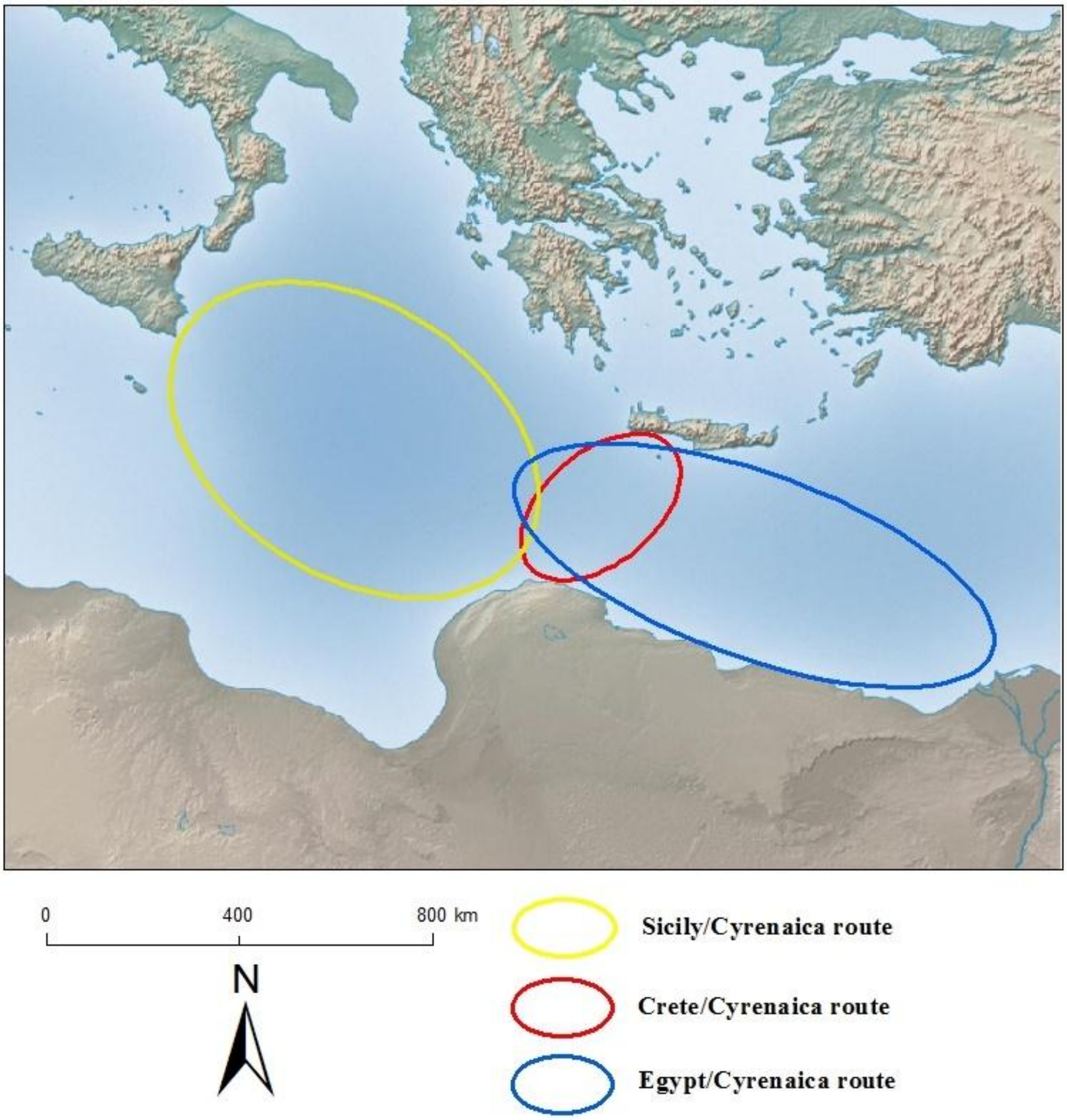


Figure 7-43: The three proposed routes from/to Cyrenaican

Cyrenaica seems to have been better connected to the Aegean via Crete rather than to its neighbouring regions to the east and west**.** On the one hand, Crete seems to have been Cyrenaica's door into the Aegean and other eastern sites. In the second and third centuries AD, it is clear that the amphora-borne products imported from Crete dominated the Cyrenaican markets. Sicily seems to have played a similar role as a western distribution centre for Cyrenaica from the Hellenistic period to the second century AD. The annexation of Cyrenaica to Rome in the first century BC supported the development of closer trade relations between the two regions. Meanwhile the commercial route between Cyrenaica and Egypt is difficult to trace. Further excavation work at other key Cyrenaican harbour sites such as Phycus and systematic excavations at Apollonia will provide a clearer picture of the maritime trade routes between Cyrenaica and Egypt (Fig. 7-43).

Chapter 8: Conclusion

8.1 Overview

Cyrenaica was ideally situated to act as a bridge between the eastern and western Mediterranean. Its eastward border was attached to Egypt, while its western one was adjacent to Tripolitania. Further to this, Cyrenaica lay to the south of the Aegean world. Its location and climate were thus rich with advantages, including the ability to yield an abundance of varied arable produce including grapes, olives, and numerous cereals. The fertility of Cyrenaica was highlighted from the fourth century BC (Herodotus IV. 155, 157, 158, 159, 170, 171, 198, 199; Diodorus Siculus III. 49, 50; IV. 26; Strabo XVII, 20, 21; Pindar Pyth. IV. 6). Herodotus, for instance, states that:

> *…three seasons of harvest, at which we may marvel: for the parts by the sea-coasts first have their fruits ripe for reaping and for gathering the vintage; and when these have been gathered in, the parts which lie above the sea-side places, those situated in the middle, which they call the hills, are ripe for the gathering in; and as soon as this middle crop has been gathered in, that in the highest part of the land comes to perfection and is ripe; so that by the time the first crop has been eaten and drunk up, the last is just coming in. Thus the harvest for the Kyrenians lasts eight months* (Herodotus, IV: 199).

In spite of this, there is a scarcity of modern archaeological research and surveys exploring the industrial features and economic, productive and interdependent patterns of the region. Moreover, this paucity of archaeological resources has led many archaeologists to significantly underestimate the economic capacity and scale of Cyrenaica's participation in the wider economic prosperity of the Roman period. This matter has led a number of scholars to speculate and draw loose conclusions regarding the decline of the Cyrenaican economy. These speculations make up three main theories: external aggression; an earthquake that struck the Mediterranean region in AD 262; and economic disintegration (for a more detailed discussion of these theories see Lloyd 1990).

It can be said that the main argument of these theories revolves around the general decline of the Cyrenaican economy after the third century AD (Goodchild 1968; Jones 1985; LLoyd 1990; Reynolds 1977; Stucchi 1975). Even before this period, the proponents of decline argue that the Cyrenaican economy was consistently moderate, and confined to provincial prosperity. In fact, the strength of the Roman economy in general has been widely debated, as discussed in Chapter 1. These older studies reflected a belief among some scholars that the entire Roman economy, whether in Cyrenaica or other parts of the Roman Empire, was based on a concept of sectional self-sufficiency, rather than inter-provincial economy.

However, it can be argued that such theories were proposed simply to justify the severe lack of investigation into the archaeology of Cyrenaica. It seems clear that the individuals proposing these ideas should not merely have waited for others to conduct their archaeological explorations and research into Cyrenaica, but pushed forward in order to finally open up discussion of the Cyrenaican economy.

Since the ports acted as mediators between inland cities and the external world, this thesis set out to obtain a comprehensive understanding of the role of Cyrenaican harbour economies, in both local and broader contexts, as explained in Chapter One. Chapter Two then presented the limited number of studies that address the harbours of Cyrenaica, particularly taking the more minor ones into consideration. Previously, very few attempts have been made to investigate the typologies, hierarchies and interactivity of these ports with each other and the wider Mediterranean. In addition, there has been minimal study addressing their productive activities. While previous papers do little to address the above themes, they do offer a helpful springboard and welcome encouragement in carrying out a regional survey along the coast between Kainopolis (el-Agla), 35 km east of Ptolemais (Tolmeta), and ancient Noat 1, 16 km west of Apollonia. A significant achievement of this field survey has been the recording of 121 new sub-sites, where previously only 23 sub-sites were known (see Chapters Three, Four, Five and Part II for a full presentation of the collected data).

8.2 Productive Activity

As previously noted, one of the main ambiguities plaguing the ancient Cyrenaican economy has been the productive activities exercised throughout the entirety of Cyrenaica, and its coastal regions in particular. In Chapter 5, the significant results of the survey were presented in order to improve upon our collective understanding of the scale of productive activity along the Cyrenaican coast. This thesis is a pioneering contribution to archaeology’s extant, but unfortunately still sparse, knowledge of this oft neglected yet important subject.

On the basis of the evidence here, recorded during the SCSC field survey, one can argue that an active pottery industry was based along the coast of Cyrenaica, with ample amphora production. Previously, there was an undeniable lack of known information on amphora production in Cyrenaica. However, during the previously detailed field survey, 12 amphora kilns which could all be assigned to amphora types MRA1 and MRA8 were found and identified in an area measuring about 50 km in length. The number of amphora kilns identified in this field survey is far greater than was previously known. Moreover, this study attempted to set up an initial typology of Cyrenaican kilns, as there were no preceding attempts to study kiln structures in Cyrenaica. Arguably, three main types of kilns existed in Cyrenaica: the rectangular, which is the most conventional; the oval; and the circular. The former seems to have more in common with Aegean kiln structures than with other areas to the west of Cyrenaica, like Tripolitania and Tunisia.

In terms of the distribution of amphora kilns in Cyrenaica, it is noteworthy that these amphora kilns were installed where the mouth of the Wadi connected to the sea (valley). In comparison, the distribution of a large number of amphora kilns recorded in Tunisia was primarily coastal, whereas the majority of amphora kilns recorded in Tripolitania were identified inland (Ahmed 2010; Hobson 2012).

Another coastal productive activity highlighted in this thesis is fish processing. It has long been believed that Roman fish processing was concentrated mainly in the western Mediterranean, especially Tunisia and Spain (Ben Lazreg et al. 1995; Slim et al. 2004; Wilson 2006). However, the new evidence suggests that salted fish and fish sauce were also both produced in Cyrenaica. Facilities involved in the production of MRA8 amphorae, believed to have been used to transport fish sauce, were identified near to a number of the vats tentatively linked to fish production. It is estimated that the productive capacity of the recorded vats along the survey area exceeded 400,000 litres of various products. This strongly suggests that production outstripped local consumption, and was likely to have been for exportation.

In this context, it should be highlighted that some of the industrial features found in Cyrenaica do not appear to have had the same geometric construction or archaeological aspects as those recorded in North Africa and the Western Mediterranean. The kiln structures identified in Cyrenaica, for example, were wholly different to the kiln shapes identified in Tripolitania and Tunisia. With this information at hand, it is worth suggesting that Cyrenaica had its own unique structural characters and methods, which were different to those of its western neighbours.

Wine productive units and purple dye installations certainly seem to have existed along the coast. However, according to the present data, these appear to be present at only a small number of the investigated sites. At Euesperides, a site dating back to the Classical period, some evidence of purple dye was uncovered (Wilson and Tébar Megías 2008). In this case study, only one site (CHSC5) at Cherronesus, which is located 120 km to the east of Apollonia (Susa), provided clear evidence of the large-scale production of purple dye. However, the date of the site could be attributed to the late Roman period, recognised through the collected pottery.

Wine production, on the other hand, presented itself along the coast in numerous small scale workshops, although site NOTSC1 seems to have been involved in a larger productive capacity. Furthermore, it is worth mentioning that evidence of a large number of wine presses has been found further inland (Akab 2010; Bentaher and Buzaian 2010; Buzaian 2009; Buzaian and Bentaher 2002; Wilson 2004). According to this archaeological evidence it can be argued that the main productive activity concentrating along the coast was not wine production. This situation is similar to those in Tripolitania and Tunisia, where a larger number of presses and wine process were identified further inland (Ahmed 2010; Hobson 2012).

8.3 Typology and Chronology

One of the main goals of this thesis was to identify the role of Cyrenaican harbours in trade and connectivity. This first required a definition of their types and a working hierarchy of the ports. In Chapter Six, it was argued that Cyrenaican harbours were established and organised deliberately and intelligently.

Generally, there were six types of harbours along the coast of Cyrenaica. These were: major (large harbours); secondary (medium harbours); ancillary (industrial harbours);

supervised anchorages; private harbours; and military harbours. Each type of harbour was assigned a particular role, according to its capacity and facilities. The first type was the major or main harbours. These harbours appear to have played a major role in inter-provincial connectivity, and were significantly involved in wider network; these aspects will be discussed further in the next section. In other words, this thesis argues that the major harbours acted as emporia. The secondary harbours, however, seem to have acted as intra-provincial redistribution centres. In other words, they provided a bridge between the hinterlands, where the productive sites were located, and the major ports which the products were exported. The industrial harbour, the third type, was observably smaller in size than those identified along the coast of the Tyrrhenian sea (Schörle 2011). As a consequence, its role seems to have been confined to facilitating the flow of goods from productive centres to secondary or major harbours.

Supervised anchorages appear to have been distributed at specific distances between the major, secondary and industrial harbours. This type of harbour usually had a single fort positioned to overlook a small bay or promontory. It can certainly be proposed that this type of supervised anchorage was set up to observe both the coast and the movement of ships on the one hand, and the land routes located a few hundred meters to the south on the other. An example of this is seen in the area located between the port of Apollonia and Phycus, which measures about 30 km in length and had three supervised anchorages, each with their own fort. The distance from one fort or supervised anchorage to the next is about 10 to 17 km. These forts were also positioned near to the coastal route linking Phycus and Apollonia. It is worth noting that five industrial harbours were also found to be located along this coast.

Based on existing chronological dating of fortified anchorages built around or after the fourth century BC, it is clear that those examined here were constructed after Thibron’s attack on the ports of Cyrene (Apollonia) and Taucheira (Diodorus of Sicily XVIII, 20, 1-6). These watch towers were thus established to observe for any danger that approached from the sea. Laronde also argued that the major defensive structures and fortifications of Apollonia were constructed after Thibron had threatened the region in the fourth century BC (Laronde 1985). This has been supported by Donald White, who argued that the two single forts near to Apollonia, one located 1.25 km to the east and the other around 3 km to the west, were established as an early warning system.

However, White seemed to link these two forts to another, located at the first stage of the medium plateau (el-Usita), just off the ancient Cyrene and Apollonia road (White 1966). With this in mind, this thesis suggested that the forts were likely initially conceived as watch towers, as elucidated above. However, this role might have been extended in the Roman period to encompass wider uses, such as controlling the movement of merchant vessels, supplying ships with shelter from sudden storms, providing water supplies, and controlling land routes.

The other two types of harbours recognised in Cyrenaica are private and military harbours. The former are natural bays of promontories, which were associated with civilian building complexes. Such buildings were generally positioned a few metres nearer the sea and surrounded by fertile land, suitable for agriculture. Unfortunately, this field survey could not be extended to include such locations, and focused on the coastal area instead. The latter type are military harbours, which were typically attached to civilian harbours. A number of examples of such styles of harbour have been identified around the Mediterranean. Perhaps the best known is the circular harbour of Carthage (Blackman 1982b). What is more, it has been frequently suggested that the inner harbour of Apollonia was a military harbour (Laronde 1996).

In Chapter Six, ancient sources were used to collected data from the field survey and then applied to structural comparisons, a process designed to construct an initial chronology of Cyrenaican harbours. Some of the major harbour sites, such as Apollonia, Ptolemais, Taucheira and Euesperides/Berenice, have very solid chronologies thanks to excavation works carried out at their sites. For the other types of harbours, however, only preliminary dates can be suggested, as they are reliant to an extent on the surface collection materials that are usually biased towards later periods of occupation. However, future excavation works at these sites will inevitably shed much light upon the chronologies and life spans of these harbours.

8.4 Trade and Connectivity of Cyrenaican Harbours

This thesis has explored the archaeological data for Cyrenaican harbours as part of much wider structures. As such, it partly reflects the approach of Braudel (1972), who emphasized that the Mediterranean not only divides but also connects, as well as that of Horden and Purcell (2000), who conceive of the more achieve use of networking by societies. The work of the latter authors is chiefly framed in terms of social and cultural history, and the transmission and hybridisation of information. It has also, however, clear implication for the economy.

In Chapter Seven, I examined the trade mechanisms and connectivity of Cyrenaican harbours through an analysis of their imported amphorae and fine-ware. This information was amassed over the course of the dedicated field survey, and was complemented by the data gathered during the excavations of Berenice and Ptolemais. This chapter not only examined the sources of traded amphorae, but also attempted to investigate and present the manner in which these products reached Cyrenaica. The investigation questioned whether goods arrived via direct trade routes with areas of production, or by redistribution mechanisms bringing together theories regarding the connectivity of Cyrenaica with the rest of the world. Moreover, this study attempted to obtain an initial understanding of the most frequently imported products in Cyrenaica, and how frequently these changed over the time.

In terms of trade routes, this study further argued that both Sicily and Crete may have played vital roles in the transportation of products to Cyrene. In other words, many western products reached Cyrenaica through redistribution mechanisms, rather than direct routes. Sicily seems to have had a major role in the redistribution of these products, especially from the early Roman period to the second century AD. Crete meanwhile was Cyrenaica's door to the eastern Mediterranean.

In terms of Cyrenaica's connection with Egypt, judging from what has been discovered and understood here, it seems important to note that the link by sea was of limited importance. While it is likely, as we have seen, that any outgoing ships would have directed their voyages from Cyrenaica towards Egypt. The return was completely different – with the returning ships sailing north-west towards Crete, and then down to Cyrenaica so as to avoid the strong current and the north-westerly winds, alongside other difficulties mentioned by Synesius in his letter (150). In general, it was argued that there were three main routes connected to Cyrenaica, the first of which linked to Sicily. This route, however began losing its importance from the third century AD, onwards. This could be explained by a general shift in Mediterranean trade networks, which occurred after the mid-Roman period, towards Constantinople (see Chapter 6). The second route connected to Crete and the third, though only a small amount of evidence of Egyptian materials has been identified thus far, linked to Egypt, through Crete.

In terms of imported products, these investigations point to wine as the most significant import in Cyrenaica. This is particularly observable from the Hellenistic period through to the first century AD, though there is some evidence of fish sauce importation in the late first century BC and first century AD. Still, it is remarkable that this was the norm, as wine was widely traded and diffused during the Classical period (Shipley et al. 2006). In the second century AD, however, changes in importations occurred. The proportion of imported olive oil appears to have surpassed that of imported wine – alongside an increase in the amount of imported fish sauce. Interestingly, in the third century AD, olive oil appears to have been the most predominantly imported product, with wine and fish sauce making up a relatively insignificant proportion of Cyrenaica's total imported products.

The high production of MRA1, which can likely be assigned to wine, and MRA8, which was probably for fish sauce, could indicate an increasing capability for local wine and fish sauce production, leading to a reduced demand for imported items from the second and third centuries AD onwards. This investigation argues that Cyrenaica seems to have met its needs for these two products throughout this period, leading to the reduced importation of such products.

8.5 Cyrenaican Harbours and the Theory of Ideal Types of City

> *Indeed, whatever the theoretical model under discussion, it is clear that archaeological data from ancient cities can make a significant contribution to debate, since it is through archaeology above all else that we can attempt to test the validity of a proposed model* (Mattingly et al. 2001: 67).

One of the aims of this thesis was to test previously proposed ideal types of city against the harbours of Cyrenaica. Considering the archaeological evidence presented in this thesis, it is arguable that many of the harbours of Cyrenaica held an active production capacity, particularly during the mid-Roman period. The evidence from the one hundred recorded vats found alongside the amphora workshops distributed along the study area suggests that Cyrenaican harbours were not only consuming the surplus of their hinterlands, but that their success was driven by their productive activities and their role as a bridge between the hinterland and the external world. Thus, the prosperity of these harbours was generated and fuelled by their status as both productive centres and emporia. The highly organised and interactive nature of Cyrenaican harbours has highlighted the existence of an urban society that organised its affairs deliberately – certainly not in a random fashion.

Certain features of two ideal types of city could match with the Cyrenaican harbours. The first is the 'producer city' model proposed by Weber and reassessed by Mattingly et al. (2001). The productive activity recorded in the harbours strongly supports this model. The second is the 'service city' model proposed by Engels (1990). The role of secondary and industrial ports (see Chapter 6) was to facilitate the movement of local products from production centres to major ports. The reverse was also true, with these secondary ports also serving to ease the movement of imported products from major ports to other ports and anchorages, to arrive near to the consumer units and local markets that needed those commodities. In these regards, certain features of Engels' model appeared to be a useful description of the data.

As I stated earlier, there was earlier a trend among scholars (Goodchild 1968; Jones 1985; LLoyd 1990; Reynolds 1977; Stucchi 1975) of identifying a general recession in Cyrenaica after the third century AD. However, according to the MRA1 and MRA8 kilns found in this project’s field survey and in ancient Erythron (Lathrun) (Mazou and Capelli 2011), Cyrenaica’s economy may have remained prosperous until AD 365, when it was hit by an earthquake (this has also been suggested by Roques 1987).

Cyrenaica’s economy during the late Calssical period can be partially characterised through a number of ancient references to the topic (Herodotus IV. 155, 157, 158, 159, 170, 171, 198, 199; Diodorus Siculus III. 49, 50; IV. 26; Strabo XVII, 20, 21; Pindar Pyth. IV. 6). However, there is less literature available regarding Roman Cyrenaica, and it is challenging to trace the economy’s capacity during this period. This is especially notable in the absence of intensive survey works in different parts of Cyrenaica. One such area is the Al-Jabal Alakhdar (Green Mountain) region, which was considered the most fertile land in Cyrenaica. We thus cannot estimate an accurate figure for the Cyrenaican economy. Despite this, if one considers that this project’s study area was intensively surveyed and represents only 2% of the total area of the coast of Cyrenaica, the amount of data acquired and presented is certainly impressive and particularly suggestive. As such, the extension of the survey towards the east, west and south will surely reveal more important data, which will greatly increase current understanding of Roman Cyrenaica's economy.

The analysis of new archaeological data in combination with literary evidence has therefore permitted us to develop a more details picture of Cyrenaica economy than is offered by a simple adaptation of previous models.

8.6 Final Thoughts and Future Works

Unfortunately, the sites along the coast of Cyrenaica are consistently exposed to destruction and deterioration by both natural and human actions. Their necessary proximity to the sea exposes their archaeological remains to a steady and unavoidable erosion from tidal forces. This has been recorded at a number of sites, including Cherronesus (Ras et-Tin), Mahel Mael and Aptouchou (el-Hanya) (Fig. 9-1 and 9-2). Moreover, severe damage has been noted at numerous archaeological remains located along the shore at Taucheira (Tocra) (Bennett et al. 2004). Recent human activity has also led to other types of archaeological deterioration. The rapid and increasing construction of buildings and holiday houses along the coast, for example, has negatively affected the coastal remains. Unfortunately, the rising price of land encourages landowners to sell to land developers, who aim to transform the area into resorts or private coastal facilities. An example of this is observable at site PHSC50, Phycus, where the land has been entirely bulldozed and divided, in order to be sold by its owner for greater profit (Fig. 8-3 and 8-4). Additionally other important locations, like the kiln areas/sites APSC3-7 in ancient Aptouchou (el-Hanya) were previously investigated in 2010 and 2013 by this writer, are currently being bulldozed (Fig. 8-5 and 8-6).

This ongoing threat requires immediate action so as to preserve the invaluable cultural heritage of the area. Fortunately, in the pursuit of this investigation I was able to record and document many sites along this survey area. However, this case study only encompassed a relatively small area, and other archaeological remains along the coast are still waiting for recovery and protection. For this reason, I plan to conduct further surveys along the coast of al-Jabal al-Akhdar in order to record as many sites as possible. In the meantime, I hope to develop a plan in partnership with the Department of Antiquities that will increase citizens' awareness of the significance of their local heritage and why it warrants protection. The locals will ideally be educated on and inspired by the ways in which they can help. I plan to incite this change using skills learned and refined at the University of Leicester, from programmes like the ‘Community Engagement in Archaeology and Ancient History’. These programmes effectively increase public awareness of archaeology, especially among children.

Considering further increases in the collective understanding of the role of harbour sites in Cyrenaica, I aim to embark upon excavation work at the ancient site of Phycus. It is a key site, located between two prominent harbours (Apollonia and Ptolemais) and in front of a middle plateau (el-Usita) that is one of the most fertile areas of al-Jabal al-Akhdar (Green Mountain). Moreover, the degree of preservation in Phycus offers an excellent opportunity to unravel the mechanisms, structures and production activities of Cyrenaican harbours.

Finally, the data that has been systematically collected during this field survey and presented here will hopefully inspire other archaeologists and researchers to carry out further surveys along the coast of Cyrenaica. The study and the methodology here should provide a basis and a springboard for their research. Further to this, the data presented in this thesis will ideally be used to update the records of the Libyan Department of Antiquities, and assist them in finding a method to protect and manage their sites.

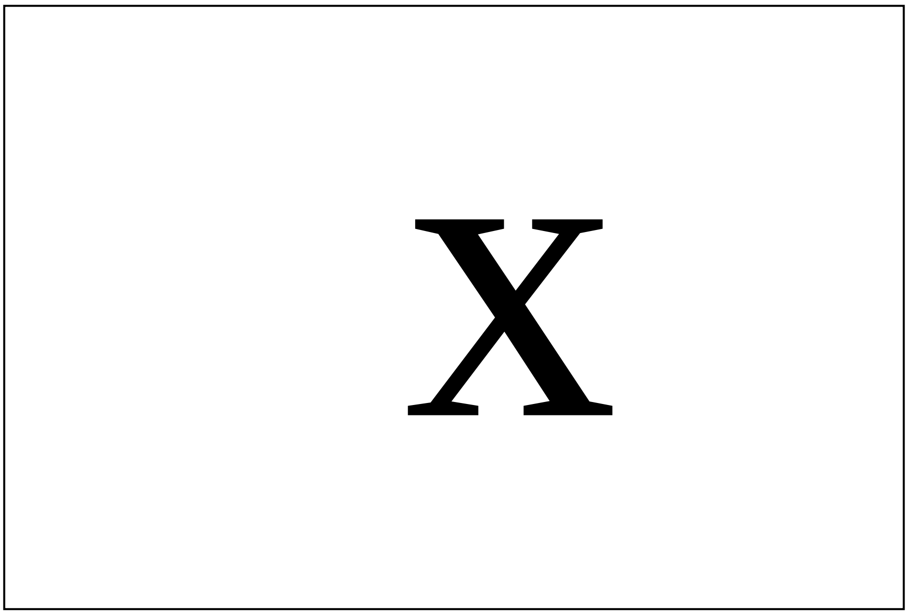


Figure 8-1: Picture was taken at the end of 1960s to the northern cliff of Aptouchou (el-Hanya) (Jones and Little 1971a: Plate V: 3)

Figure 8-2: Picture to the same place was taken in 2013. From the both images, it can see the scale of erosion have occurred to the site.

Figure 8-3: Site PHSC50 at Phycus

Figure 8-4: Site PHSC50 at Phycus

Figure 8-5: Google earth of the Aptouchou has been captured in 2009

Figure 8-6: Google earth of the Aptouchou has been captured in 2014 (the red circle and arrows show the current destructive works carrying out at the site)

Bridging the Eastern and Western Mediterranean: The Roman Harbour Sites on the Coast of Cyrenaica, North-Eastern Libya

Part II

Thesis Submitted for the Degree of

Doctor of Philosophy

at the University of Leicester

by

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2014

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Chapter 9: Site Gazetteer

9.1 General introduction

This chapter introduces the sites and sub-sites that I recorded during my fieldwork, with general descriptions of the structural remains of the sites that were extensively and intensively surveyed (for a discussion of the methodology, the collected pottery, productive activity and the function of these sites, see Chapters Three, Five, Six and Seven).

The chapter is divided into three main parts, following this introduction (9.1). Section 9.2 examines the features recorded within each site. The details of the sites are divided into sub-sections (9.2.1 to 9.2.16) under seven main headings: introduction, location of sites, buildings and walls, industrial features, water supplies (wells, cisterns and aqueducts), other features (tombs and quarries) and conclusions. The remaining two parts consist of an in-depth analysis and discussion of the site's features and their significance in historical terms (9.3). This is followed by the chapter summary (9.4).

9.2 The Archaeological Features of the Surveyed Sites

9.2.1 Introduction

The sites are ordered according to their geographical location, from east to west. We start with the ancient site of Cherronesus (CHSC), located 120 km to the east of Apollonia, and finish with the site of Kainopolis (KASC), 35 km to the west of Ptolemais. Most of these have never been documented or mapped before, making this work of great importance to the archaeological record. There are 16 principal sites and 144 sub-sites. 23 of the 144 sub-sites have been previously recorded (Fig. 9-1 and Table 9-1). However, these previous studies are usually just brief descriptions, without accurate measurements, maps or sketches.

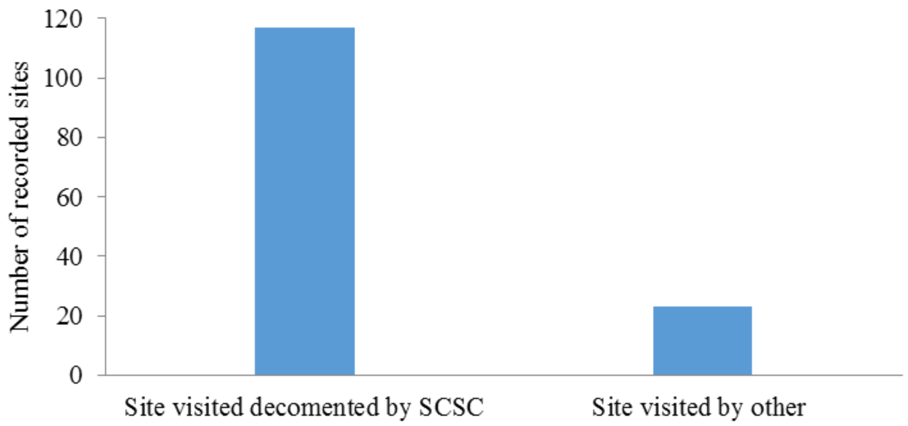

Figure 9-1: The number of sites recorded for the first time and others previously documented

Site information		Previously recorded		Reference
Site Name	Sub-sites	Yes	NO	
Cherronesus	CHSC1	√		(Tusa 2010; Tusa 2011)
	CHSC2		√	
	CHSC3		√	
	CHSC4		√	
	CHSC5	√		(Tusa 2010; Tusa 2011)
	CHSC6		√	
	CHSC7		√	
	CHSC8		√	
	CHSC9		√	
	CHSC10		√	
	CHSC11		√	
	CHSC12		√	
	CHSC13		√	
Noat 1	NOTSC1	√		(Akab 2010; Tusa 2011)
	NOTSC2		√	
	NOTSC3		√	
	NOTSC4		√	
Noat 2	NOSC1		√	
	NOSC2		√	
	NOSC3		√	
Mahel Mael	MMSC1		√	
	MMSC2		√	
	MMSC3		√	
	MMSC4		√	
Sil Amer	SASC1	√		(El Jiteily and Laronde 1999; Laronde 1987; Roques 1975; 1999; Stucchi 1975)
	SASC2		√	

Site information		Previously recorded		Reference
Site Name	Sub-sites	Yes	NO	
Assa Mousa	AMSC1		√	
	AMSC2		√	
Cape of Phycus	CPSC1		√	
	CPSC2		√	
	CPSC3		√	
	CPSC4		√	
	CPSC5		√	
	CPSC6		√	
	CPSC7		√	
Phycus	PHSC1	√		(Flemming 1971; Jones and Little 1971a; Roques 1975; Tusa 2011)
	PHSC2		√	
	PHSC3	√		(Jones and Little 1971a; Tusa 2011)
	PHSC4		√	
	PHSC5		√	
	PHSC6		√	
	PHSC7		√	
	PHSC8		√	
	PHSC9		√	
	PHSC10		√	
	PHSC11	√		(Jones and Little 1971a)
	PHSC12		√	
	PHSC13		√	
	PHSC14	√		(Ward-Perkins et al. 2003)
	PHSC15		√	
	PHSC16		√	
	PHSC17		√	
	PHSC18		√	
	PHSC19		√	
	PHSC20		√	
	PHSC21		√	
	PHSC22		√	
	PHSC23		√	
	PHSC24		√	
	PHSC25		√	
	PHSC26		√	
	PHSC27		√	
	PHSC28		√	
	PHSC29		√	
	PHSC30		√	

Site information		Previously recorded		Reference
Site Name	Sub-sites	Yes	NO	
Phycus	PHSC31		√	
	PHSC32		√	
	PHSC33		√	
	PHSC34		√	
	PHSC35		√	
	PHSC36		√	
	PHSC37		√	
	PHSC38		√	
	PHSC39		√	
	PHSC40		√	
	PHSC41		√	
	PHSC42		√	
	PHSC43		√	
	PHSC44		√	
	PHSC45		√	
	PHSC46		√	
	PHSC47		√	
	PHSC48		√	
	PHSC49		√	
	PHSC50		√	
	PHSC51		√	
	PHSC52		√	
	PHSC53		√	
	PHSC54		√	
	PHSC55		√	
	PHSC56		√	
	PHSC57		√	
	PHSC58		√	
El-Shmariah	ESSC1		√	
	ESSC2		√	
	ESSC3		√	
Aluet Um-Elnamel	AUSC1		√	
	AUSC2		√	
	AUSC3		√	
	AUSC4		√	
SW Um-Elnamel	WUSC1		√	
El-Best	EBSC1		√	

Site information		Previously recorded		Reference
Site Name	Sub-sites	Yes	NO	
Shaat el-Marakeb	SMSC1		√	
	SMSC2		√	
	SMSC3		√	
	SMSC4		√	
	SMSC5		√	
	SMSC6		√	
	SMSC7		√	
	SMSC8		√	
	SMSC9		√	

Table 9-1: The sites and sub-sites recorded by the SCSC, and others known within the survey area

9.2.2 Cherronesus (Ras et-Tin) CHSC

9.2.2.1 Introduction

The ancient site of Cherronesus is located 120 km to the east of Apollonia (Susa) and about 50 km to the east of Darnis (Derna). It is particularly significant for its well-sheltered bay, which provided a safe haven for ships. The anchorage appears to have been divided by two long natural structures, which may have served as quays, into two adjacent basins that were placed against the north-westerly winds (Fig. 9-2).

This anchorage is still used today by local citizens and their fishing boats. Several of the archaeological structures can even be seen beneath the water. This site would thus benefit greatly from large scale underwater investigations.

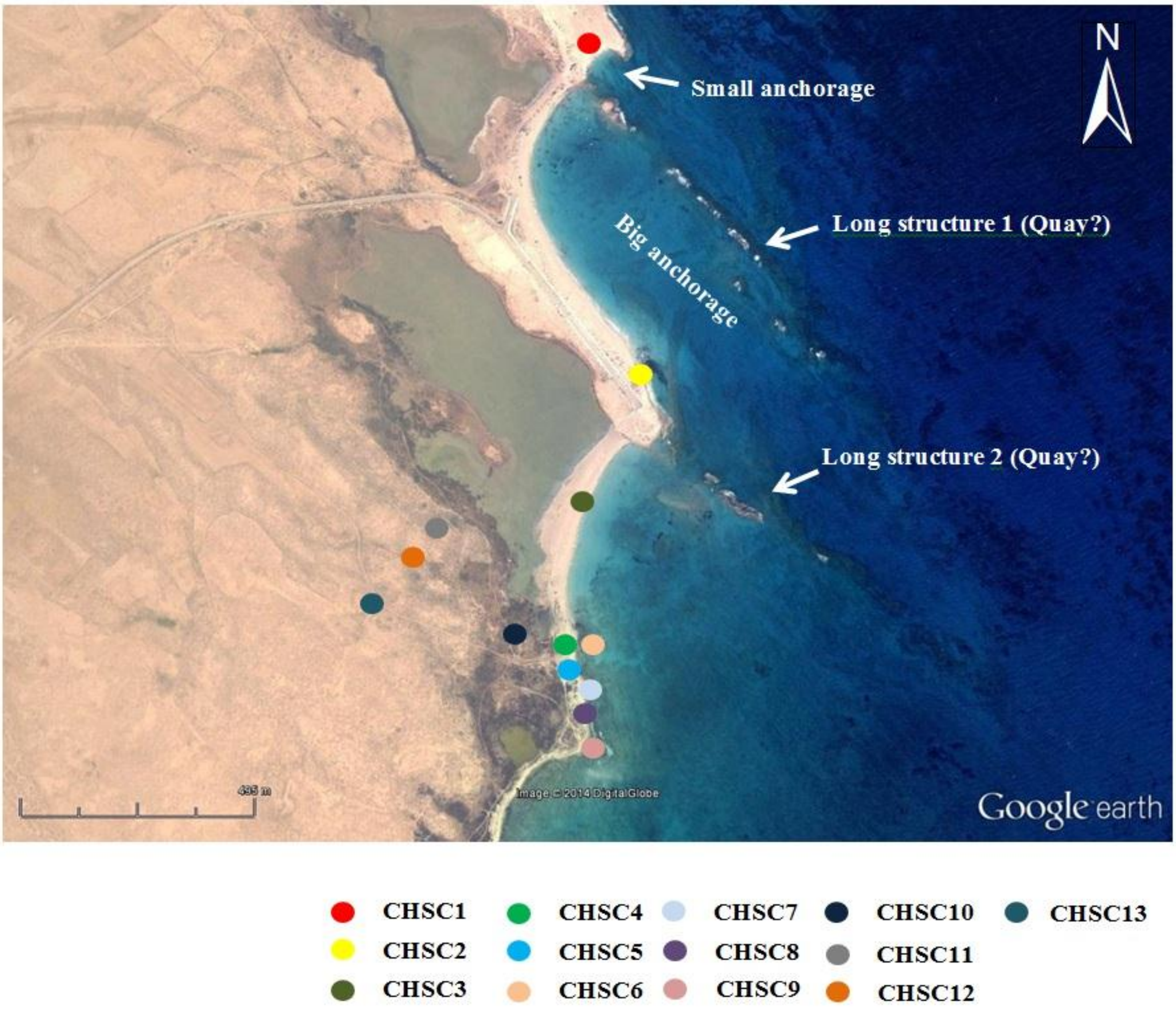

Figure 9-2: The distribution of sites at ancient Cherronesus (Ras et-Tin).

9.2.2.2 Location of sites

The SCSC survey team surveyed an area of 80 ha, and recorded 13 sub-sites (CHSC1-13) (Fig. 9-2). Tthe sites are distributed into two main areas. The first locus is the shoreline, with sites CHSC1-9 going from north to south for 700 m. The second area is further to the west, around 400 m from the shore, where four more sites were documented – CHSC10-13.

9.2.2.3 Buildings and walls

9.2.2.3.1 CHSC3

This site is comprised of a set of well-worked masonry walls in various shapes and sizes and lies to the south of CHSC1. Its walls run from the shore area, towards the sea to the east. A number of these walls could actually be followed and traced in the shallow water (Fig. 9-3). A considerable amount of masonry and pottery can be found in this area.

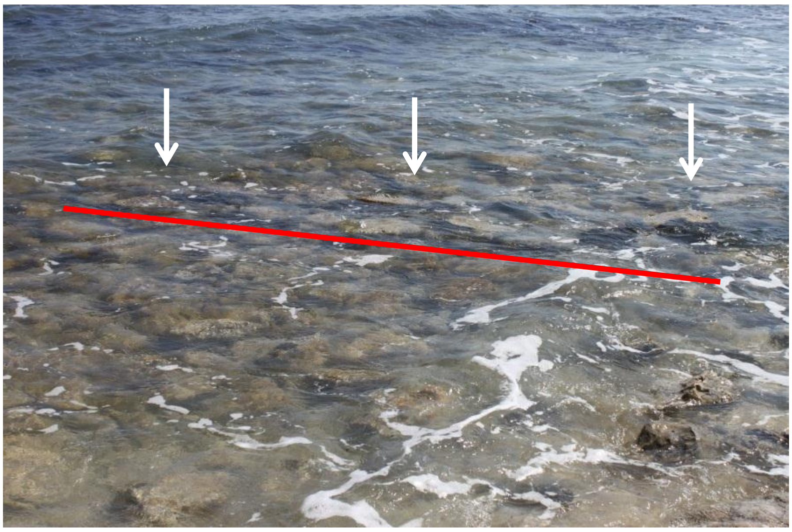

Figure 9-3: One of the walls within site CHSC3 that runs under the water. The wall is just above the red line, with the white arrows pointing to it. Looking south.

9.2.2.3.2 Site CHSC4

To the south of site CHSC3 are the remains of two parallel walls. These two walls stretch from the west (shore area) to the east (the sea), and the distance between them is approximately 10 m. The visible length of the first wall is around 8 m and its width 0.5 m. The remaining height of the wall is about 0.5 m. Meanwhile only 0.5 m of the second wall could be traced, along with just 0.10 m of its height.

9.2.2.3.3 Site CHSC6

This site lies in the shallow water just off of sites CHSC5 and CHSC4. It consists of a set of shaped and unshaped masonry that form unconnected walls.

9.2.2.3.4 Site CHSC7

Two parallel rectangular rooms rest in the shallow waters of CHSC7. The first room lies to the west, while the second is adjacent to the first, from the east. Their respective dimensions are approximately 4 m^2 (Fig. 9-4).

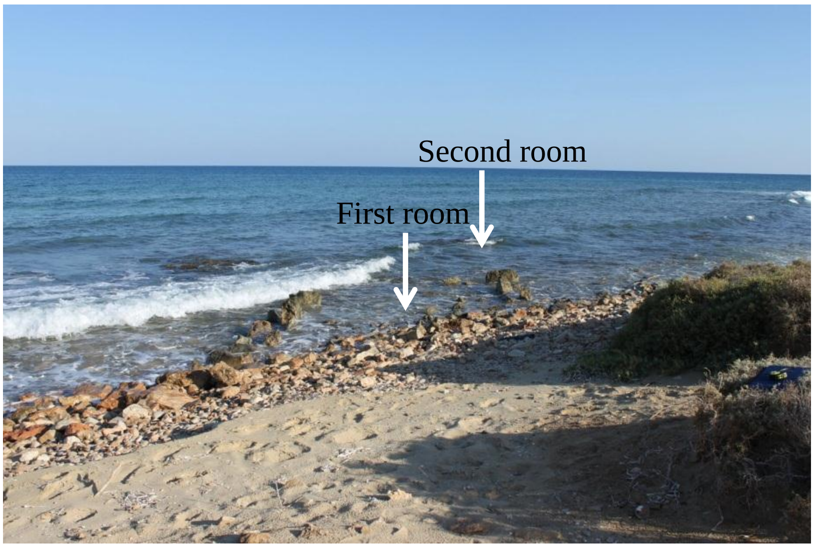

Figure 9-4: Two parallel buildings. Looking east.

9.2.2.3.5 Site CHSC8

Two parallel walls lie a few meters to the south of CHSC7, and indicate a potential passageway or corridor (Fig. 9-5). The space between them is 1.40 m. Both walls extend from west to east, towards the sea. The enduring length of the first wall is 3.60 m, while the second wall presents itself at 1 m long.

9.2.2.3.6 Site CHSC9

This site is a rectangular building consisting of four rectangular rooms (roughly 4 $\times$ 6 m). It can be seen emerging directly from the shallow water (Fig. 9-6). The site is south of the corridor structure found at site CHSC8.

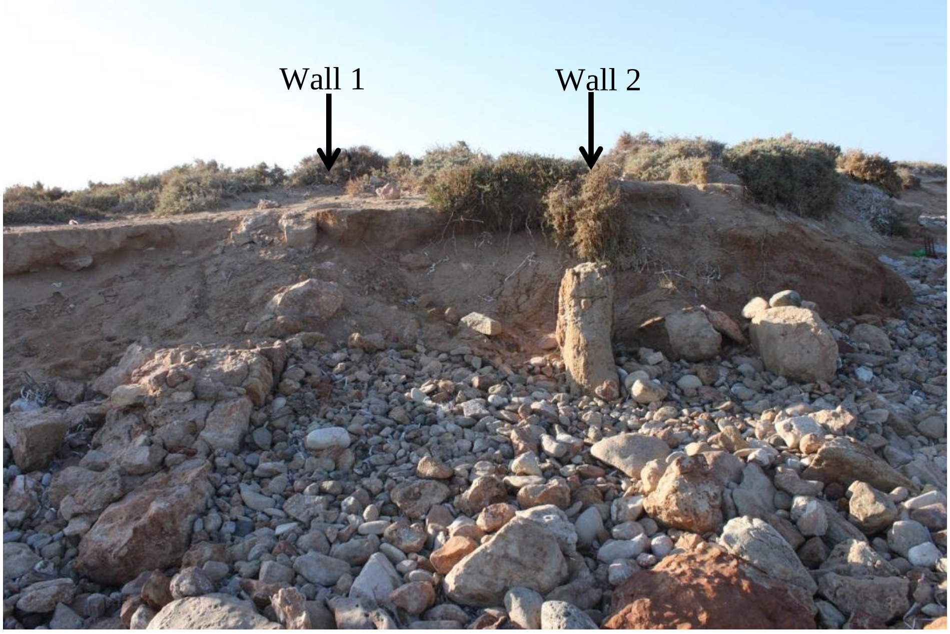

Figure 9-5: The corridor or passage (site CHSC8).

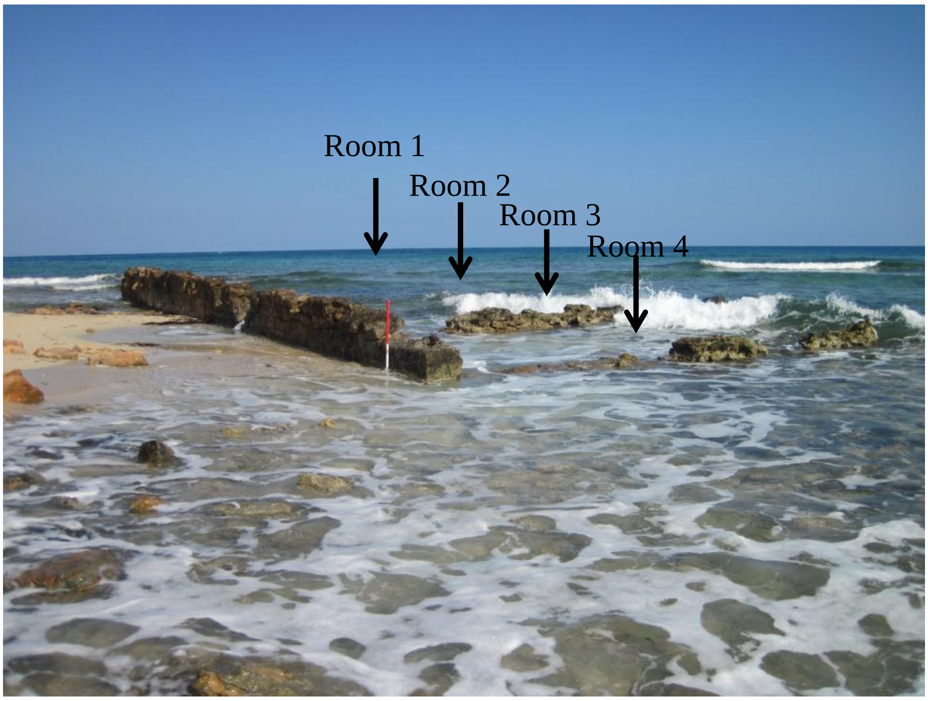

Figure 9-6: The rectangular building (site CHSC9).

9.2.2.3.7 Site CHSC10

This site resides to the north-west of CHSC5. The building's remains appear to have been constructed with unshaped stone and as a result are difficult to trace. It seems to contain two nearly square rooms, the dimensions of which are about 5 m × 4.3 m. In the middle of the building is a circular structure with a diameter of approximately 3 m. The southern wall is semi-circular and looks southward. It is difficult to pinpoint the exact function of the structure, but traces of burning have been found in the internal side of the semi-circular wall, providing an initial suggestion that it was an industrial space (Figs. 9-7 and 9-8).

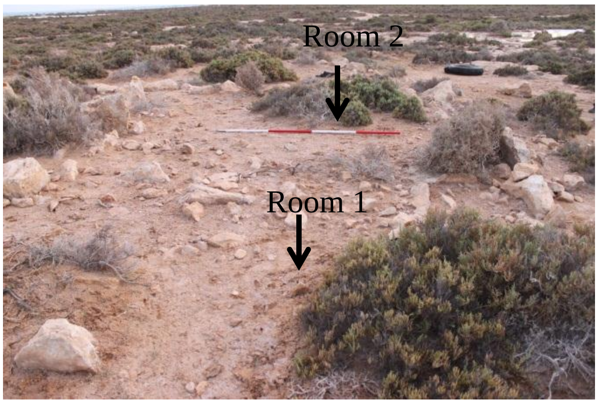

Figure 9-7: Rooms 1 and 2 within site CHSC10. Looking north.

Figure 9-8: The southern semi-circular wall within site CHSC10. Looking south.

9.2.2.3.8 Site CHSC11

This site stands atop a small, high protrusion (Fig. 9-9), which lies about 280 m to the west of the shoreline and 270 m to north-west of site CHSC10. The building is poorly preserved and very few interior and exterior wall outlines could be traced (Fig. 9-10). It is important to note, however, that a remarkable quantity of murex shells is distributed widely in the north-eastern part of this building (Fig. 9-11). The function of the site remains unclear, but the presence of murex shells suggests it may have been related to purple dye production.

Figure 9-9: A general view of site CHSC11. Looking north-east.

Figure 9-10: The southern wall of the building. Looking north-east.

Figure 9-11: The remains of murex shells in the north-eastern section of the building. Looking west.

9.2.2.3.9 Site CHSC12

This site is located 40 m to the south-west of site CHSC11. It is a rectangular building, divided in two parts by a 0.64 m thick wall. The eastern part of this building (part one) could barely be traced, but the second part is discernibly divided into three rooms (Fig. 9-12). The first room is 3.5 m x 5.0 m, the second is 5 m x 5 m and the third is 3.5 m x 5 m.

Figure 9-12: The second part of the building (site CHSC12), looking south-east.

9.2.2.3.10 Site CHSC13

This site presents a clear outline of a set of walls to the south-west (1-12), which appear to have been built with unshaped stones of various sizes and morphologies (Fig. 9-13). The walls seem to have formed a group of rooms. It is difficult at this time to fully interpret this site, and it requires further investigation and excavation.

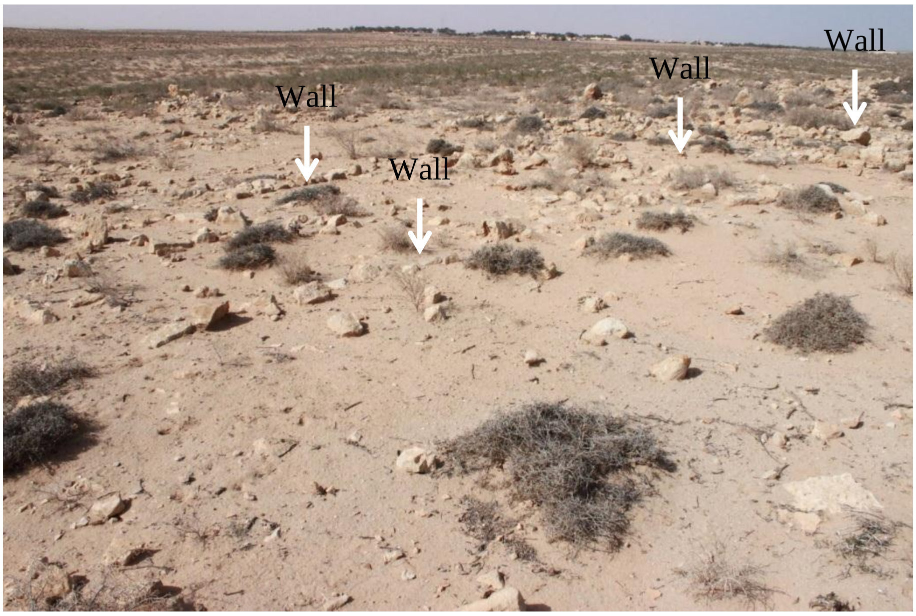

Figure 9-13: A general view of site CHSC1. Looking south-west.

9.2.2.4 Industrial features

9.2.2.4.1 Site CHSC2

This site lies to the south of the bay and has an impressive quantity of potsherds distributed across its entirety (Fig. 9-14), suggesting pottery production or waste dump.

Figure 9-14: A general view of site CHSC2. Looking west.

9.2.2.4.2 Site CHSC5

Located to the south of CHSC4, this site overlooks the sea. There are large quantities of murex shells scattered over this site, as in CHSC11. The area is thus likely to have served as a waste yard for purple dye production. This mound of murex shells occupies a square area measuring about 28 m × 28 m, and rises approximately 1.5 m above sea level (Figs. 9-15 and 9-16). Nowadays, local citizens use the murex shell remains as a substitute for lime gravel when building houses, which unfortunately and inevitably means that this important archaeological evidence of purple dye activity at Cherronesus (Ras-El-Tin) is being worn away. There are also many pottery sherds mixed within this mound of murex shells, supporting the idea of its use as a dump.

Figure 9-15: The mound of murex shells. Looking west.

Figure 9-16: A close-up of the mound.

9.2.2.5 Water supply (Wells, Cisterns and Aqueducts)

There were no remains of water supply mechanisms identified in this area.

9.2.2.6 Other features (Tombs and Quarries)

9.2.2.6.1 Site CHSC1

This site is a tomb (Figs. 9-17 and 9-18) discovered during structural work in 2008. At the time, a number of grave goods were collected by an Italian mission who visited the site in 2010 (Tusa 2010; 2011). These goods are currently preserved at the depot of the Department of Antiquities of Cyrene.

The tomb lies towards the south-eastern end of the long south-west side of the bay, and overlooks the sea. It has a square room containing two graves, with a small hole in its ceiling. The doorway of the room appears to have been closed by a wall, recently destroyed upon the tomb’s discovery.

Figure 9-17: The doorway of the tomb. Looking south-east.

Figure 9-18: The internal room of the tomb. Looking south-east.

9.2.2.7 Conclusion

The ancient site of Cherronesus seems to have had an important role in productive activities, and especially in the production of purple dye – no similarly large quantities of murex shells have been recorded anywhere else along the coast of Cyrenaica. Moreover, the location of the site, perfectly protected by a natural bay, suggests active trading (see Chapters Five and Seven). Large-scale excavations are needed, however, in order to fully understand this important site which connected eastern and western

Cyrenaica. The site could yet provide valuable information on trade routes with other Mediterranean areas, as it lies immediately off Crete and close to Egypt.

9.2.3 Noat 1

9.2.3.1 Introduction

This site lies 1 km to the east of Noat and 16 km to the west of Apollonia. The site is comprised of eight sub-sites (NOTSC1–8).

9.2.3.2 Location of sites

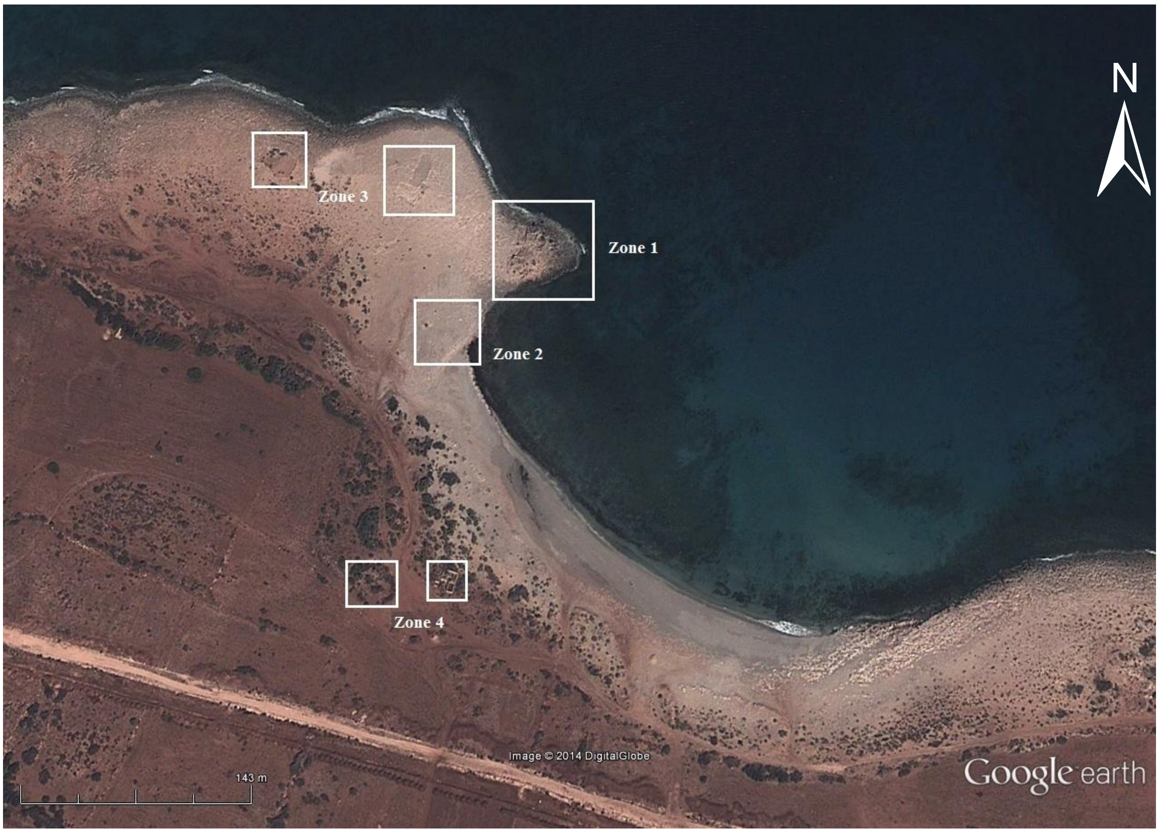

Figure 9-19: Google Earth image showing the geographical distribution of sites at Noat 1.

The sub-sites are located in four distinct geographical areas (Fig. 9-19). The first zone is the headland of the promontory, occupied by sites NOTSC1 and NOTSC2. Meanwhile the second lies to the south of the aforementioned, on a sandy beach – site NOTSC3. The third zone is a small rocky hill, 60 m north-west of zone one – NOTSC4. To the west of this site, another small rocky protrusion provides NOTSC5. The fourth zone is located approximately 200 m to the south-west of the first zone, and its soil is distinguished by its fertility. It is host to sites NOTSC6, NOTSC7 and NOTSC8.

9.2.3.3 Buildings and walls

9.2.3.3.1 Site NOTSC3

This site lies 40 m to the south of site NOTSC1 and is entirely obscured by sand. It presents as a rectangular building, though only a general outline can be identified, alongside a few walls.

9.2.3.3.2 Site NOTSC6

This site is a set of wall lines, which lie near to NOTCS4 and NOTCS5. Surface investigation is insufficient to determine its structure and function (Fig.9-20), but excavation work would reveal more information.

Figure 9-20: Part of the wall outlines within site NOTSC6, looking west.

9.2.3.4 Industrial features

9.2.3.4.1 Site NOTSC1

Section A (NOTSC1A)

The southern side of this building (Fig 9-21) displays a set of wall outlines (1, 2, 3 and 5). The first wall (1) runs 18 m from south-east to north-west. At its north-western tail, the second wall (2) begins to progress northwards for 9.15 m, with a slight deviation towards the east (Fig 4-22). Nearing the end of this run, the third wall (3) emerges from 2's interior. This wall stretches towards the east for 6 m and then disappears. The fourth wall is parallel to the second and runs for 11.82 m until curving 90 degrees to the west, for 6 m, and forming a final wall (5). These are the only visible remains.

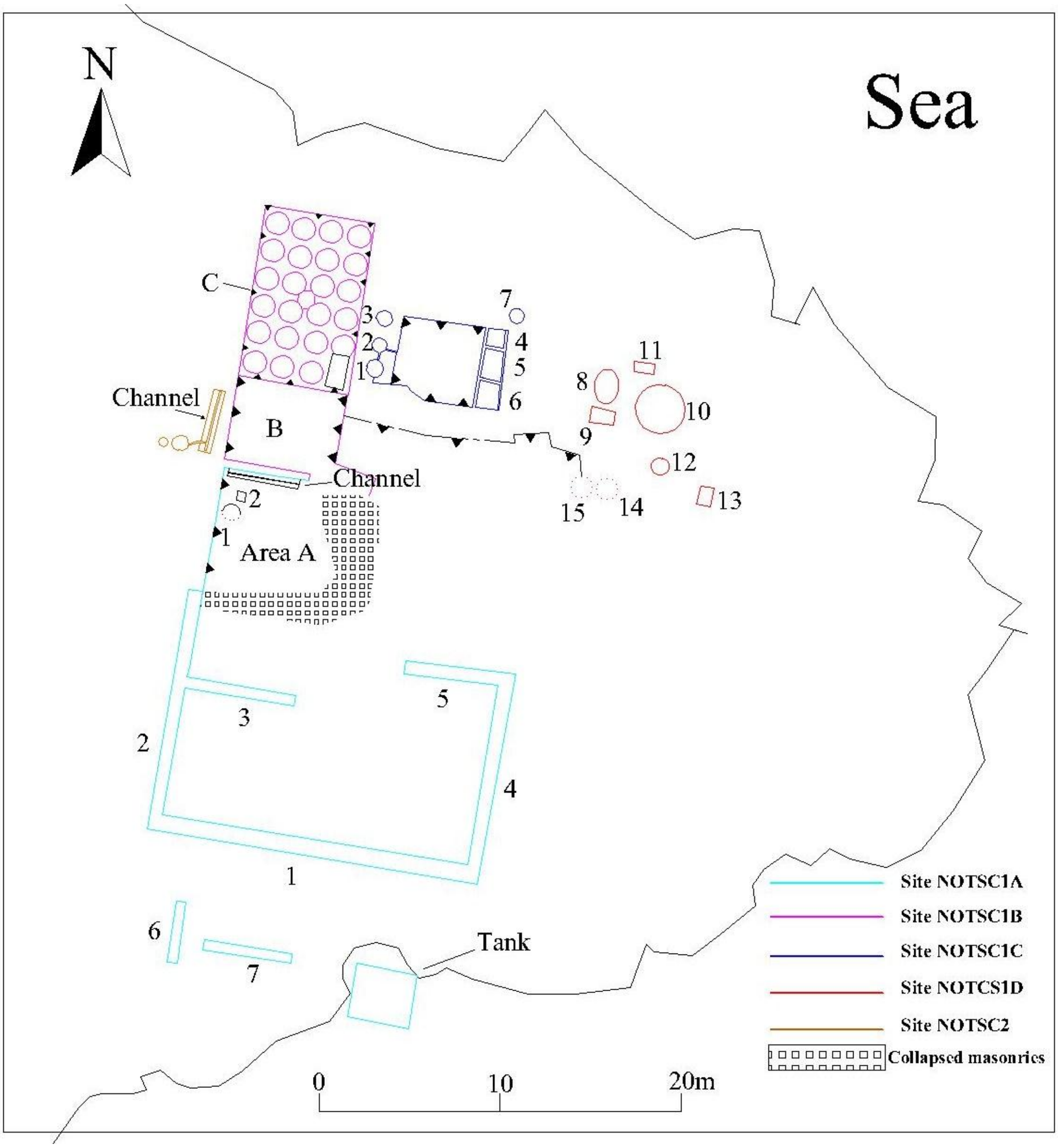

Figure 9-21: Sites NOTSC1 and NOTSC2 at ancient Noat 1.

The north-west, front segment of section A has a downwards, vertical, ground cut of 0.5 m into the rock (area A), which does not hold the same ground level as the rest of section A. The southern, eastern and north-eastern sides of area A are buried by collapsed masonry. Towards the northern edge of this location, there is a channel lined with *opus signinum*, stretching from east to north (Fig 9-21). Additionally, there are two vats cut into the rock to the south-east of this channel (Figs 9-21 and 9-23). One is circular with a diameter of 1 m and lined with *opus signinum*, the second is square and lies 0.28 m to the north of the first vat, with dimensions of 0.50 m^2. At the rear of section A are the outlines of two walls (6 and 7) (Fig 9-24). Wall six runs from north to south for a distance of 3.4 m. In contrast, the seventh wall runs from west to east towards the sea for 4.9 m. At the end of this wall can be found a square basin measuring 3 x 3 m lying just beneath the shallow water (Fig. 9-25).

Figure 9-22: A general view of the external western side of section A (wall 2) within site NOTSC1. Looking east.

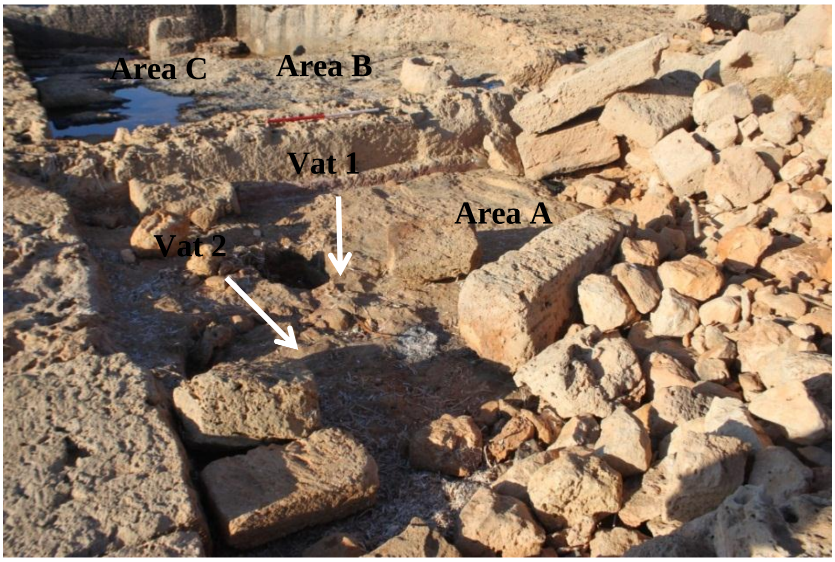

Figure 9-23: A general view of area A within section (A) and areas B and C within section (B). Looking north-east.

Figure 9-24: Wall 7 progresses towards the sea and the large basin. Looking north.

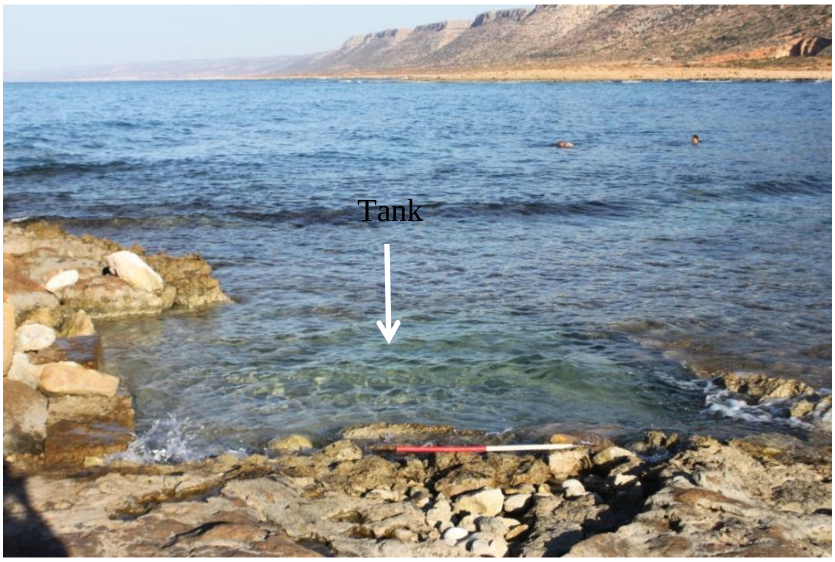

Figure 9-25: The large basin covered by water, lying to the south-east of wall 1, section A. Looking east.

Section B (NOTSC1B)

This section is found northwards of section A. It is, in turn, divided into two areas (areas A and B). Both of these areas cut vertically into the rock and each has a disparate ground level. The first area (A) is a rectangular space measuring 6.04 x 4.68 m and has the same ground level as area A, within section A. However they appear to be separated by a small, high, rocky wall.

Area A looks as if it opens into another rectangular area (B), which cuts into the rock. Area B measures approximately 6.10 x 9.51 m. Its ground level is 0.50 m lower than the previous A areas that were found within sections A and B. Within area B at ground level are 23 dolia measuring about 1.3 m in diameter. Along with a central pillar, these suggest that the area was roofed. This section is located 6 m to south of the sea (Figs. 9-21).

Section C (NOTSC1C)

To the east of section B is section C. It consists of three circular vats (1, 2 and 3) cut perpendicular to the normal level of the rock. Vats 2 and 3 are seemingly connected from above by a 0.1 m wide channel. Vat 2 is connected to a rectangular area measuring 4.5 x 3.9 m, and cut into the rock by another channel. The ground level of this rectangular area is 0.5 m lower than that of the rock area's surface. The remains of counterweights and a crash stone can be found within the parameters of this area (?). Towards this area's eastern side are three rectangular vats (4, 5 and 6) measuring 0.9 x 1 m; 1.01 x 1.67 m; and 1.15 x 1.26 m, respectively. They all share a depth of 0.5 m. These vats have the same ground level as the previous rectangular area, and their mouth is on the same surface level as the site. Another circular vat (7) can be found 0.4 m to the north-east of vat 3 (Fig. 9-21).

Section D (NOTSC1D)

Five meters to the east of section C is a set of 6 vats (numbered 8 to 13). Each of these vats cut into the ground level of the rock area (Fig. 9-21). Vat 8 is oval in shape, measures 1.91 x 1.33 m and is lined with *opus signinum*. The vat is packed with stone masonry, meaning it was impossible to measure its depth. Vat 9 lies 0.33 m to the south of vat 8. It is rectangular with dimensions of 0.87 m x 1.34 m. Meanwhile, vat 10 is circular with a diameter of 2.73 m and width of 0.30 m, and lies 1.14 m to the east of vat 8. Another vat (11) is located 1 m to the north of vats 8 and 10. It is also rectangular and measures 0.55 m x 1.16 m. 1 m to the south of vat 10 is a circular vat (12) with a diameter of approximately 1 m lined with *opus signinum*. Another rectangular vat (13) lies 2 m to the south-east of vat 11 with the dimensions 0.77 x 1.04 m. Excepting vat number 10, it was not possible to measure the depth of the vats as they were filled with stones. Another two vats appear to exist 3 m to the south of vats 8 and 9, but these were near impossible to trace.

9.2.3.5 Site NOTSC2

This site rests 1 m to the west of section B. It is a cut into the rock and is 3.50 m long from north to south, 0.6 m wide and 0.2 m deep. There is a channel in the centre of this cut with a width of 0.12 m. This channel slopes gradually from north to south and is connected from its south-west corner to an adjacent circular-lined vat, measuring 0.85 m in diameter. Another small circular vat is located to the west of the aforementioned vat and measures 0.55 m in diameter. The depth of neither vat could be identified as they were full of soil (Fig. 9-21).

9.2.3.6 Water supply (Wells, Cisterns and Aqueducts)

9.2.3.6.1 Site NOTSC4

This site is an oval cistern (Fig. 9-26). Its mouth is surrounded by huge stone blocks, and seems to have an underground channel (?) inside it. The channel's course flows northwards.

Figure 9-26: A general view of the cistern within site NOTSC4. Looking west.

9.2.3.6.2 Site NOTSC5

At a distance of 4 m to the south-east of this cistern lies an aqueduct. It is observable for a full 3 m and thereafter disappears (Fig. 9-27). The aqueduct appeared to have been connected to two lakes 1 km south-east of the site. Correspondingly, this aqueduct's orientation is directed towards the two lakes (Fig. 9-28).

Figure 9-27: A section of the aqueduct. Looking south-west.

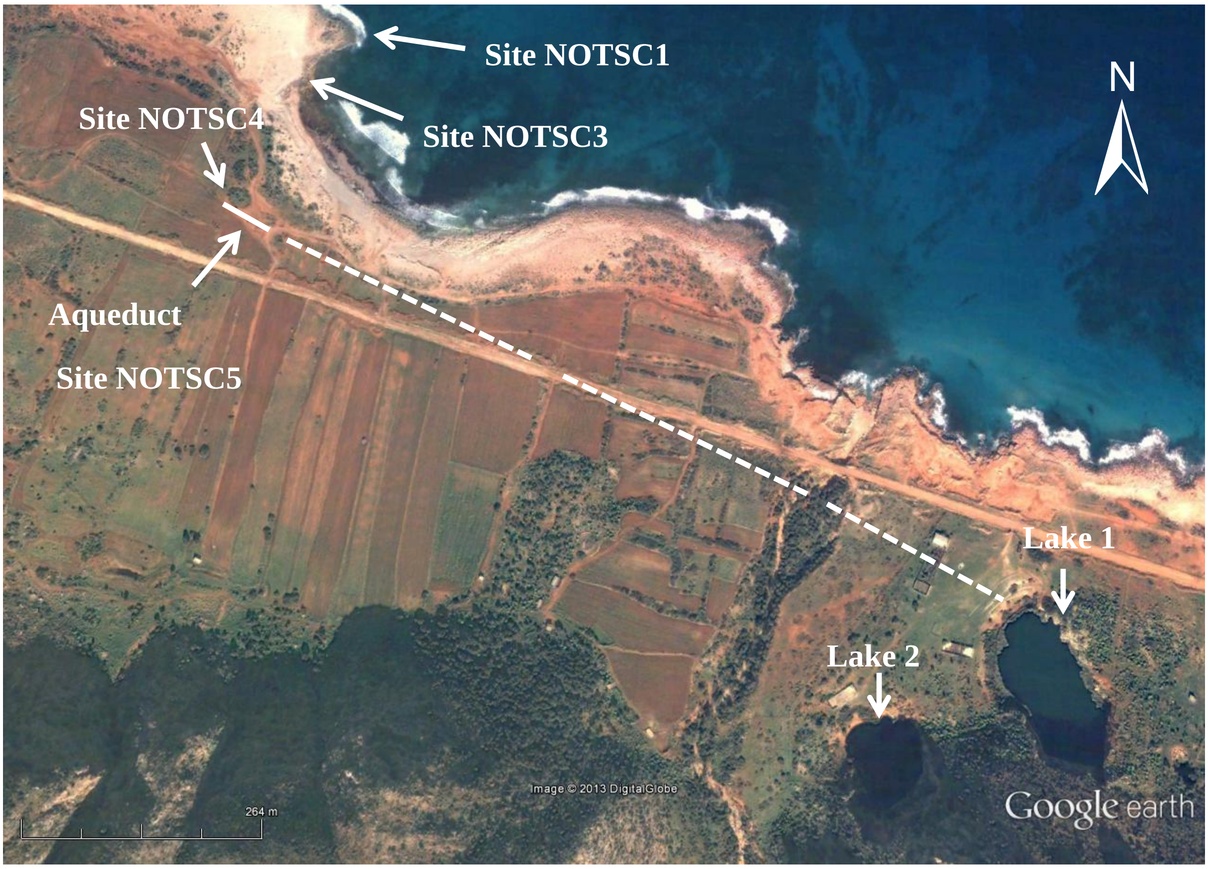

Figure 9-28: A Google Earth image illustrating the potential route of the aqueduct.

9.2.3.7 Other features (Tombs and Quarries)

9.2.3.7.1 Site NOTSC7

At a distance of 70 m north-west of site NOTSC1 is a quarry lying on a small rocky hill. This quarry occupies a total area of 121 m^2 (Fig. 9-29).

9.2.3.7.2 Site NOTSC8

Another quarry can be discerned 77 m to the west of site NOTSC7. This spans 323 m^2 (Fig. 9-30).

Figure 9-29: Quarry 1 (NOTSC7), looking east.

Figure 9-30: Quarry 2 (NOTCS5), looking north.

9.2.3.8 Conclusion

This site seems to have been established as an industrial zone. According to the scale of its industrial remains, however, the site may have been involved in many more productive activities in the area. Its proximity to a well-protected bay provides it with a natural anchorage for small ships, and suggests that the site may have had its own harbour facilities (see Chapters Five and Six).

9.2.4 Noat 2

9.2.4.1 Introduction

This site is located 1.2 km to the west of NOTSC (Noat 1) and 17 km to the west of Apollonia. It is comprised of three sub-sites: NOSC1, NOSC2 and NOSC3.

9.2.4.2 Location of sites

This site is significant for its topography – a flat area 40 m from the sea and suitable for agricultural use. The general composition of the site indicates industrial use (Fig. 9-31).

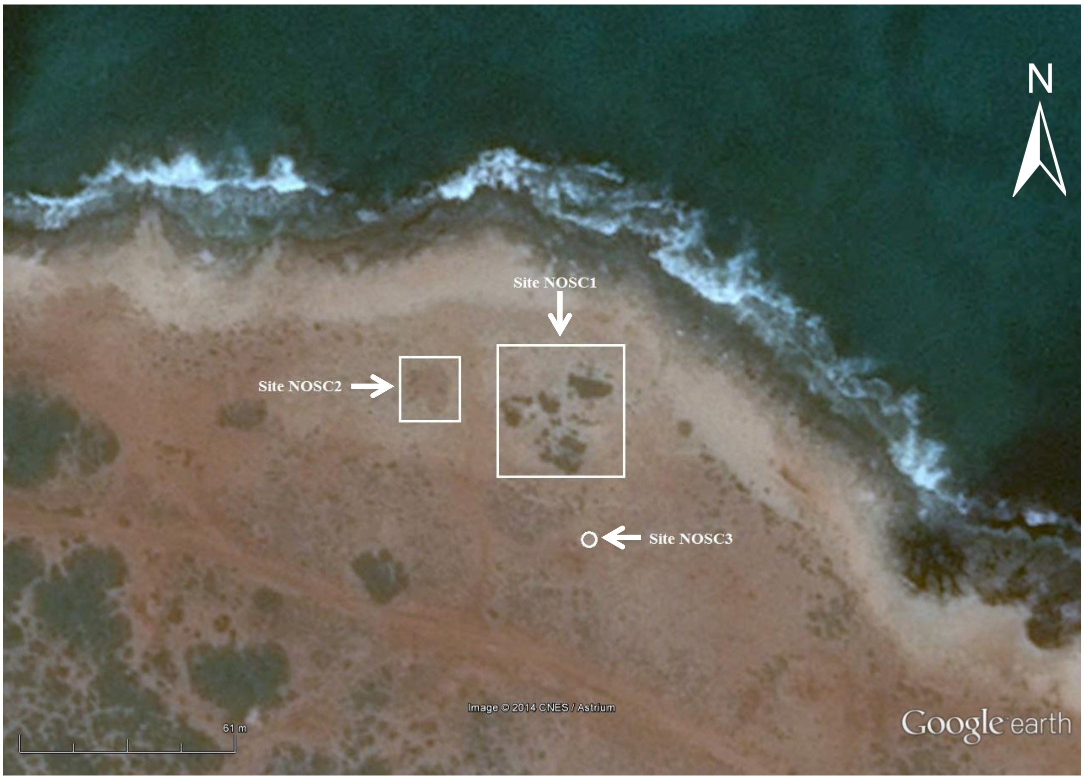

Figure 9-31: Google Earth shows the location of sites NOSC1, NOSC2 and NOSC3.

9.2.4.3 Buildings and walls

9.2.4.3.1 Site NOSC1 (Sections B and C)

This site appears to be the key feature of the area. It consists of a building divided into three sections (A, B and C). The last two parts were built over the same phase, while the first section (C) appears older according to its structure and masonry. Overall, the remains of the three sections encompass an area of 155 m^2 (Fig. 9-32) (for section A, see the industrial features section below).

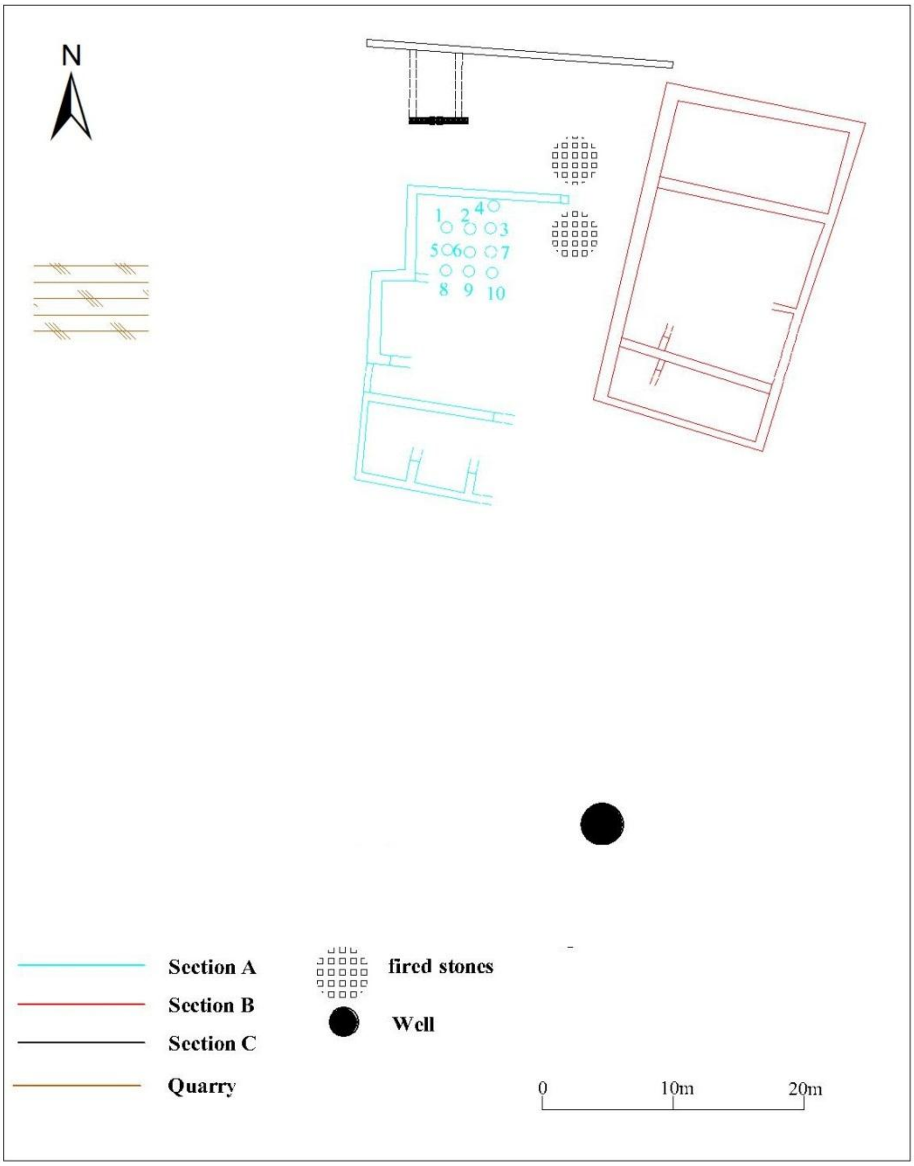

Figure 9-32: The archaeological remains of Noat 2.

Section B

There is a rectangular building to the east of section A which measures 24 m from south-west to north-west and 15 m from west to east. It appears to be divided into four rectangular rooms (numbered 1 to 4), measuring 13.29 m x 6.42 m; 6.84 m x 13.09 m; 5.6 m x 12.05 m; and 3.77 m x 11.82 m, respectively. The general condition of the building is quite poor, but it seems to continue towards the north and north-east where a mound of stones and a gate can be observed (Fig. 9-33). However the site appears to have been added in at a later time, as the construction of the wall is completely distinct from section A.

Figure 9-33: Part of the internal walls of section B, looking south.

Section C

This site lies to the north of, and seems to be connected to, section A. The different type and structure of stones apparent here, suggest an earlier construction than sections A and B. A long wall can be identified, running from west to east and stretching 23.49 m. Moreover, there is a room or passage (?) with a southern wall and blocked entrance that seems to lead to the south, where section A is situated (Fig. 9-34).

Figure 9-34: Section C remains. Looking south.

9.2.4.4 Industrial features

9.2.4.4.1 Site NOSC1 (Section A)

Section A

A rectangular structure measuring 22 m from north to south and 15.5 m from west to east can be found here. The construct has walls that appear to form rooms and a corridor (?). The front part, on the higher ground, presents four rows of vats (numbered 1 to 10). Each row contains three vats, though the first row has just one.

Vats 1 and 3 measure around 1 m in diameter with a depth of 0.50 m. No trace of lining remains, though the internal wall was clearly built of small, worked stones. Vat 4 measures 1 m in diameter, but its depth could not be examined as it was full of soil. It was most probably constructed from two layers of stone. Further to this, the internal layer contains charred stones, from the mouth, which indicate burning activities. In support of this view, a massive amount of small, scorched stones are scattered throughout the area, to the east and north-east of these vats (Fig.9-35) in particular. Vats 2 and 7 can barely be traced. However, vats 5, 6, 8, 9 and 10 exhibit the same diameter as vats 1 and 3, also with traces of lining (*opus signinum*).

Figure 9-35: Fired stones scattered around section A. Looking west.

9.2.4.5 Water supply (Wells, Cisterns and Aqueducts)

9.2.4.5.1 Site NOSC2

Approximately 23 m to the south of NOSC1 is a well, which is still in use today.

9.2.4.6 Other features (Tombs and Quarries)

9.2.4.6.1 Site NOSC3

This site is a quarry, located around 15 m to the west of site NOCS1.

9.2.4.7 Conclusion

Noat 2 seems to have unique characteristics which set it apart from the other recorded sites. It seems to have been involved in industrial activities (see Chapter 6) over several periods of time, although its activity may have peaked during the mid-Roman period (see Chapter 7).

9.2.5 Mahel Mael

9.2.5.1 Introduction

This site lies 21 km to the west of Apollonia, and about 12.8 km to the east of Phycus. It is overlooked by a number of small natural bays (Fig. 9-36).

9.2.5.2 Location of the sites

The archaeological remains recorded here include four main sites, MMSC1-4, which are scattered around a 3000 m^2 area close to the sea. 50 m to the east of this site is a valley running from the south towards the sea. The valley is connected to a small sheltered anchorage (?) which is 11 m wide, and 63 m long from the eastern side and 27 m long from the western side.

Figure 9-36: A Google Earth image showing the location of sites at Mahel Mael.

9.2.5.3 Building and walls

9.2.5.3.1 Site MMSC4

15 m east of the wall within site MMCS3 is a set of walls that appear sporadically. These suggest that the site of Mahel Mael continues further east, towards the valley.

9.2.5.4 Industrial features

9.2.5.4.1 Site MMSC1

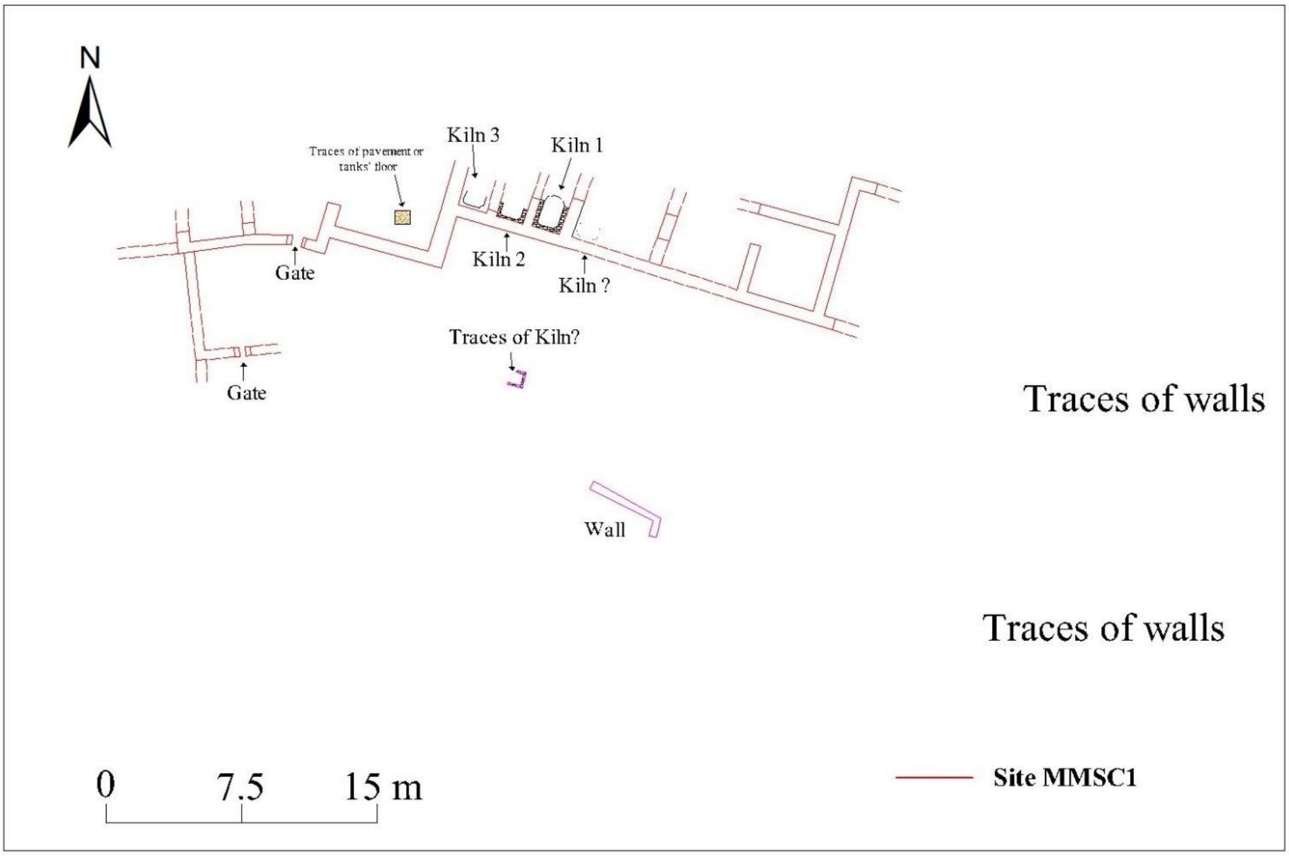

Figure 9-37: The archaeological remains at Mahel Mael.

A row of three kilns (1, 2 and 3) can be found overlooking the sea at this site (Figs. 9-36 and 9-37). These are in poor condition, having been eroded by the sea. The general plan of the kilns can be guessed by extrapolating information from the best preserved example – kiln (2). This kiln is virtually circular, or perhaps slightly oval, with a diameter of 1.5 m. It has been built in a similar manner to those found at the Cape of Phycus (see below), with a layer of firebrick reinforced externally by two further layers of small stones packed with mud and gravel. These kilns fall within the courtyard. Wall 1 is built of two lines of small stones filled in with mud, and is contiguous to the southern part of kilns 1, 2, and 3. At the same time it forms the external walls of the kilns. The wall runs from east to west for over 21 m. Other walls emerge from wall 1 and run to the north into the sea. These walls form rooms which may have served as work spaces. Supporting this hypothesis, a small area measuring 1 m^2 displayed a paved floor, though it could perhaps have been part of a tank (Fig. 9-38). This area lies to the west of the kilns and north of the first wall. A few meters to the north-west of this floor lies an entrance still in situ, leading to an upper area where outlines of walls can be distinguished (Fig. 9-39).

Figure 9-38: The mortar floor (?) within site MMCS1, at Mahel Mael.

Figure 9-39: One of the entrances within site MMCS1. Looking south.

9.2.5.4.2 Site MMSC2

A few meters to the west of site MMSC1 is a mound of pottery sherds, which are suggestive of a pottery dump.

9.2.5.4.3 Site MMSC3

This site is located 11 m to the south-west of MMSC1. It is notable that there appear to be kilns here, as fragments of firebrick can be found on the ground. Eight meters to the east of these firebrick fragments, there is a 2 m-long wall that runs from north to south and then disappears. Large-scale excavations are needed to uncover the archaeological remains, to understand the relationship between its parts, and to obtain a wider view of its functions.

9.2.5.5 Water supply (Wells, Cisterns and Aqueducts)

No traces of water supply were recorded.

9.2.5.6 Other features (Tombs and Quarries)

No traces of tombs or quarries were documented during this field survey.

9.2.5.7 Conclusion

This site seems to have been established as an industrial quarter for ceramic production (for more details see Chapters Six and Seven). Large-scale excavations and further field surveys to the south of the site would reveal more valuable information about the location and its activity.

9.2.6 Sil Amer

9.2.6.1 Introduction

This site lies 21 km to the west of Apollonia and around 12 km to the east of Phycus. It is situated at the edge of a plateau overlooking the sea from the north and the east (Fig. 9-40). The shore of the bay provides the entrance to the valley of Sil Amer. This valley extends towards the south until it reaches the ancient city of Balagrea (modern el-Beida). The area is a high hill, rising 30 m above sea level. Its eastern edge slopes steeply towards the sea at the west side of the bay. The north and north-east sides, meanwhile, slope gently towards the sea. The west and south-west are flat lands suitable for cultivation. The south-east side of this site is the peak line of the valley, which slopes vertically.

Figure 9-40: Sites SASC1 and SASC2 within ancient Sil Amer.

Two sites, SASC1 and SASC2, were recorded at Sil Amer. It notable that site SASC1 has been previously recorded by a handful of scholars (Roques 1976; Larond 1983; Stucci 1976).

9.2.6.2 Location of the sites

These two sites are located to the north-east of Sil Amer. Site SASC1 lies towards the north-easterly edge of the upper plateau, while SASC2 is situated towards the north-east corner of the lower part of the slope (Fig. 9-40).

9.2.6.3 Buildings and walls

9.2.6.3.1 Site SASC1

This site is host to a nearly square building measuring 33 m from south to north and 31 m from west to east. It is likely that the building was a watch tower (?). The outline of its external walls were successfully traced and some rise up to 2 m. The walls seem to have been built of two lines, the external side constructed from well-worked masonry and mostly 0.9 x 30 x 25 m. The internal walls, however, were built of smaller stones. Part of a revetment on the side of the western wall can be seen. No trace of internal divisions can be discerned as the internal side is a mere accumulation of stones. Furthermore, it is challenging to find the building’s gate as the western and northern walls are almost complete. The gate may have been installed in the southern side (Fig. 9-41).

9.2.6.4 Industrial features

9.2.6.4.1 Site SASC2

In the north-east corner of site SASC1, on a lower part of the slope, is a rectangular basin cut into the rock that measures 1.3 m x 2.2 m with and is 2 m deep. Its floor is divided into two basins, 1 and 2. On the eastern edge of basin 1, there is a passage leading to a larger rectangular basin (3) measuring 6 m x 3 m, This basin is connected to the sea, but it is unclear whether the basins were connected purposefully and artificially or by natural processes (Figs. 9-42 and 9-43).

Figure 9-41: A general view of site SACS1. Looking north-east.

Figure 9-42: The rectangular cut in the rock, the two basins (1 and 2), and the passage leading to basin 3. Looking east.

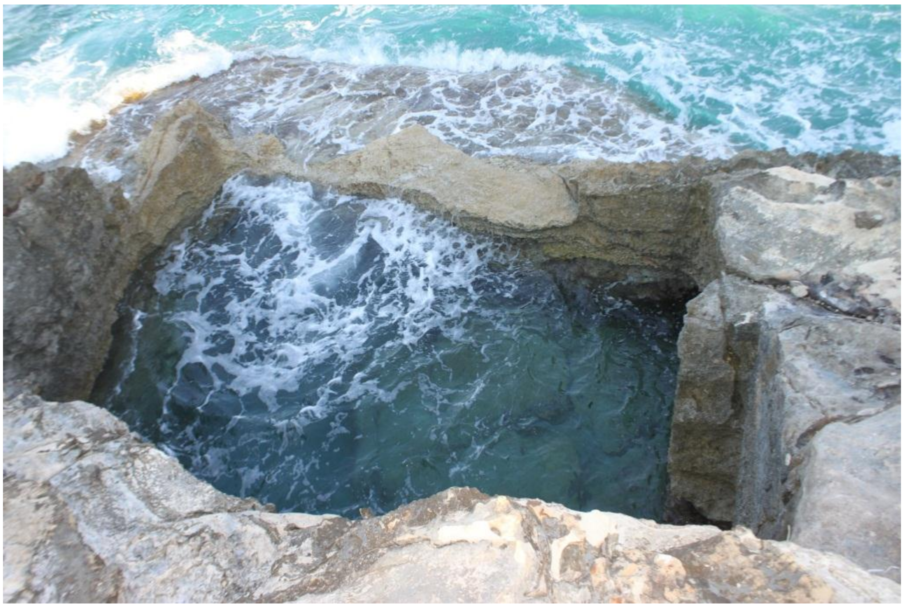

Figure 9-43: The large basin. Looking east.

9.2.6.5 Water supply (Wells, Cisterns and Aqueducts)

No traces of a water supply were recorded.

9.2.6.6 Other features (Tombs and Quarries)

No other features have been traced.

9.2.6.7 Conclusion

This site seems to have been a watch point used to control the land and sea routes between Apollonia and Phycus. However, the survey team was not able to extend the survey to the south of the site to assess if there was a settlement or any other archaeological features that might be connected to the site.

9.2.7 Assa Mousa

9.2.7.1 Introduction

This site is located 1 km to the east of the Cape of Phycus (el-Mamluh), and is a rocky area by the sea. The site is relatively small with limited features which were probably related to industrial activities.

9.2.7.2 Location of the sites

The documented features are all by the sea in a rocky area adjacent to a small shelter, which seems suitable for anchoring small fish boats. This anchorage seems to be formed from a natural cut in the rock. It is 13 m wide and approximately 64 m long (Fig. 9-44 and 9-45).

Figure 9-44: The distribution of sites AMSC1 and AMSC2 at Assa-Mousa.

Figure 9-45: The natural cut anchorage at Assa-Mousa. Looking north-east.

9.2.7.3 Buildings and Walls

9.2.7.3.1 Site AMSC2

No buildings or walls were located during the survey. However, there is a collapsed cave with traces of a doorway leading to an interior cave. The site could have been used for storage, or as a collection point for goods for trade.

9.2.7.4 Industrial features

9.2.7.4.1 Site AMSC1

This site consists of six circular vats, numbered 1-6. Numbers 3 and 4 are 1 m in diameter, while the others are 2 m in diameter. It is worth mentioning that vats 1 and 4 seem to be connected to the sea from below due to erosion. The general depth of all the vats seems to be 2.5 m (Fig 9-46).

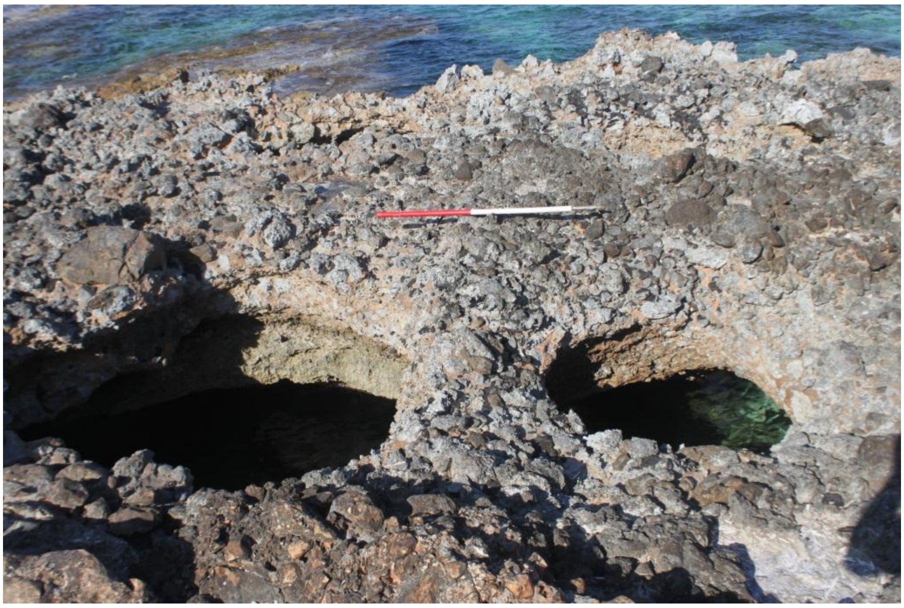

Figure 9-46: General view of vats 1 and 4. Looking north.

9.2.7.5 Water supply (Wells, Cisterns and Aqueducts)

No water supply features were recorded at the site.

9.2.7.6 Other features (Tombs and Quarries)

No other features were noticed at the site.

9.2.7.7 Conclusion

The features of this small site are concentrated in an area measuring less than 1500 m^2. However, the SCSC survey could not extend the survey to the south where the land is suitable for cultivation, as the owner of the surrounding land would not allow the team to investigate the area.

9.2.8 Cape of Phycus (el-Mamluh)

9.2.8.1 Introduction

This site lies about 7 km to the east of Phycus and about 25 km to the west of Apollonia. The archaeological remains of the Cape of Phycus occupy an area of about 1 km^2. It is worth mentioning that the significant archaeological remains at this site were recorded and documented for the first time here.

9.2.8.2 Location of the sites

The archaeological remains seem to be distributed in two main areas, which are separated naturally by a valley connected to the sea (Fig. 9-47). The first area is divided in turn into another two geographical zones. The first is the shore area, which is occupied by three main sites (CPSC1, CPSC2 and CPSC3).

The width of the shore zone in this part is about 84 m, with more than half of this width formed of soil suitable for agriculture. The remaining part is a rocky area directly south of the shoreline. The second area lies about 80 m from the line of the sea, and consists of a relatively small, high hill, which rises about 15 m above sea level. The hill slopes gently towards the north, where sites CPSC1 and CPSC2 are located**.** The north-west of the top edge of this hill is dominated by site PCSC4.

The second area, on the other hand, has the same character as the first area. It is divided into two zones: a rocky shore area, and an upper area consisting of a small high hill. Site CPSC5 occupies the latter area, while sites CPSC6 and CPSC7 are located in the shore area.

Figure 9-47: The distribution of sites at the ancient Cape of Phycus.

9.2.8.3 Buildings and walls

9.2.8.3.1 Site CPSC4

The site covers an area of 950 m^2. It was a building complex, and has now collapsed. It is difficult to recreate all its details; however, the arch and dram of a column can be seen. A corridor with a row of square column bases on both sides was identified. The site seems to have been a civic building, as no traces of any fortified features were apparent (Figs. 9-48 and 9-49).

Figure 9-48: Part of the archaeological remains of site CPSC. Looking north-east.

Figure 9-49: Arch within site CPSC. Looking north.

9.2.8.3.2 Site CPSC5

The condition of this site is critically poor. It has been destroyed by a modern lighthouse, walls, a room and a cement floor. The only remains that can be identified are stones and three entrances which are still in situ (Fig. 9-50).

Figure 9-50: Part of the archaeological remains of CPSC5. Looking south.

9.2.8.4 Industrial features

9.2.8.4.1 Site CPSC2

This site lies 35 m from the sea and covers an area of 2000 m^2. Large-scale excavations are needed to understand the functions of the site. Going from the remains visible on the ground, it can be initially assumed that the site consisted of a rectangular structure surrounded by external walls.

The building consists of a set of tanks of different shapes and sizes, mainly rectangular, built of stone and lined with opus signinum. By tracing the foundations the following features can be identified (Figs. 9-51 and 9-52):

Eight tanks (numbered from 1 to 8), which seem to vary in size and shape. Most are rectangular, apart from tank 6 which has curved corners. The dimensions of the tanks are (2.80 m × 2.40 m, 1.50 m × 2.50 m, 1.60 m × 2.40 m, 1.60 m × 1.50 m, 1.60 m × 140 m, 1.50 m × 250 m, 1 m, 1.20 m × 1.13 m and 1.00 m × 0.70 m). Their depths are uncertain.

Three basins can be partly traced (9, 10 and 11). Although their shapes and sizes cannot be determined definitively, it is probable that they were the same shape as the basins next to them. For instance, basin 9 is likely to have be similar in shape to basins 1and 2.

Figure 9-51: General view of site CPSC2.

9.2.8.4.2 Site CPSC3

This site lies 55 m to the west-north of site CPSC2**.** The archaeological remains are distributed in an area covering 2000 m^2. As with the previous site, it seems to have been an industrial yard set up for ceramic production (for more details of this site, see Chapter 5). It consists of four kilns of different shapes and sizes (Fig. 9-52).

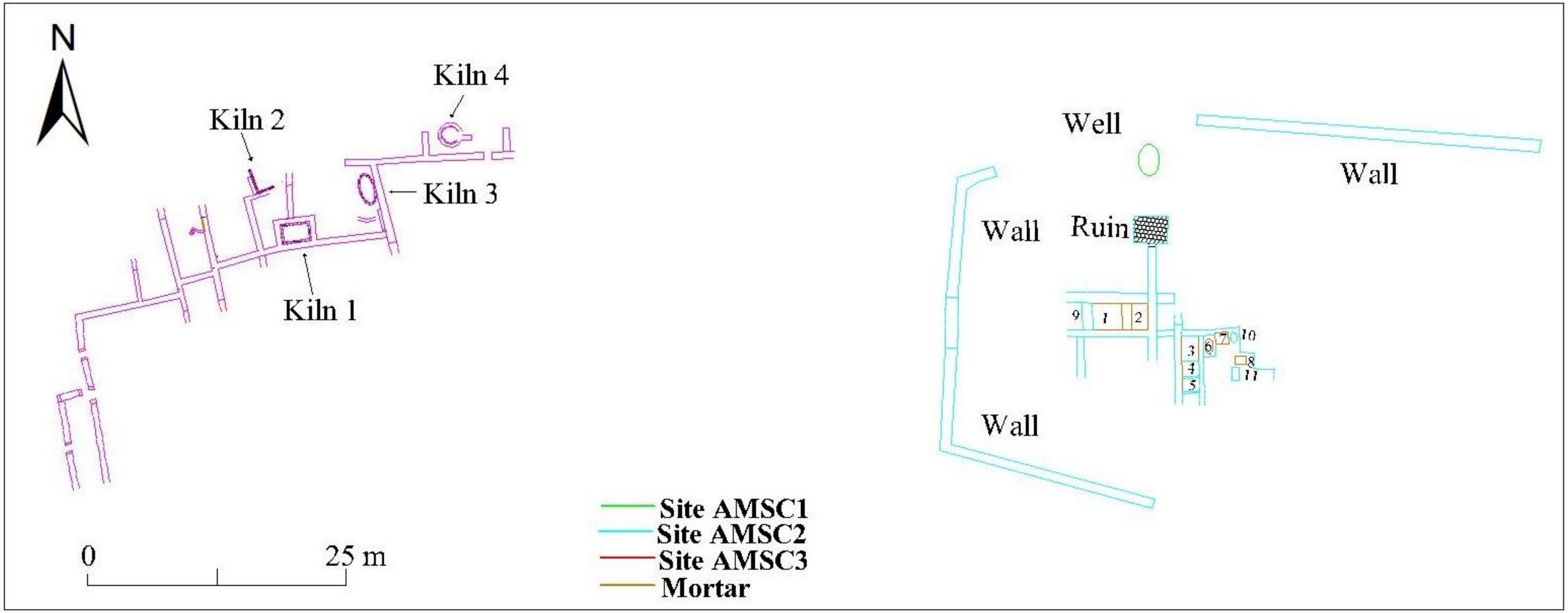

Figure 9-52: Sites CPSC1, CPSC2 and CPSC3 at the ancient site of the Cape of Phycus (el-Mamluh).

Kiln number 1 (Fig. 9-53) is rectangular in shape, measuring 2.5 m × 2.0 m and surviving up to 0.15 m high. The external wall is built up of two lines of small stones infilled with mud, whereas the internal walls are built of firebricks which are ashy red in colour. The shape of this kiln is similar to the one discovered inside the ancient walls of Taucheira (Tocra), which dated to the Hellenistic period (Buzaian 2000), and to the rectangular kilns at the ancient site of Ptolemais (Tolmeta) (Stępniowski and Maciałowicz 2011). Another kiln (number 2) lies to the north of kiln 1. It is difficult to reconstruct the whole shape due to damage to its surface. However, its rectangular shape is similar to kiln 1. Another kiln (number 3) lies to the east of kiln 1. It is an oval structure (Fig. 9-54) built of the same materials as kilns 1 and 2. As with the other kilns on the site, kiln 3 cannot be fully reconstructed without further investigation. However, it seems to have a diameter of 2 m.

Figure 9-53: Kiln 1 within site CPSC3. Looking south.

Figure 9-54: Kiln 3 within site CPSC3. Looking south.

Kiln 4 is a circular and built of two layers of stones and firebrick. Only half the diameter and part of a stokehole (?) can be detected. Excavation is needed to reveal the whole structure. All the kilns on this site are built using the same materials and techniques: an internal layer of firebrick reinforced by two external layers of small stones. They all fall within a courtyard area. There is a wall (1) built of stones and filled with mud mixed with gravel just to the south of kiln 1, and around two to three meters south of kilns 2, 3 and 4. In addition, other walls adjoined to wall 1 run from the south to the sea to the north and south. These walls form rooms which are adjacent to or surround the kilns. Mounds of pottery sherds are located three meters to the south-east of the kilns.

9.2.8.4.3 Site CPSC7

To the west of site CPSC5 are traces of two small vats measuring 0.40 m in diameter cut into the rock (Fig. 9-55). There is a flat rocky pavement on both sides along the anchorage. On the right side of the bay, the flat area extends for a distance of 200 m and more than 5 m in width. There is a strange mushroom-shaped rocky element. It is unclear if it is artificial or a natural formation caused by the movement of the waves (Fig. 9-56).

Figure 9-55: Two vats at site CPSC7. Looking south

Figure 9-56: The mushroom shape and the flat rocky area to the right of the bay in front of site AMCS2. Looking west.

9.2.8.5 Water supply (Wells, Cisterns and Aqueducts)

9.2.8.5.1 Site CPSC1

This site is located about 14 m to the north of vat 2 within site CPSC2. It is a well which is still in use today (Fig. 9-57).

Figure 9-57: The well (site CPSC1). Looking south.

Figure 9-58: The quarry within site CPSC6. Looking south.

9.2.8.6 Other features (Tombs and Quarries)

9.2.8.6.1 Site CPSC6

In the rocky area to the north-west of site CPSC5 is a small quarry, which seems to have been a place where columns drums were extracted (Fig. 9-58).

9.2.9 Phycus (Zawiet el-Hamama)

9.2.9.1 Introduction

The ancient site of Phycus lies 19 km to the north of ancient Balagrea (el-Beida), 25 km to the north-west of Cyrene (Shahat), and 30 km to west of Appolonia (Susa). The location of ancient Phycus was successfully determined by Denes Roques (Roques 1975/ 1999). Phycus seems to have been an important site due to its location between two major Cyrenaican ports (Apollonia to the east and Ptolemais to the west), and its size suggests that it was not a small village or settlement. The huge density of archaeological remains confirm that the site had an important role in ancient times, but it has received little attention or documentation from scholars.

Only the eastern headland of the promontory has been visited and described by a limited number of scholars (Flemming 1971; Flemming 1965; Jones and Little 1971a; Laronde 1987; Roques 1999; Roques 1975; Tusa 2010; Tusa 2011). During my field survey, I endeavoured to document as much as possible. More than 50 sub-sites (PHSC1-54) were recorded and documented for the first time.

9.2.9.2 Location of the sites

My field survey indicates that Phycus occupied a huge territory, and its remains were not just confined to the headland of the promontory area (Figs. 9-59 and 9-60). The site seems to extend about 3 km from the south-west to the north-east, and 1.5 km from the shoreline in the north-west to the foot of the middle plateau (el-Usita) to the south-east. Generally, the site can be divided into three zones. First is the shore area and the headland of the promontory area. This part preserves many archaeological remains (PHSC1-20) of ancient Phycus.

The second zone lies directly to the south-east of the shoreline and promontory. It is a set of relatively small rocky hills or Alua, known locally as Aluet El-Lib. This zone is about 2 km long from the south-west to the north-east and is about 200 m wide.

The distance between this hill (Alua) and the shoreline zone varies from one part to another. For instance, the north-eastern part of this zone lies about 40 m from the shoreline, while it lies at a distance of 500 m in the middle section where the promontory area is located. It narrows again in the south-western part to reach 150 m from the sea. Aluet El-Lib has 20 sub-sites (PHSC21-54).

The third area is located directly behind this hill (Alua). It is a flat area measuring about 600 m from the hill (Alua) to the foot of middle plateau (el-Usita), and about 2 km from the south-west to the north-east. The area is distinguished by its fertility.

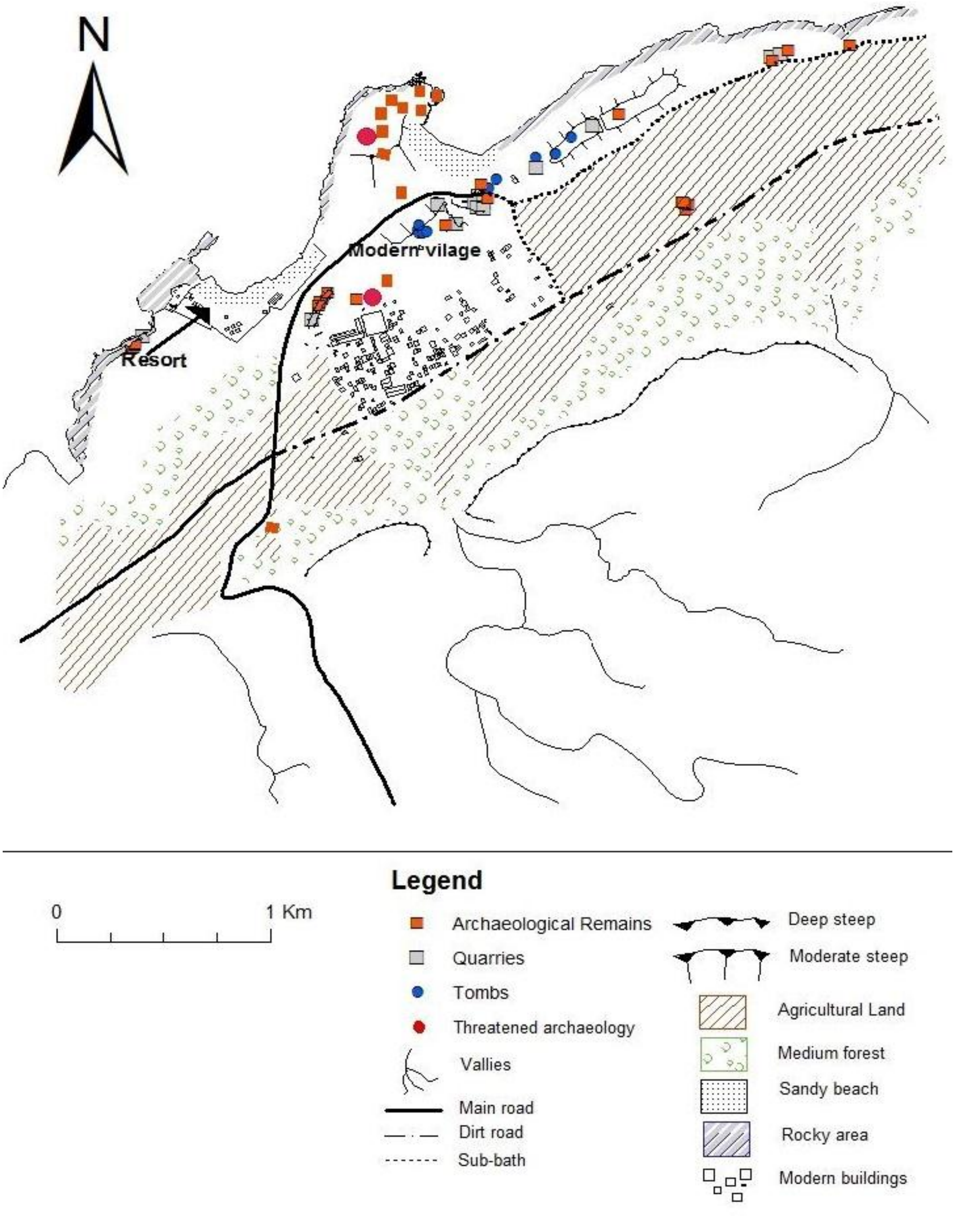

Figure 9-59: The distribution of archaeological remains at the ancient site of Phycus.

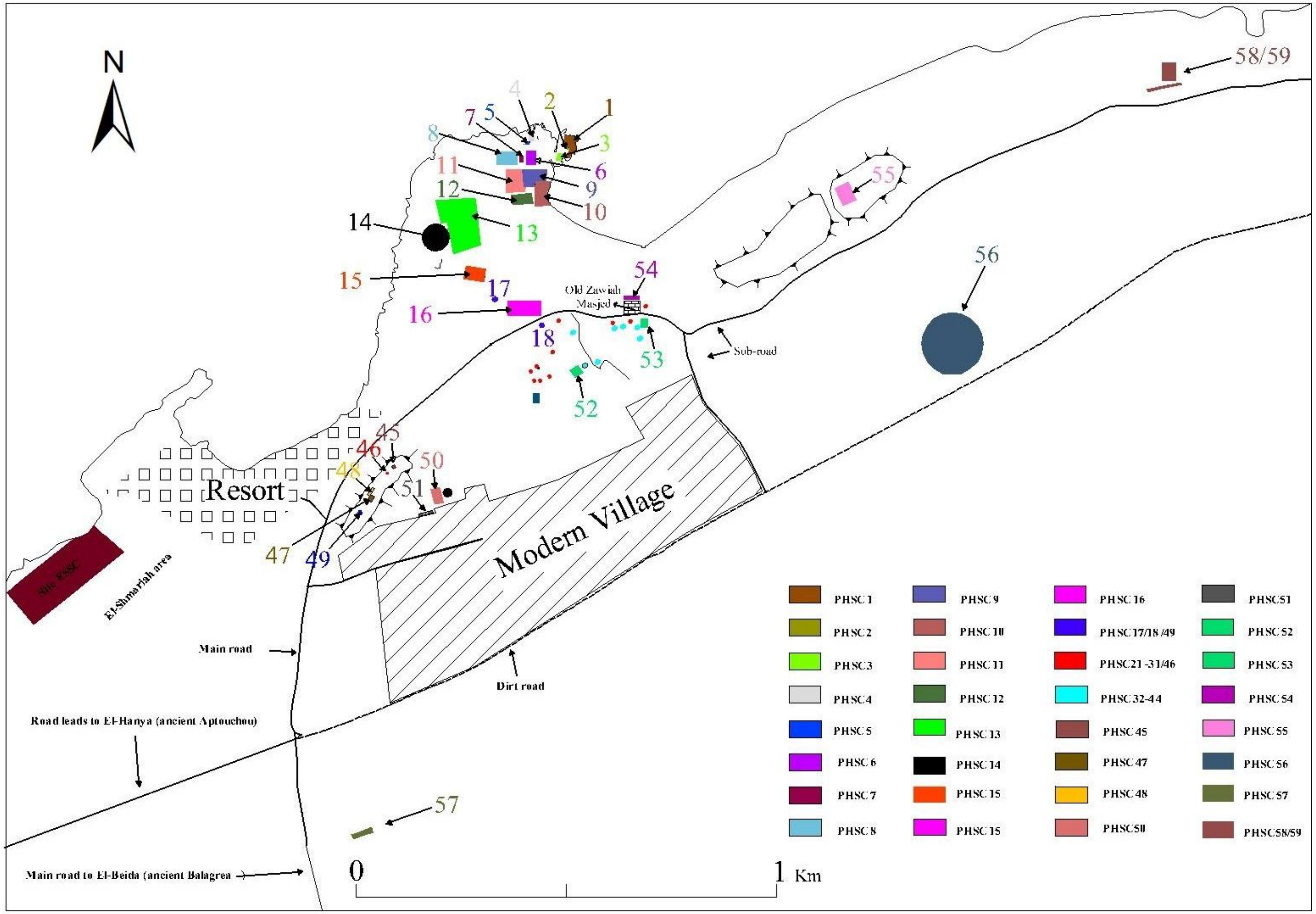

Figure 9-60: The distribution of sites at ancient Phycus.

This area preserves a number of archaeological remains (PHSC-55-58). Due to the limited time documentation of this part was not possible, although some attempts were made to record and photograph some features. Unfortunately this zone is exposed to daily threats caused by the extension of the modern village of el-Hamama, which was created in the centre of this area. The area directly to the south-east and west of Aluet El-Lib is particularly at risk.

It was not possible to draw and record all the archaeological remains at Phycus, due to the huge size of the site and the limited time of the survey. However, I gave property in my fieldwork to zones 1 and 2.

9.2.9.3 Buildings and walls

9.2.9.3.1 Site PHSC3

To the south-west of site PHSC2 and west of Group 1 (see Fig. 9-74) is a rectangular building. Three walls (1, 2 and 3) are still standing, whereas just a part of the northern wall (4) survives. The southern wall (1) survives to a height of 2 m and a length of 7 m, and was built of two layers of stones. The external layer was constructed using large rectangular masonry while the internal layer was built of smaller sized blocks than the external one. The wall from the western side seems to extend towards the west. Another two walls (5 and 6) can be traced from the southern side of wall 1, and run towards the south.

The eastern wall (2) of this building runs from the south to the north and is built using the same materials and techniques as wall 1. Its external height is about 1 m. The western wall (3) runs from the south to the north for 8 m, and only 0.2 m of the height survives. Another wall (4) has only 3 m of its length remaining. The wall is not connected to walls 2 or 3, but it seems that it formed the northern wall of this building. It is noticeable that there are other walls (7, 8, 9 and 10) which appear to the east of this building. Some scholars who have visited the area suggested that this site might be a lighthouse (Jones and Little 1971a; Tusa 2010; Tusa 2011).

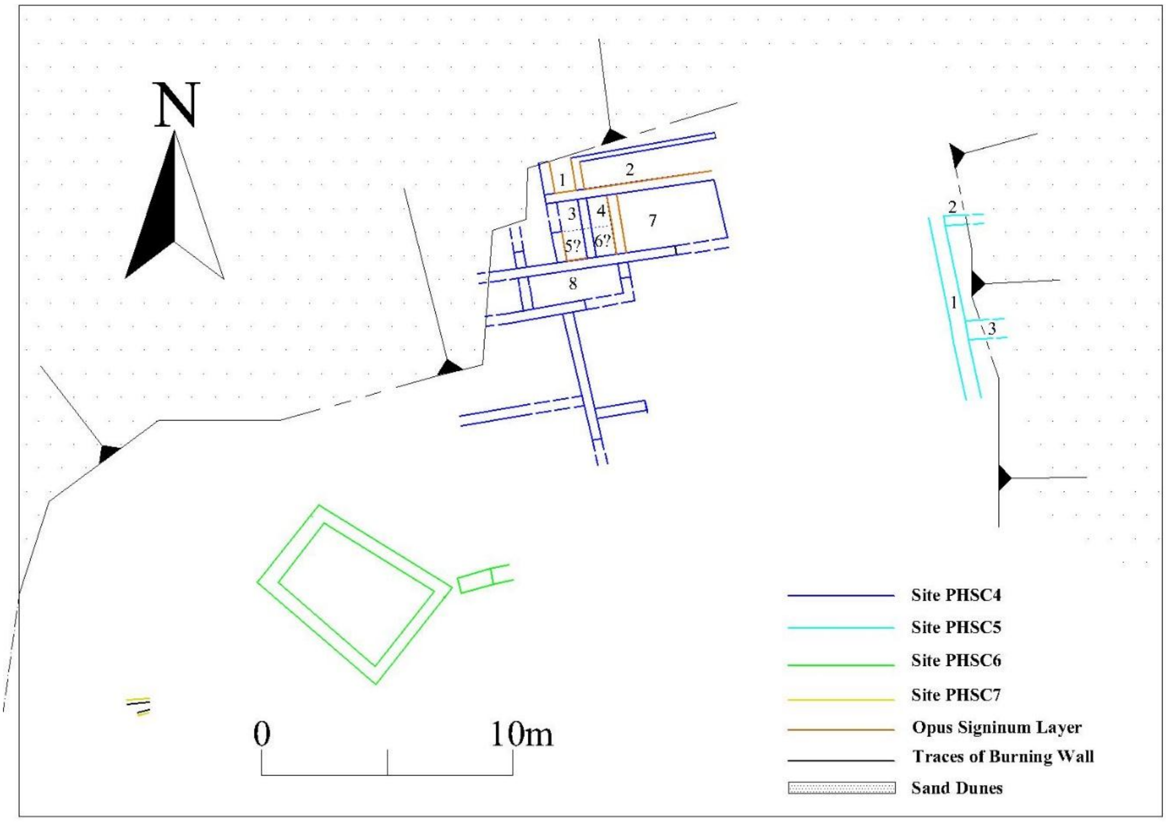

Figure 9-61: The distribution of sites PHSC4, PHSC5, PHSC6 and PHSC7.

9.2.9.3.2 Site PHSC5

A large part of the site is covered by sand. However, a set of walls of a building which appears to be built of large and heavy blocks can be seen (Fig. 9-61).

9.2.9.3.3 Site PHSC6

This is a non-equilateral rectangular-shaped building. It is approximately 6 m to the south-west of site PHSC4. The north-west wall of the building runs from the north-east to the south-west for a distance of 4 m and the opposite wall (south-east) is about 5 m. The other two walls run from the north-west to the south-east for a distance of 6.2 m. There is another part of wall connected to the eastern corner of this building running towards the east for a distance of 1 m (Fig. 9-61).

9.2.9.3.4 Site PHCS7

Two parallel walls appear for a distance of less than 0.5 m. Traces of burning appear on both internal sides (Fig. 9-61).

9.2.9.3.5 Site PHSC8

This site lies to the south of site PHSC5. It is a set of walls and remains scattered in an area of 834 m^2. It is difficult to reconstruct a full picture of the site as the majority of its structures have collapsed, and it is now only an accumulation of stones. The only construction that can be partially detected is a structure which was a basilica building (church) (Fig. 9-62). Two parallel sides of walls (1 and 2) run from east to west, forming a nave or yard leading to a western apse. However, many sites in Cyrenaica consist of two churches, one with an eastern apse and another with a western apse (Laronde and Michel 2004; Ward-Perkins et al. 2003).

9.2.9.3.6 Site PHSC9

These are two walls 15 m to the west of the previous site. The walls run from the north to the south for a distance of 5.5 m (Fig. 9-62). The walls seem to form a corridor or a passage. The space of the corridor is about 2 m in width. It is unclear if both external sides of the walls were connected to sites PHSC8 and PHSC10.

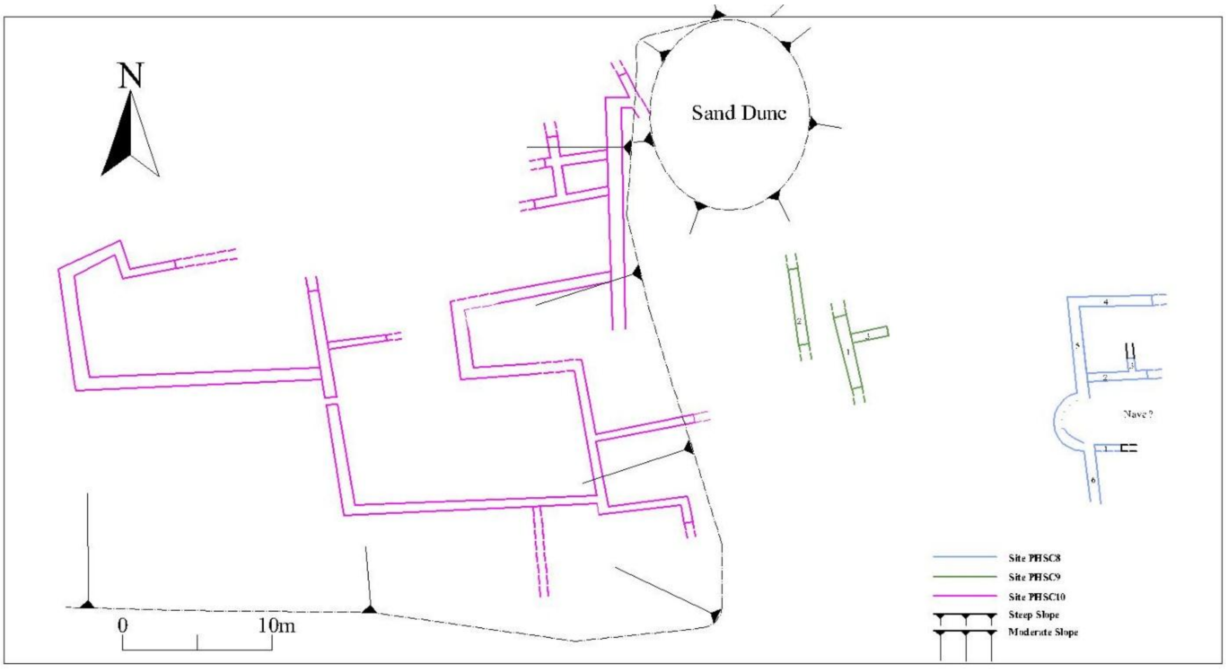

Figure 9-62: Sites PHSC8, PHSC9 and PHSC10.

9.2.9.3.7 Site PHSC10

This site lies 8 m to the west of site PHSC7. It occupies an area of 1.477 m^2 (Fig. 9-62). A set of walls forming a group of various sizable rooms can be seen, which could have been used for storage.

9.2.9.3.8 Site PHSC11

This site lies a few meters to the south of site PHSC8. It contains two buildings (1 and 2). Building 1 runs from the west towards the sea to the east, separated by a wall or corridor (Fig. 9-63), is about 465 m^2. Tracing the walls of this building, 6 rooms (1–6) can be seen. Rooms 1 to 3 are located to the west side of the building and measure 3.30 m x 7.31 m and 2.84 m x 7.21 m respectively, while room 3 can be only partly traced. The western wall (1) of the room runs from the south to the north. At the end of room 3 it curves to the west, indicating that the building might have been connected to Site PHSC12 to the west. To the east of these rooms is another set of three rectangular rooms (4, 5 and 6). Rooms 4 and 5 measure 3.46 m x 6.09 m and 2.87 m x 6.43 m respectively, whereas room 3 can be only partially traced.

The third part of this building can be found contiguously to the east of rooms 4-6. It contains two rooms (7 and 8). Room 7 is rectangular, but the western, southern, eastern and northern walls are not equilateral. They measure 5.36 m, 9.1 m, 4.28 m and 8.96 m respectively. Room 8 lies to the north of room 7, and measures 10.23 m x 9.4 m. The western wall (4) of this set of rooms (7 and 8) seems to continue to the north. Whereas the eastern wall (5) seems to form the wall of the rooms, the western wall of the corridor separates buildings 1 and 2.

Building 2 is located 4.5 m to the east of room 8 within building 2. It is difficult to detect the whole structure of this building as its condition is very poor. A set of 4 long walls can be seen running from the west to the east for a distance of 20 m. These walls divided the building into three parts (Fig. 9-63). Two further walls (5 and 6) run from the upper part of the building from the north to the south. The first and second sets of walls form 6 rooms (1 to 6) measuring 5.17 m x 4.49 m; 5.31 m x 7.33 m; 3.59 m x 5.3 m; 4.58 m x 2.86 m; 7.16 m x 2.86 m; 3.75 m x 3.01 m respectively. It is not clear if there are more rooms, as traces of walls are not apparent.

There is another wall about 6 m to the south of this building's southern wall. This wall was built at the upper edge of a basin cut into the rock (Fig. 9-63). The space between wall 6 and the southern wall of this building forms a passage or a large basin (?) going into the sea. However, only 6 m of the length of the wall can be traced. At the end of this passage is an oval vat cut into the rock measuring 1 m^2.

The eastern wall of building 1 seems to run to the south as traces of it can be seen. It runs to the north in a curve, before turning 90 degrees to the east for a distance of 21 m (Fig. 9-63).

9.2.9.3.9 Site PHSC13

This site lies 5 m to the west of site PHSC11. There are archaeological remains distributed over an area of 1000 m^2. It is difficult to identify the type of structure as the majority of its masonry is under the soil or has been removed. Generally, it is a group of walls that form a set of buildings.

9.2.9.3.10 Site PHSC14

This site is located to the south of site PHSC14 and to the west of site PHSC12. An area of 787 m^2 was occupied by a large church, which has an eastern apse (Fig. 9-63). The site was identified for the first time in the 1960s (Ward-Perkins et al. 2003). The general outline of the church is a rectangle measuring 35 m x 14.16 m. By tracing the church's outline, which appears fully on some sides and sporadically on others, it can be argued that it consists of a middle nave, south and north aisles, and an eastern apse still in situ. There are two rooms along the north-south side of the church, and there seems to be another set of rooms along the northern aisle. It is remarkable that this is contrary to the description by Perkins, who stated that the central area of the church is an open space and that there was no indication of arcades (Ward-Perkins et al. 2003).

9.2.9.3.11 Site PHSC15

This site is located 111 m to the south-west of site PHSC13. Outlines of walls form rooms (Fig. 9-64). The site seems to consist of four buildings and some walls scattered over an area of 128 m from north to south, and 84 m from east to west. The function is without large-scale excavation.

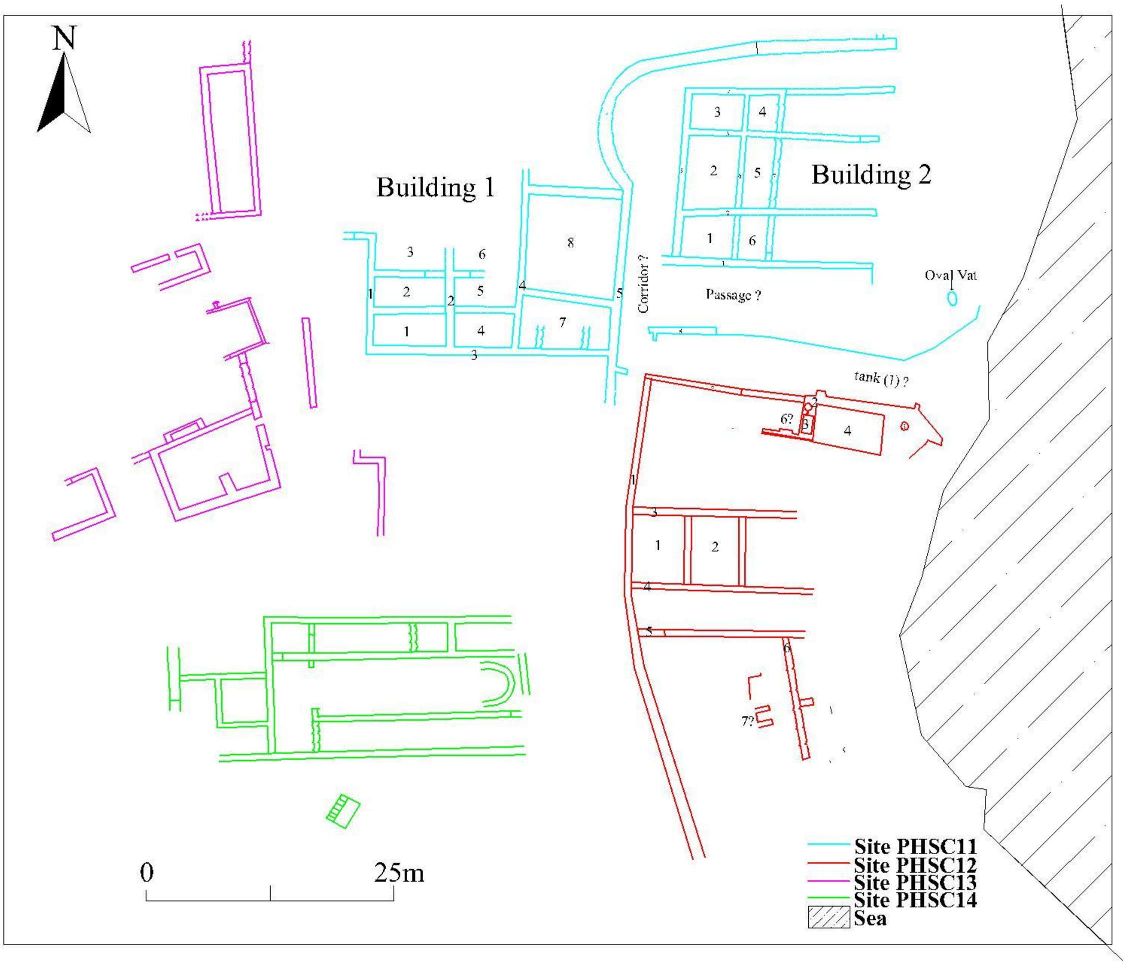

Figure 9-63: The distribution of sites PHSC11, PHSC12, PHSC13 and PHSC14.

9.2.9.3.12 Site PHSC17

This site lies on a gentle slope south of site PHSC15. It contains the massive remains of a large ruined fort or watchtower (Fig. 9-64). The building is rectangular with an entrance positioned in the middle of the eastern wall. The two longitudinal walls that run from the north-west and south-west to the south-east measure 44.2 m, while the western wall measures 24.68 m and is 0.75 m wide. The internal walls have been reinforced from the exterior by other layers of walls with a width of 1 m. There is an external sloping revetment on the external western wall side. Notably, there are two rectangular towers installed in the middle of the northern and southern walls measuring 2.36 m x 6.25 m.

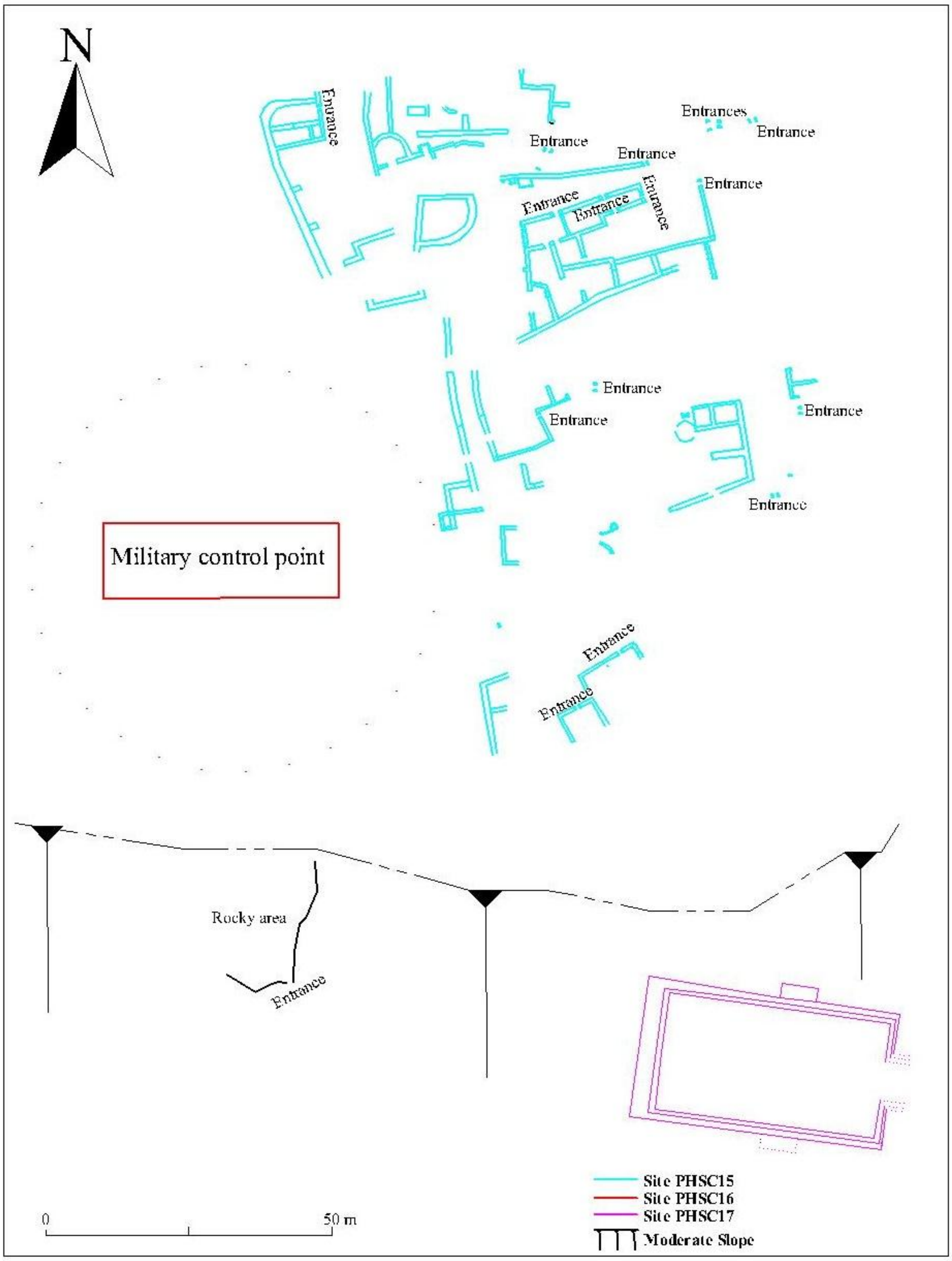

Figure 9-64: Sites PHSC15, PHSC16 and PHSC17.

9.2.9.3.13 Site PHSC45

This site lies to the north-east of Aluet El-Lib. The area is the highest point in the entire surrounding region (Figs. 9-65 and 9-66). This meant it was possible to survey the entire city here, and it also overlooks the bay and the eastern headland of the promontory. The condition of the site is poor, and only the outlines of a few walls can be traced. However, the site seemed to be square in shape.

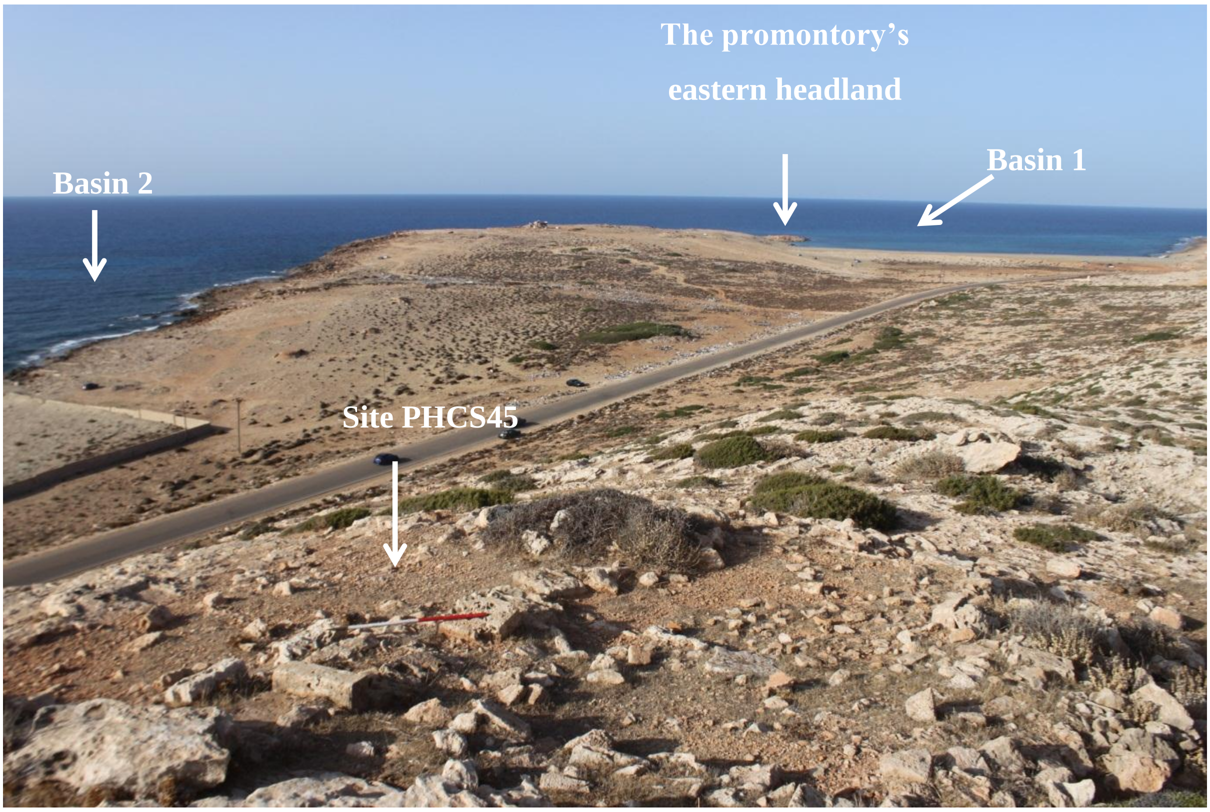

Figure 9-65: Overview of site PHSC45 and its location within the eastern headland of the promontory. Looking north-east.

Figure 9-66: Northern wall of site PHSC45.

9.2.9.3.14 Site PHSC47

A further 20 m to the south-west of PHSC46 are the remains of a large rectangular building measuring 18 m x 11 m. The lower part of the building seems to be cut into the rock, forming a basement or a cellar. There are four square rooms (4 m x 4 m) installed in the northern side of the building, and a set of parallel niches which can be clearly seen at the top of the southern wall. This could have been used for beams to fix the roof (Fig.9-67 and 9-68).

Figure 9-67: Site PHSC47. To the left can be seen niches in the southern wall. Looking south-west.

Figure 9-68: Site PHSC47 from the north-eastern side.

9.2.9.3.15 Site PHSC50

This site lies to the south-east of this hill. It is a set of buildings with blocks shifted by the humans. The remains of a massive ruined rectangular building can be detected. Unfortunately, the site was not planned due to lack of time. There was a great deal of damage on the eastern side of the site. Also, new houses are being constructed in the area which will affect and destroy the site if action is not taken.

9.2.9.3.16 Site PHSC51

An ancient wall runs from east to west for 5 m south-east of site PHSC47. The site exists just at the edge of a modern pavement.

9.2.9.3.17 Site PHSC52-53

To the north of the village are the ruins of two rectangular buildings. Only some of the outlines of the walls and an entrance can be identified (Fig. 9-69).

Figure 9-69: Site PHSC52. Looking north-east.

9.2.9.3.18 Site PHCS54

This site lies to the north of the old Zawieh/Masjed, but has not been surveyed as it lies within a closed garden. However, some remains and a marble column can be seen.

9.2.9.3.19 Site PHSC55

This site lies to the north-east of Aluet El-Lib, and is a square building which seems to have consisted of two floors (ground and top floors). The former cuts into the rock and contains two rooms. The first contains stairs, some blocked gates?, and a door leading to the second room with the remains of a collapsed ceiling. The second floor was built of large and medium well-shaped blocks. A major part of this floor has been destroyed. Only some of its walls, gates and an arch are still in situ (Figs. 9-70, 9-71, 9-72 and 9-73). There are no signs of any fortified elements, despite its ideal location for surveillance.

Figure 9-70: The upper part of site PHSC55. Looking north-west.

Figure 9-71: The arch of site PHSC55. Looking north.

Figure 9-72: Room 1 cut into the rock on the ground floor of site PHSC55. Looking south-west.

Figure 9-73: Room 2 cut into the rock on the ground floor of site PHCS50. Looking north-west.

9.2.9.3.20 Site PHSC57

This site is a dam located to the south-west of the village and at the end of a dirt road. It is about 2 m high and 8 m long.

9.2.9.3.21 Site PHSC58

This site is located to the north-east of site PHSC51, and consists of the ruins of a square building overlooking the sea, in poor condition. To the south is a wall that continues sporadically from the west to the east.

9.2.9.4 Industrial features

9.2.9.4.1 Site PHSC1

This site lies on the eastern headland of the promontory. This zone contains 39 tanks or vats (Fig. 9-74) distributed in seven groups in an area of 2000 $m^{2.}$

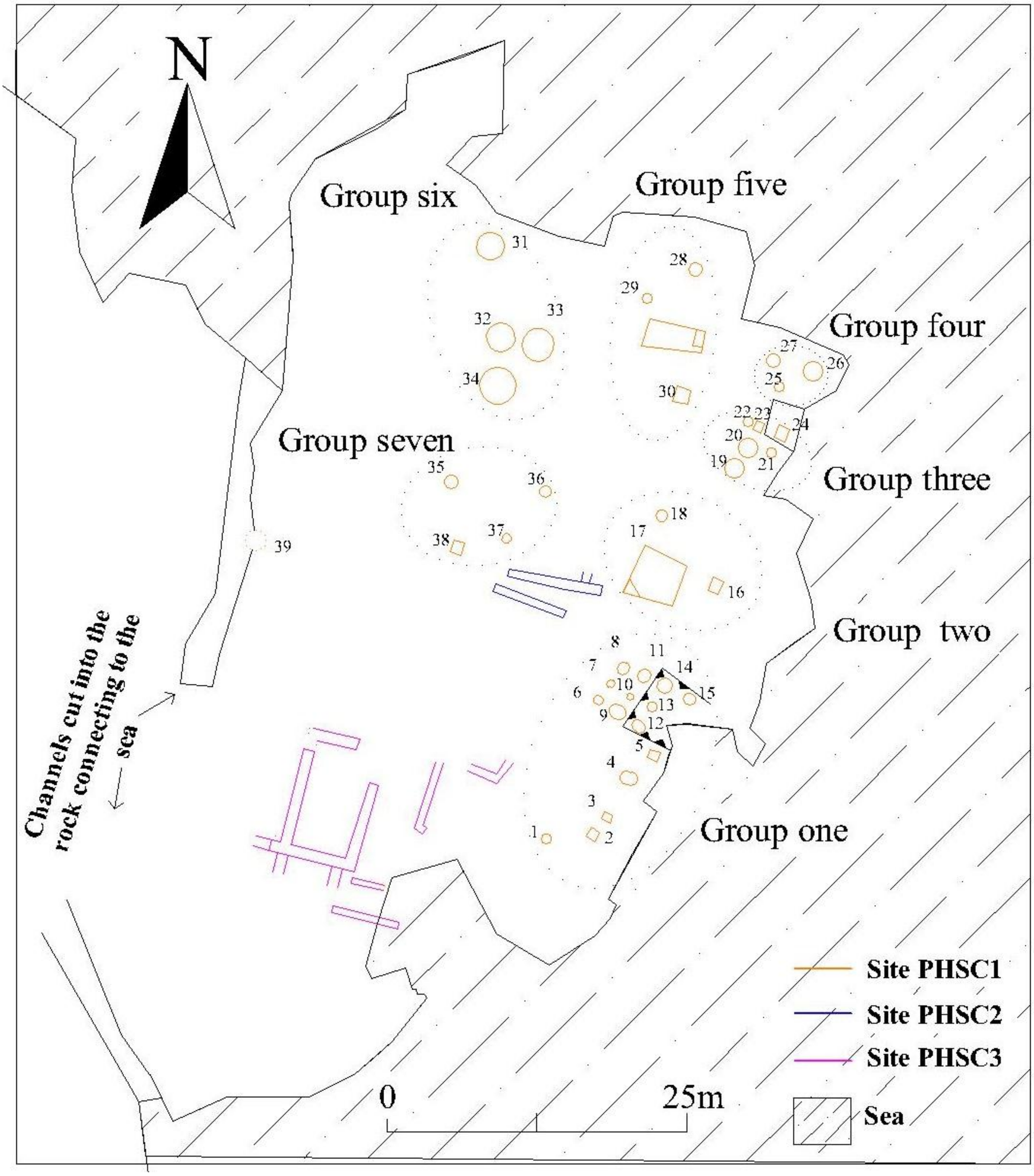

Figure 9-74: The distribution of sites PHSC1, PHSC2 and PHSC3 at ancient Phycus.

Group one

1) A row of five vats cut into the rock vertically (numbered 1-5) measuring 1 m^2, while vats 3 and 5 are rectangular measuring 0.7 m × 0.6 m and 0.9 m × 0.95 m respectively. Vats 1 and 4 are circular in shape with diameters of 1 m and 1.4 m respectively. The depth could not be identified for this group because of the accumulation of soil. All vats are lined with waterproof plaster (*opus signinum)*.
2) A row of ten vats (numbered 6-15) cut into the rock. All the vats are lined up three by three. The vats vary in size and shape, six having a round shape (vats 6, 7, 8, 10, 11, 13, 14 and 15) measuring 0.8 m, 1 m, 0.75 m, 1.15 m, 0.75 m, 1.25 m, 1 m, and 1.5 m in diameter respectively. Two are oval (vats 9 and 12) measuring 1.4 m and 1.25 m. All the vats are lined with *opus signinum*. It is worth mentioning that the first line of three vats (12, 13, 14 and 15) was built half a metre lower than the level of the others in the group.

Group two

This is a set of three vats (16-18). Vats 16 and 17 are rectangular, measuring 1.2 m × 0.95 m and 4.36 × 3.87 m respectively. Vat 18 is circular in shape with a diameter of 1.2 m. As with Group One, the three vats are lined with *opus signinum*.

Group three

This set of 6 vats (19-24) is located 3.7 m north of Group Two. Vats 19, 20, 21 and 22 are circular in shape, with diameters of 1.5 m, 1.4 m, 1.2 m and 1.2 m respectively. It is worth mentioning that vats 22 and 23 were interconnected, measuring 2 m × 3 m, and were faced with *opus signinum.*

The eastern side of vats 21 and 22 facing the sea is completely destroyed by erosion, which allows us to estimate its depth as more than 1.5 m.

Group Four

To the north of Group Three is a set of three circular vats (25-27). Vat 25 has been eroded by the sea, leaving its southern side visible in section. It has a circular opening measuring 0.85 m in diameter and is about 2 m deep, with its cylindrical shaft lined with *opus signinum*. Vats 26 and 27 are located to the north of the previous one and are circular in shape, measuring 1.7 m and 1.2 m respectively. Their depths have not been identified as they are full of soil. Both are lined with *opus signinum.*

Group five

This group consists of a set of three vats (28-30) of varying shape and size. Vats 28 and 29 are circular with diameters of 1.23 m and 0.89 m respectively. Vat 30 is rectangular and measures 1.30 m × 1.24 m. There is a rectangular cut in the rock located between vats 28, 29 and 30 of unclear purpose. The depths of these vats could not be determined because they were full of soil, as were nearly all the vats at this site.

Group Six

This group is located to the northwest of Group Four and contains four vats (31-34). These are the largest circular vats at the site, with diameters of 2.25 m, 2.48 m, 2.8 m and 3.1 m respectively, again with undetermined depths. All four vats are lined with *opus signinum*.

Group seven

A set of four vats (35-38) of varying size and shape, located between 4 m and 7 m apart. Vats 35, 36 and 37 are circular with diameters of 1.2 m, 1 m and 0.76 m respectively, and are lined with *opus signinum*. The remaining vat (38) has a rectangular opening leading to a large rectangular tank measuring about 3 m ×2 m, and is at least 2 m deep. The tank is lined with *opus signinum.* This tank most probably served as a water cistern.

It is worth mentioning that there are two channels cut into the rock running from the sea into the site. One runs north to south and is about 2 m wide and 1 m deep. The other runs from southeast to northwest and is about 2 m wide and 0.2 m deep.

9.2.9.4.2 Site PHSC2

This site lies to the west of group three and to the south of group seven within site PHSC1 (see below) (Fig. 9-74). It is difficult at present to identify the function of the building, as only outlines of walls are visible.

In summary, the site contains two parallel walls (1 and 2) running from west to east. The site could be a corridor or part of a building within site PHSC3. The western part of Wall 1 is about 0.5 m high, while the eastern part is about 1 m. Wall 2, on the other hand, could hardly be traced as it is covered by an accumulation of soil. The distance between walls 1 and 2 from the west is about 1 m, and then the space starts to widen towards the east to a width of 2 m. The area between the walls is full of soil mixed with pottery sherds and fragments of firebricks.

9.2.9.4.3 Site PHSC4

This site is located to the west of site 1. It is difficult at the moment to identify the whole plan of the site as it is covered by sand (Fig. 9-61). Some of the visible remains indicate a complex building lying beneath the sand. The general impression is that it might have formed a set of tanks or basins (?) of different sizes and shapes (mostly rectangular) built of stone and lined with *opus signinum.*

9.2.9.4.4 Site PHSC12

This site lies a few meters to the south of site PHSC11. More investigation and excavation is needed to explore the site and its surrounding area in order to better understand its function (Fig. 9-63). From the small fragments visible on the surface, it can be suggested that the occupied area had an industrial function.

The complex occupied a rocky area measuring about 400 m^2, with a huge tank cut into the rock (1) running from the west to the east into the sea. The tank is 5 m wide and 10 m long, starting at surface level to the west and sloping to 1m deep by the sea. On the top right side of the tank is a large tank (number 4) measuring 6.8 m × 4 m, and is 0.5 m deep. To the west of the large tank are two further vats (numbers 2 and 3). One of them is circular (vat 1) with a diameter of 0.9 m, while the other is rectangular (vat 2), measuring 1 m × 1.78 m. Both vats are connected by a 0.5 m wide channel. There is another circular vat (number 4) installed in the eastern side of the large tank with a diameter of 0.88 m. The depth of the three vats cannot be determined, and all are faced with *opus signinum*.

Not far to the south of these tanks is a set of visible remains, distributed in different parts of this area. A diagonal wall (1) can be traced running sporadically from north to south for a distance of 48 m. At the beginning of this wall seems to be a connection with another wall (2) from the north, which runs from west to east towards the north-west corner of tanks 1 and 4. The other three walls (3-5) attached to wall 1 from the eastern side can be traced sporadically and run towards the sea. Another wall (6) attached to wall 3 and parallel to wall 1 running to the south can be seen. Two rectangular rooms (1 and 2) measuring 5.25 m x 6.96 m and 4.86 m x 6.95 m respectively can be detected. 2.3 m to the west of wall 6 there is a possible tank (7) faced with waterproof *opus signinum.* The width of this tank is about 0.9 m, while its length is undetermined as a major part of it is missing or covered by sand.

9.2.9.4.5 Site PHSC16

This site is adjacent to PHSC13 from the west, and has been completely bulldozed in order to build a military control point. The only remains that can be seen are the huge amounts of pottery sherds (Fig. 9-64).

9.2.9.4.6 Site PHSC18

This site is located 370 m to the south of site PHSC17 and 300 m south-east of the sea (Fig. 9-75). This is a large complex occupying an area of 2000 $m^{2.}$ The site has been disturbed by human activities, making it difficult to reconstruct a complete picture of what went on here. Further investigation and excavation would reveal more detail. The site consists of a set of basins of different sizes and shapes (numbered from 1 to 4) built of small stones and lined with thick layers of *opus signinum*. These basins were installed in a line from the south to the northwest. To the northeast another large basin with *opus signinum* can be traced.

Another wall faced with mortar running north to south is located east of the first basins. There are two large rectangular basins (numbers 6 and 7) to the south of this complex, measuring 6 m^2 and 15 m^2 respectively and more than 2 m deep. There are another two basins (numbers 8 and 9) lined on the inside with modern cement. It is clear from the exterior of these basins that they were built with ancient stones. It is not clear whether basins (8 and 9) are relined ancient vats/tanks or the result of modern reuse of ancient materials.

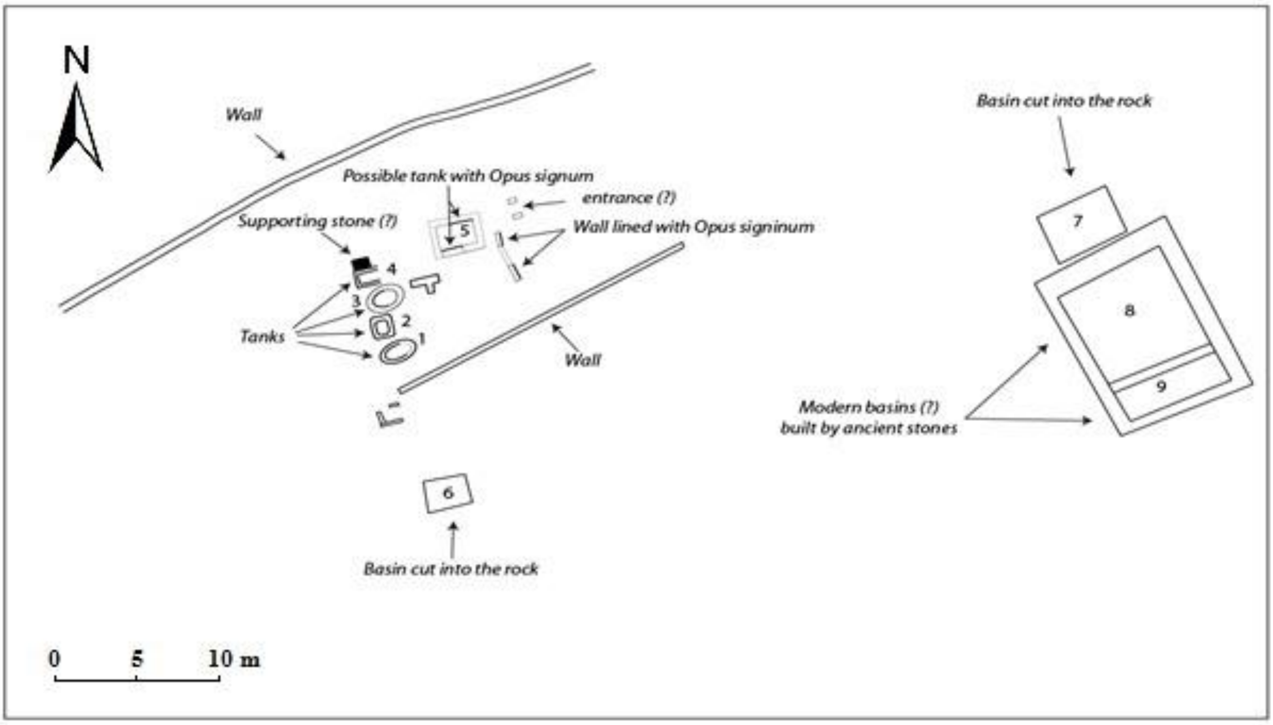

Figure 9-75: Site PHSC18

9.2.9.4.7 Site PHCS48

This site is located a few meters to the northeast of site PHSC47. It seems to have some industrial elements – a rectangular tank measuring (1.5 m x 0.5 m) lined with waterproof (*opus signinum)* (Fig. 9-76). A few meters to the east of this are two circular vats measuring 1 m and 0.6 m in diameter. The bigger vat seems to have had a lid. Both vats were installed in rock flat and seem to be connected by a channel 0.03 m wide. Also there seems to be another shallow, wide channel connecting the big vat to the south-west corner of this flat rocky area (Fig.9-77).

Figure 9-76: The rectangular basin within site PHSC50. Looking south.

Figure 9-77: Two circular basins within site PHSC50. Looking west.

9.2.9.4.8 Site PHSC56

1600 m to the east of the modern village and 440 m to the south of site PHSC50 are the remains of three circular kilns (1, 2 and 3) with diameters of 3 m (Fig. 9-78). These three kilns are installed next to each other, and their walls are about 1 m wide. Traces of burns are visible on the internal side of the kiln walls. To the south of these kilns is a circular shape with a diameter of 1 m – probably another kiln. To the north of these kilns is a small quarry. In front of these kilns from the south, at distance of 10 m, there is a wall which seems to have been the exterior wall of this workshop. The very wide diameters and lack of pottery sherds suggests that these kilns were used for lime production (See Chapter 5 for more details).

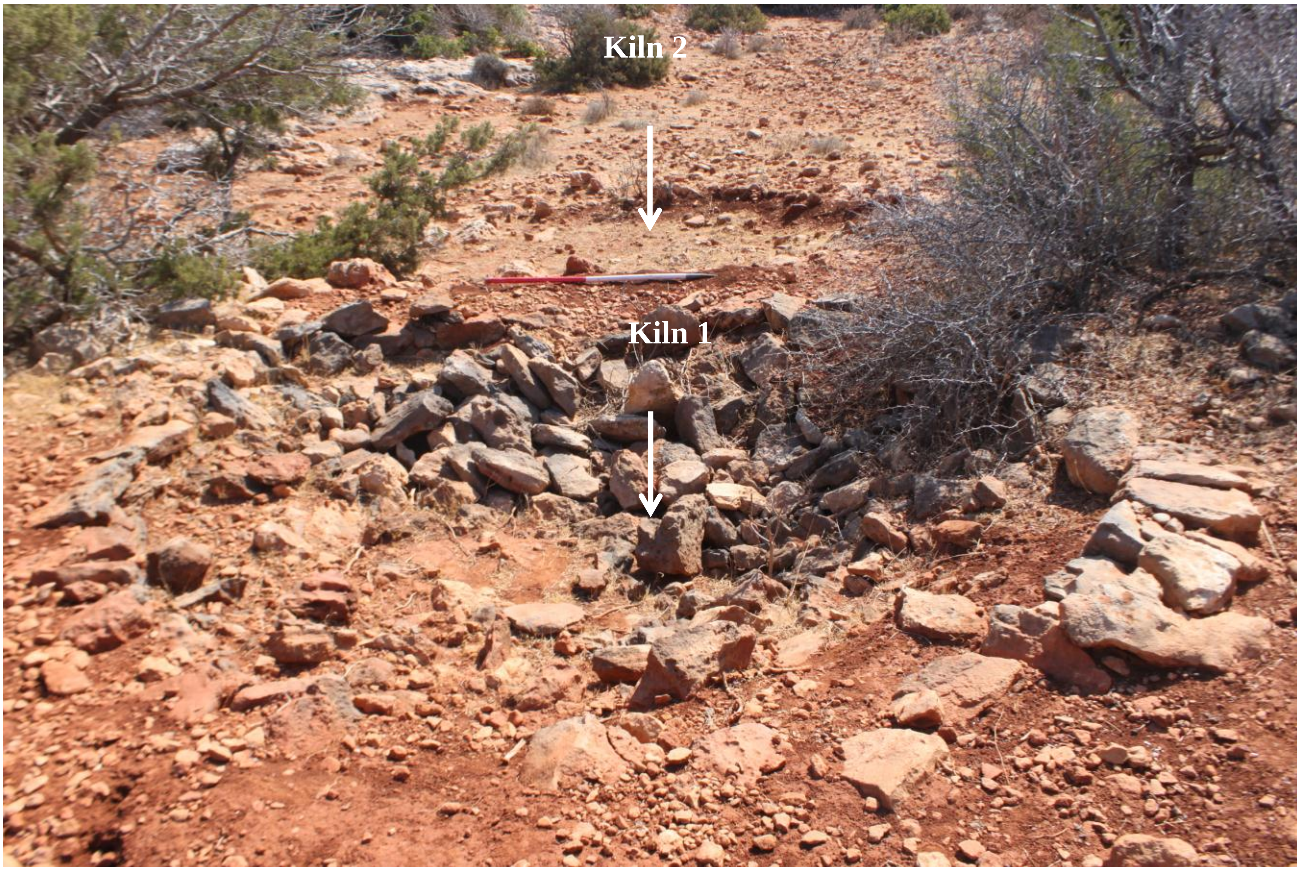

Figure 9-78: Kilns 1 and 2 within site PHSC56.

9.2.9.5 Water supply (Wells, Cisterns and Aqueducts)

9.2.9.5.1 Site PHCS19-20/49

A number of wells were found at this site, the first of which (PHSC19) is located to the south of site PHSC17. It is not in use today. The second well (PHSC20) is located to the south of site PHSC18 and is still in use today. Similarly, PHSC49 is a well which is still used. A huge modern cistern was built to the south of the adjacent well which feeds the modern village.

9.2.9.6 Other features (Tombs and Quarries)

9.2.9.6.1 Sites PHSC21-31

This site is located to the south of site PHSC18 and the modern road (Fig.9-79a, b, c). A set of tombs cut into the rock is installed perpendicularly. The general plan of these tombs includes a main entrance leading to a main square room. This in turn has three other doors, a door in each side of the room's wall, leading to another room where the grave is cut. Niches cut in different sizes and shapes decorate the main entrance. The general character of these tombs is reminiscent of the tombs in the necropolis of Cyrene.

It is notable that tomb number PHCS24 has an inscription on the wall to the right side of main door.

Figure 9-79a, b, c: Tombs within sites PHCS21-31

9.2.9.6.2 Site PHSC46

A few meters to the west of site PHSC45 are four individual tombs. According to the local people, these date back to the period of Italian colonisation.

9.2.9.6.3 Site PHSC32-44

This area has been occupied by quarries of different sizes.

9.2.9.6.4 Site PHSC59

To the west of site PHSC58 are two quarries.

9.2.9.7 Conclusion

The ancient site of Phycus is the biggest site in my survey area, and contains a considerable number of archaeological remains (Table 9-3). It seems to have seen a great deal of activity. The large scale industrial features (Fig. 9-80) are concentrated on the promontory area (other than those at Aluet El-Lib and in the third zone) and indicate intensive economic activity (see Chapters Six and Seven).

It is important to note that the tombs and quarries were built at Aluet El-Lib, whereas the buildings seem to have been distributed in the three main areas of the site (Fig. 9-81 and Table 9-3). In terms of water supply, the initial investigation seems to suggest that the site relied on wells, one of which is in the shore area and the second at the foot of Aluet El-Lib, while the third is to the south-west of Aluet El-Lib. There may have been other sources located to the south of the site, but at this stage the SCSC survey could not confirm this as it concentrated on the first two areas.

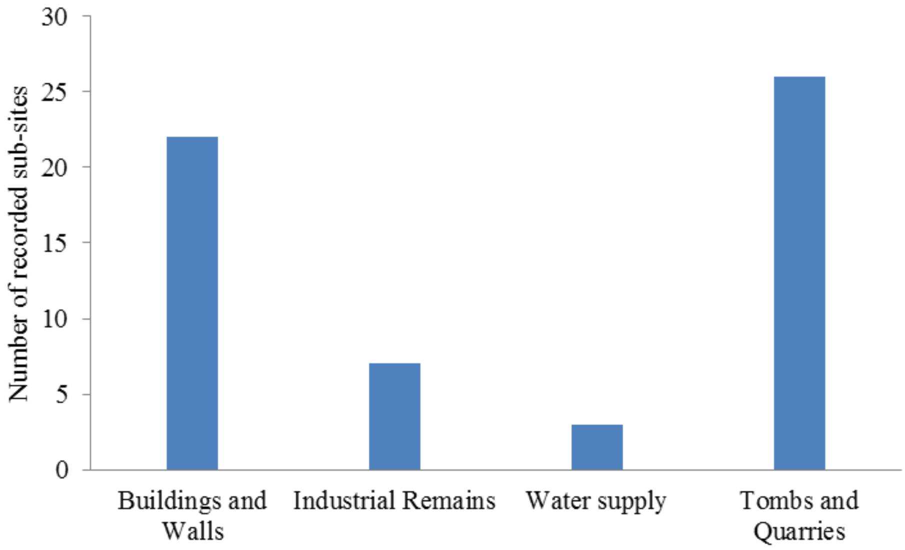

Figure 9-80: The types of archaeological remains identified at Phycus.

Sub-Site	Site Location			Site Type			
	Shore area (Zone 1)	The hill (Alua) (Zone 2)	Cultivated land (Zone 3)	Buildings and Walls	Industrial Features	Water supply	Tombs and Quarries
PHSC1	√				√		
PHSC2	√			√			
PHSC3	√			√			
PHSC4	√				√		
PHSC5	√			√			
PHSC6	√			√			
PHSC7	√			√			
PHSC8	√			√			
PHSC9	√			√			
PHSC10	√			√			
PHSC11	√			√			
PHSC12	√				√		
PHSC13	√			√			
PHSC14	√			√			
PHSC15	√			√			
PHSC16	√				√?		
PHSC17	√			√			
PHSC18	√				√		
PHSC19	√					√	
PHSC20	√					√	
PHSC21		√					√
PHSC22		√					√
PHSC23		√					√
PHSC24		√					√
PHSC25		√					√
PHSC26		√					√
PHSC27		√					√
PHSC28		√					√
PHSC29		√					√
PHSC30		√					√
PHSC31		√					√
PHSC32		√					√
PHSC33		√					√

	Site Location			Site Type			
Sub-Site	Shore area (Zone 1)	The hill (Alua) (Zone 2)	Cultivated land (Zone 3)	Buildings and Walls	Industrial Features	Water supply	Tombs and Quarries
PHSC32		√					√
PHSC33		√					√
PHSC34		√					√
PHSC35		√					√
PHSC36		√					√
PHSC37		√					√
PHSC38		√					√
PHSC39		√					√
PHSC40		√					√
PHSC41		√					√
PHSC42		√					√
PHSC43		√					√
PHSC44		√					√
PHSC45		√		√			√
PHSC46		√					√
PHSC47		√		√			
PHSC48		√			√		
PHSC49			√	√			
PHSC50			√	√			
PHSC51			√	√			
PHSC52			√	√			
PHSC53		√		√			
PHSC54		√		√			
PHSC55			√		√		
PHSC56			√	√			
PHSC57		√		√			
PHSC58		√					√

Table 9-2: The archaeological remains at ancient Phycus.

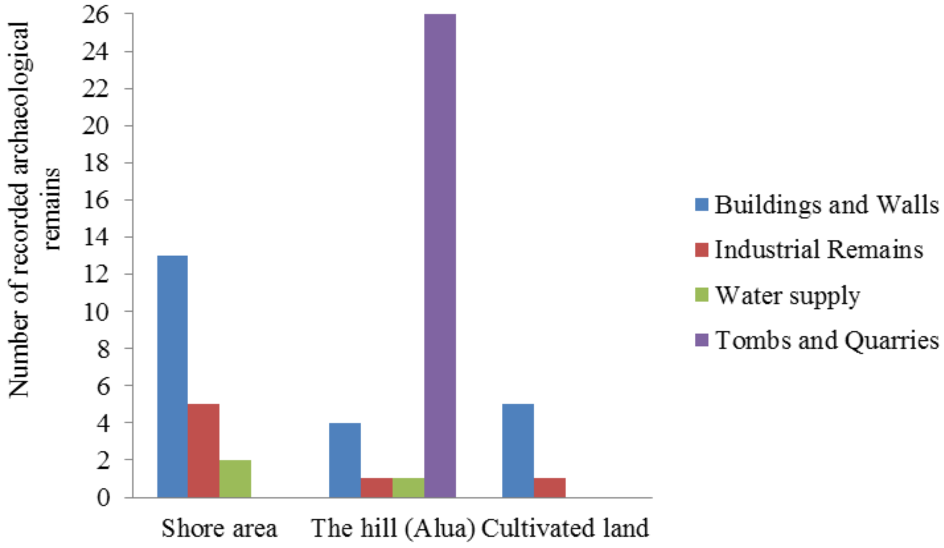

Figure 9-81: The distribution of archaeological remains at Phycus.

9.2.10 El-Shmariah

9.2.10.1 Introduction

This site is located 100 m to the west of the el-Shmariah resort (Maseef el-Shmariah) and 1 km south-west of ancient Phycus. The site seems to have formed the western border of ancient Phycus (Figs. 9-59 and 9-60). The archaeological remains of this site have never been recorded before. Unfortunately, the site has been bulldozed as a result of illegal sand mining. Only three sub-sites can now be detected.

9.2.10.2 Location of the sites

The three recorded sites (ESSC1-3) are located on the rocky area near to the sea. The first site (ESSC1) lies about 30 m to the south-east of the sea, while sites ESSC2 and ESSC3 lie 20 m to the south-east of the sea and a few meters to the north-east of site ESCS1.

9.2.10.3 Buildings and walls

9.2.10.3.1 Site ESSC1

This site has the remains of the foundations of a wall or enclosure, and runs from the south-west to the northeast along the coastline for 100 m. The wall was built of large masonry blocks placed horizontally next to each other using dark brown mortar, which contains small and medium shale grits. The masonry is about 1 m long and 0.6 m wide. It is likely that the wall was part of a defensive wall belonging to the ancient city of Phycus (Fig. 9-82).

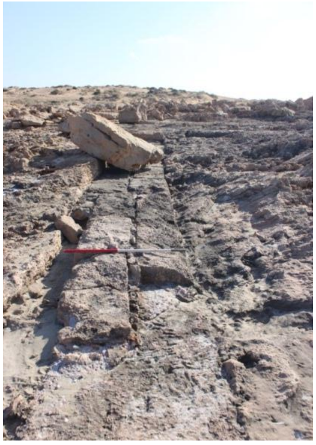

Figure 9-82: Wall within site ESSC1. Looking south-west.

9.2.10.3.2 Site ESSC2

At the end of the wall (site ESSC1) to the north-east is a rectangular passage (?) cut into the rock. It is 5 m wide, up to 1m high and 50 m long. The passage leads into a small bay (Fig. 9-83).

Figure 9-83: The passage leading to a small basin (ESSC2). Looking east.

9.2.10.4 Industrial features

No industrial features have been identified in the vicinity.

9.2.10.5 Water supply (Wells, Cisterns and Aqueducts)

No water supply features have been identified in the vicinity.

9.2.10.6 Other features (Tombs and Quarries)

9.2.10.6.1 Site ESSC3

To the end of the right hand side of the site ESSC2 is a small quarry. It seems that part of the masonry from the wall at ESCS1 was taken from this quarry.

9.2.10.7 Conclusion

The initial interpretation of the site of El-Shmaria is that it was part of the ancient site of Phycus. No clear archaeological evidence has been identified at the site apart from the wall parallel to the coastline. Further investigation to the south-east of the site would provide more information.

9.2.11 Aluet Um-Elnamel

9.2.11.1 Introduction

This site lies 3 km to the west of Phycus and has two rocky areas (A and B) overlooking a bay (Fig. 9-84). The areas rise about 22 m and 18 m respectively above sea level. Their territory is suitable for agricultural activity. The SCSC survey team made a brief visit to the site, and four sub-sites were recorded (AUSC1, AUSC2, AUSC3 and AUSC4).

Figure 9-84: General view of the bay of Aluet Um-Elnamel.

9.2.11.2 Location of the sites

Site AUSC1 is situated on the top of the first eminence (A), which overlooks the sea from the north-west. The second site (AUSC2) lies a few meters to the north-west of site AUSC1, on the slope of the rocky eminence. The third site (AUSC3) lies 25 m to the south-east of site AUSC1, while the fourth site is located in the area between the two eminences.

9.2.11.3 Buildings and Walls

9.2.11.3.1 Site AUSC1

This site shows the outline of a small square building (plans and measurements were not taken). Only some of the external outline of the walls appear (the north-west and south-west walls). Also, one internal wall runs from the south-west to the north-east (Fig. 9-85).

Figure 9-85: The square building at Aluet Um-Elnamel (site AUSC1).

9.2.11.3.2 Site AUSC4

Only a few scattered outlines of the site could be traced, but the site seems to have occupied an area of 540 m^2.

9.2.11.4 Industrial features

9.2.11.4.1 Site AUSC2

This site is a sectional cut into the sloped area of the rocky eminence. There are signs of two presses (Figs. 9-86 and 9-87) and the remains of counterweights (Fig. 9-88) (for more details see Chapter 5).

Figure 9-86: Remains of a wine press (site AUSC2).

Figure 9-87: The second feature, probably part of a wine press.

Figure 9-88: Remains of a counterweight at site AUSC2.

9.2.11.5 Water supply (Wells, Cisterns and Aqueducts)

No information has been recorded relating to the water supply.

9.2.11.6 Other features (Tombs and Quarries)

9.2.11.6.1 Site AUSC3

This is a quarry 19 m to the southeast of site AUSC1, on the slope of the first eminence. No information about tombs or other features has been obtained.

9.2.11.7 Conclusion

Due to the limited time it was difficult to record the site of Aluet Um-Elnamel in detail or to produce any plans. However, the initial assessment suggests that the site had some civic activity (see Chapters Six and Seven).

9.2.12 South-West of Um-Elnamel

9.2.12.1 Introduction

This site lies 3.9 km to the south-west of Phycus and about 1 km to the south-west of Aluet Um-Elnamel. It is located about 800 m to the south-east of the sea. Site UKSC1 lies 40 m to the south of the modern road connecting the modern villages Zawiet el-Hamama and Zawiet el-Hanya and is 2.6 km from the main junction of Zawiet el-Hamama.

9.2.12.2 Location of the site

This site is located in a small high rocky eminence.

9.2.12.3 Buildings and walls

No remains have been noticed.

9.2.12.4 Industrial features

No information has been recorded.

9.2.12.5 Water supply (Wells, Cisterns and Aqueducts)

9.2.12.5.1 Site WUSC1

This site has a strange feature – a long channel cut into the rock, which is 1.1 m wide, 112 m long and of an unknown depth as it was full of soil. The channel runs for 20 m (from the top of the eminence in the north-east), and turns 180 degrees on itself. It then continues parallel for another 13 m before heading off at a 75-degree angle for 41 m, then once again turns through 180 degrees and runs parallel for another 38 m. The overall shape of the channel is similar to a bent paperclip (Figs 9-89, 9-90 and 9-91). Unfortunately, I could not examine the vicinity of the channel as it lies within the yard of a modern house. There is a pen at the start of the channel.

Figure 9-89: The channel cut into the rock (site SUSC1).

Figure 9-90: Channel (site SUSC1). Looking south-west.

Figure 9-91: Another part of the channel (site SUSC1). Looking north-east.

9.2.12.6 Other features (Tombs and Quarries)

No information has been recorded.

9.2.12.7 Conclusion

This site is unique, as nothing similar has been noted in my study area. It is remarkable that no basins or collection points have been noted at the end of this channel, leading to the suggestion that it might be a water-mill structure. However, without more investigation and excavation, this interpretation remains a hypothesis.

9.2.13 El-Best

9.2.13.1 Introduction

This site lies 6.7 km to the south-west of Phycus, and seems to be a single building (EBSC1) as no other archaeological remains have been noticed in its vicinity. The general geographical location of the site, as with neighbouring sites UESC, SUSC and SMSC, overlooks the sea from the north side. The rear side has fertile land suitable for agriculture.

9.2.13.2 Location of the site

Site (EBSC1) is situated on a small high sandy eminence which lies at a distance of 280 m from a bay.

9.2.13.3 Buildings and walls

9.2.13.3.1 Site EBSC1

The site is covered by sand. Only some outlines of external walls could be traced (Fig. 9-92 and 4-93). In general, it is a square building which occupies 1369 m^2.

9.2.13.4 Industrial features

The site seemed to have an industrial features, as a half section of a crushing stone emerging from the sand was found (Fig. 4-94).

9.2.13.5 Water supply (Wells, Cisterns and Aqueducts)

No information has been recorded.

9.2.13.6 Other features (Tombs and Quarries)

No recorded information.

9.2.13.7 Conclusion

In general, the site seems to be similar to neighbouring sites such as SMSC.

Figure 9-92: General view of site EBSC1. Looking south-west.

Figure 9-93: Arch emerging from the sand at site EBSC1. Looking east.

Figure 9-94: Press crushing stone found inside site EBSC1. Looking east.

9.2.14 Shaat el-Marakeb

9.2.14.1 Introduction

This site is located 5 km to the north-east of the ancient site of Aptouchou (APSC), and about 8 km to the south-west coast of Phycus (PHSC). This is one of the sites which the SCSC survey has recorded for the first time. It preserves a number of visible sub-sites and archaeological remains in its vicinity. Seven sub-sites were documented during my survey.

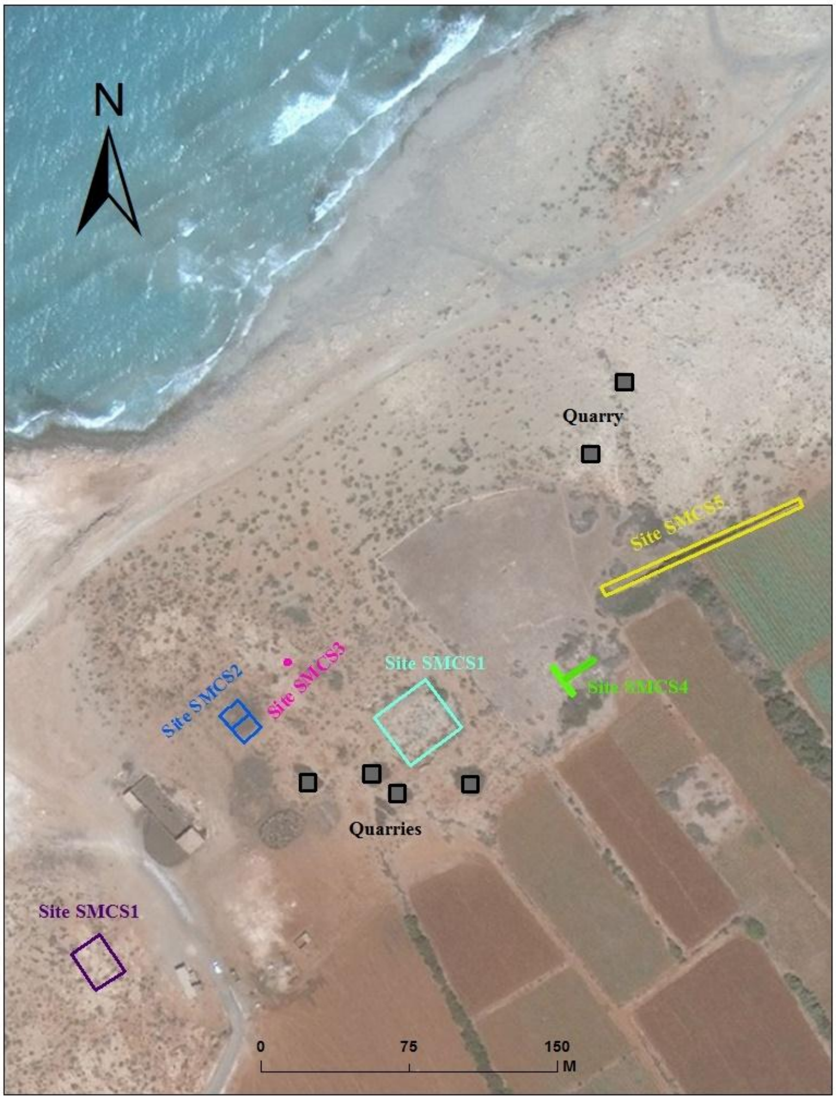

Figure 9-95: The distribution of sites within the ancient site of Shaat El-Mrakab.

9.2.14.2 Location of sites

The site is situated in a small rocky hill known locally as Aluet El-Marakeb. The site is surrounded to the south, south-east and south-west by fertile land suitable for agriculture. It overlooks a small bay that could be used for mooring small boats. A huge amount of pottery sherds are distributed all around the site indicating massive human activity. The site is divided into eight sub-sites (Fig. 9-95) scattered all around Alowet El-Marakeb, to a distance of 378 m to the west and east and 66 m to the north and south.

9.2.14.3 Buildings and walls

9.2.14.3.1 Site SMSC1

The main site in this area is a rectangular building complex occupying an area of 784 m^2. A major part of the building seems to have collapsed, and only a few external walls can be traced (Fig. 9-96). Its exterior northern wall extends west to east for a distance of 28 m, and is about 0.7 m wide. This wall is supported by a revetment approximately 1 m wide.

Figure 9-96: General view of site SMSC1. Looking south-east.

9.2.14.3.2 Site SMSC2

To the north-west of site SMCS1 is another square-shaped building. By tracing of its walls, it seems that the building was divided into two rooms (Fig. 9-97). Room one was a square with two entrances, in the eastern and southern walls. The next room (2) is square, with one gate in the middle of the northern wall. It is noticeable that the walls were built of two layers of unshaped stones, and the core was filled with small stones mixed with mud.

Figure 9-97: South-eastern corner of site SMSC2. Looking south-east.

9.2.14.3.3 Site SMSC4

This site lies a few meters to the east of SMCS1. The area has a set of walls running from north to south and from east to west. These walls seem to form rooms. Some of the walls were built using the same techniques as at site SMCS2.

9.2.14.3.4 Site SMSC5

This site lies 100 m to the east of site SMCS1. It is a dam (Fig. 9-98) built of large, rectangular- shaped masonry. The dam runs west to east for 50 m and is 3.5 m high. The manner of the dam's construction was to set large worked masonry blocks next to each other horizontally. The masonry is 1 m long, and 0.6 m to 0.7 m wide.

Figure 9-98: The dam (site SMCS5). Looking south-east.

9.2.14.3.5 Site SMSC8

This site is located 100 m to the west of site SMSC2. It is a rectangular building which has totally collapsed, and can only be traced by following its external shape.

9.2.14.4 Industrial features

No clear evidence of industrial activity has been recorded in the surveyed area. However, if the survey was extended to the south-east and south-west we might obtain new evidence.

9.2.14.5 Water supply (Wells, Cisterns and Aqueducts)

9.2.14.5.1 Site SMCS3

In front of site SMCS1 and to the north-east of site SMC2 is a circular vat cut into the rock (Fig. 9-99). Its mouth measures 1 m in diameter with an unidentified depth. The vat seems to have been a water cistern with waterproof lining.

Figure 9-99: Water cistern. Looking north.

9.2.14.5.2 Site SMSC9

This site is located to the south-east of SMSC1. It is totally collapsed. However, from the initial assessment of the site, it seems to be a vaulted cistern similar to those found in different parts in Cyrenaica (*e.g.* Ptolemais and Cyrene).

9.2.14.6 Other features (Tombs and Quarries)

9.2.14.6.1 Sites SMSC6/7

Two quarries lie on the foothills in front of the dam (site SMCS5). The two quarries (SMSC6 and 7) seem to have provided masonry to the dam and other buildings within the sites. No tombs were found during the survey.

9.2.14.7 Conclusion

The recorded remains within Shaat el-Marakeb concentrate on the Alua (hill) (Table 9-4 and Fig. 9-100). There were no archaeological remains visible along the shore, although this might be due to sand dredging. No industrial features were recorded at the site (Fig. 9-101), although the site is situated on fertile land. Remarkably, the site does not seem to have any signs of defensive or military structures. This could be due to the fact that the site was used for private activities. However, the site might have taken advantage of the nearby agricultural land and its location near to the sea for trading the crops produced.

Sub-Site	Site Location			Site Type			
	Shore area	The hill (Alua)	Cultivated land	Buildings and Walls	Industrial Features	Water supply	Tombs and Quarries
SMSC1		√		√			
SMSC2		√		√			
SMSC3		√				√	
SMSC4		√		√			
SMSC5			√	√			
SMSC6		√		√			
SMSC7		√		√			
SMSC8		√		√			
SMSC9						√	

Table 9-3: The archaeological remains at ancient El-Marakeb.

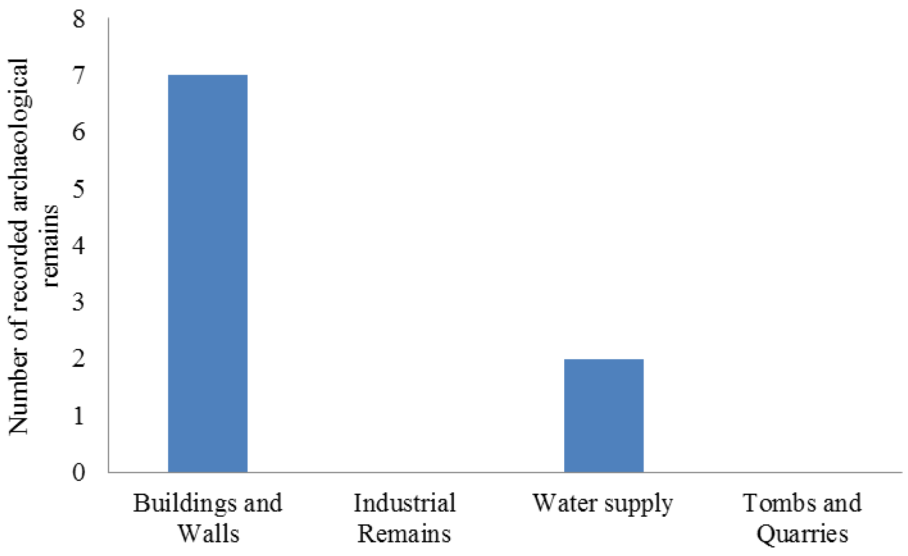

Figure 9-100: The types of archaeological remains identified at the site.

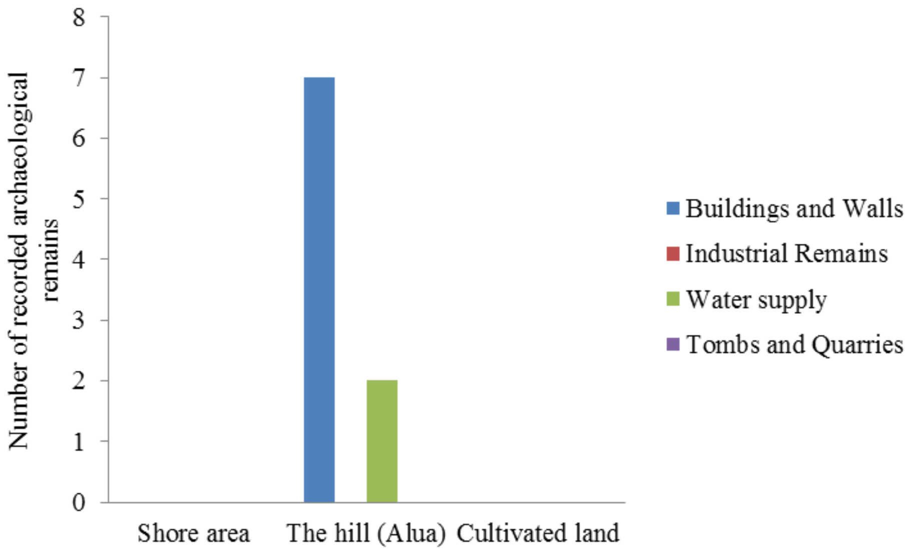

Figure 9-101: The distribution of archaeological remains.

9.2.15 Aptouchou (el-Hanya)

9.2.15.1 Introduction

The modern village of el-Hanya is located 20 km to the north-east of the ancient site of Balagrae (el-Beida), and 13 km to the north of ancient Artimis (Massa). It also lies about 55 km to the east of Ptolemais (Tolmeta) and 47 km to the west of Apollonia (Susa). el-Hanya was known in ancient times as Aptouchou (Laronde 1985; Talbert 2000). Aptouchou (APSC) occupied a very large area, and its remains are scattered in the middle of the modern village, as well as along the coast and south-west of the shore and village. It seems that the industrial area lies along the harbour region, with the bulk of the remains appearing to be related to workshops and industrial activities. The necropolis was positioned to the south-west and south-east of the port. Through the initial fieldwork, it appears that the site also extends to the south-east. However, the SCSC survey concentrated on the bay area, where it recorded and documented about fourteen sub-sites.

9.2.15.2 Location of the sites

Generally, the area has three adjacent bays which form an irregular pitchfork shape. They seem to have offered natural refuge and anchorage for small ships (Fig 9-102 and 9-103). The bulk of the archaeological remains are scattered along the larger basin (bay 1) area. These remains are distributed in four main loci (A1-4). The first area lies to the north-east of bay 1. Unfortunately this area (site APSC1) has been totally bulldozed, and two military buildings now occupy the space. The only archaeological evidence from this area is the huge quantities of pottery sherds that can be seen all over the ground.

The second area overlooks the bay and is occupied by a small hill. It reaches its highest point on the northern side (seaward side/cliff area). The hilltop starts to decrease gradually from three orientations, these being the east, south and west. The area has a number of archaeological remains (sites APSC3-9/11).

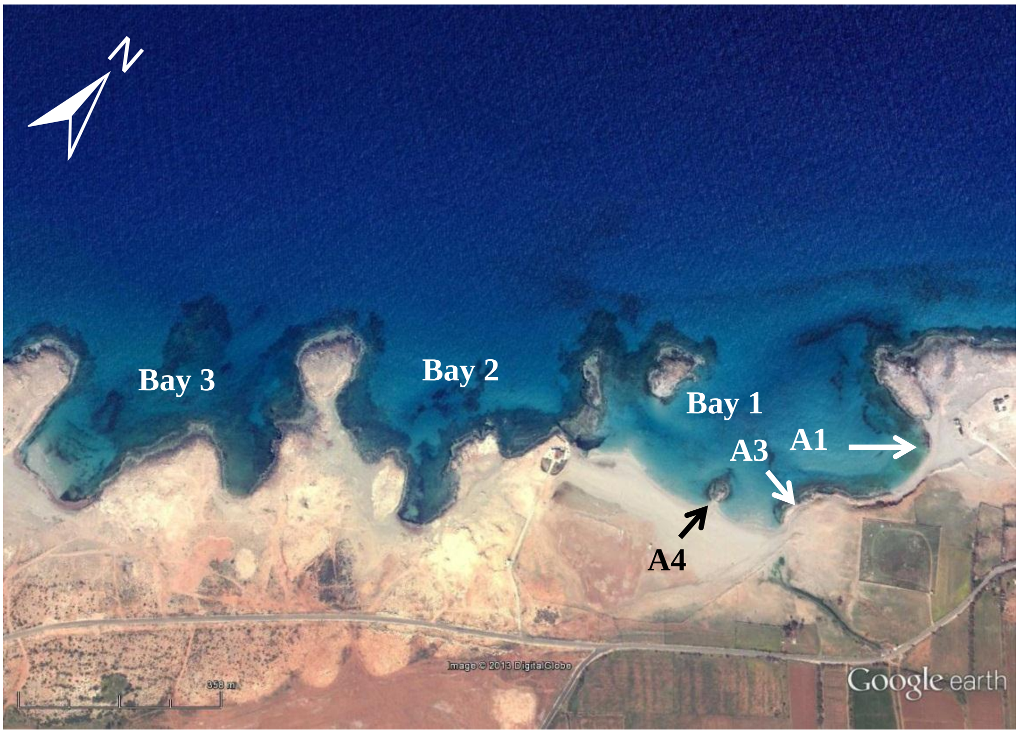

Figure 9-102: Google Earth image shows the three bays of ancient el-Hanya and the distribution of A1, A2, A3 and A4.

A modern cemetery has been placed south-east of the hilltop which measures 1.6560 ha. This cemetery seems to cover a considerable portion of the archaeological remains situated on the hilltop. The escarpment (cliff) on the seaward side of this hilltop exposes a vertical section. Its height increases from 2 m up to 6 m. The archaeological remains (site APSC10) in this part are exposed in section (Fig. 9-104). Severe erosion damage has destroyed many deposits over the years.

The third area can be found to the north of the foot of the escarpment (A2). It has a set of different remains (sites APSC12-13), some of which remain under the sea. The last area lies 150 m to the north-west of area two and is located in site APSC14, a small islet.

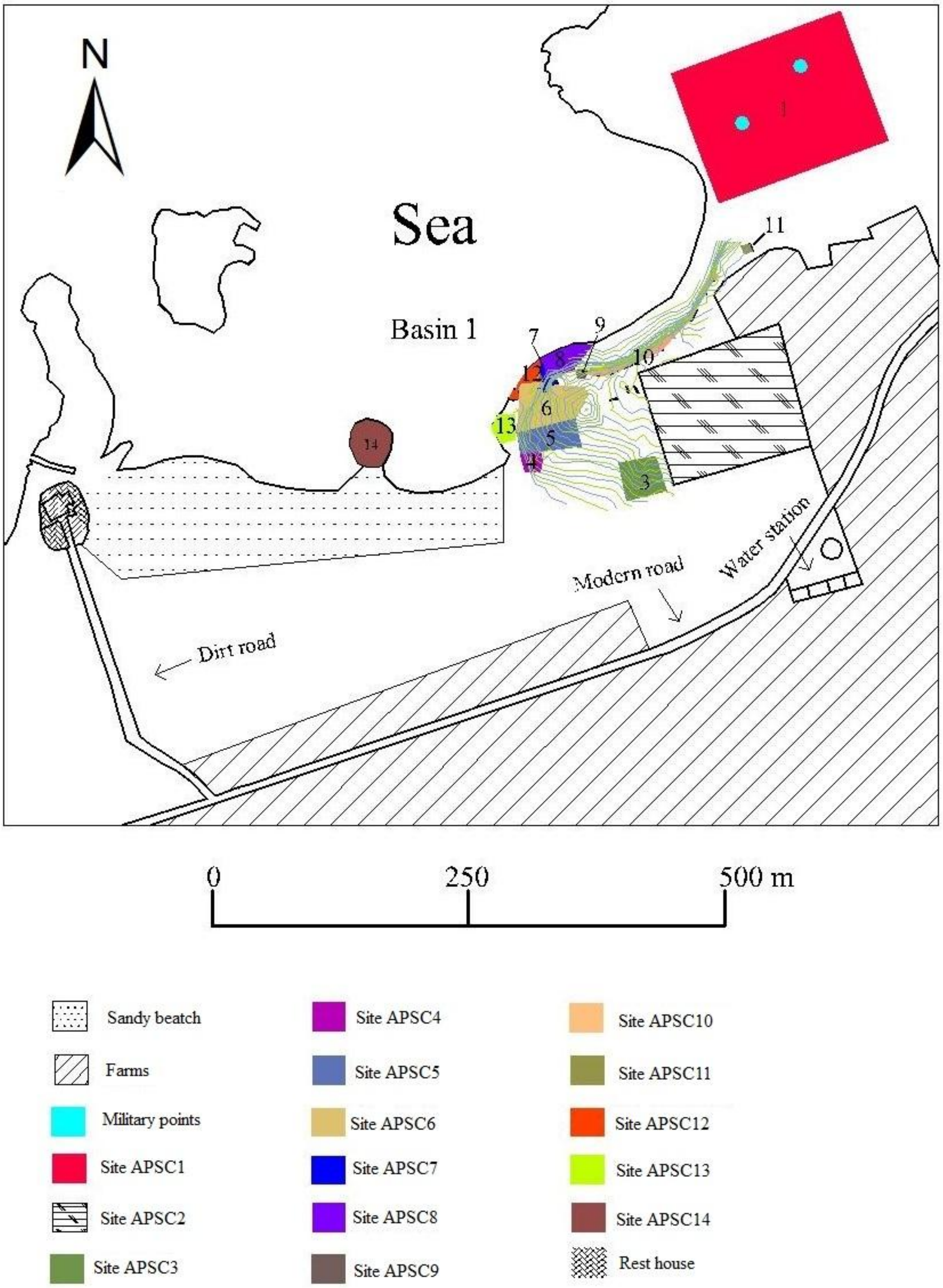

Figure 9-103: The distribution of sites at Aptouchou (el-Hanya).

Figure 9-104: Side of the cliff. Looking east.

9.2.15.3 Buildings and walls

9.2.15.3.1 Site APSC3

This site lies on the south-west corner of the cemetery. It is a building with an area of 697 m^2. The building is divided by a wall into two sections – area A and area B (Fig. 9-105). The former is a rectangular room or yard (?) measuring 28 m from the east to the south-west and 13.19 m from the north to the south. There is no trace of interior walls which might divide the internal side. Section B is also a rectangular building, adjacent to and connected with area A from the north.

The outer walls are 24.75 m long from east to south-west and 11.87 m long from north to south. Some interior walls can be sporadically seen forming chambers (1, 2 and 3). Rooms 1, 2 and 3 are 11.39 m long and 3.18 m wide. The eastern side of wall room 3 seems to be occupied by a rectangular area. The building appears to extend to the north, and traces of the eastern wall of the building continue to the north.

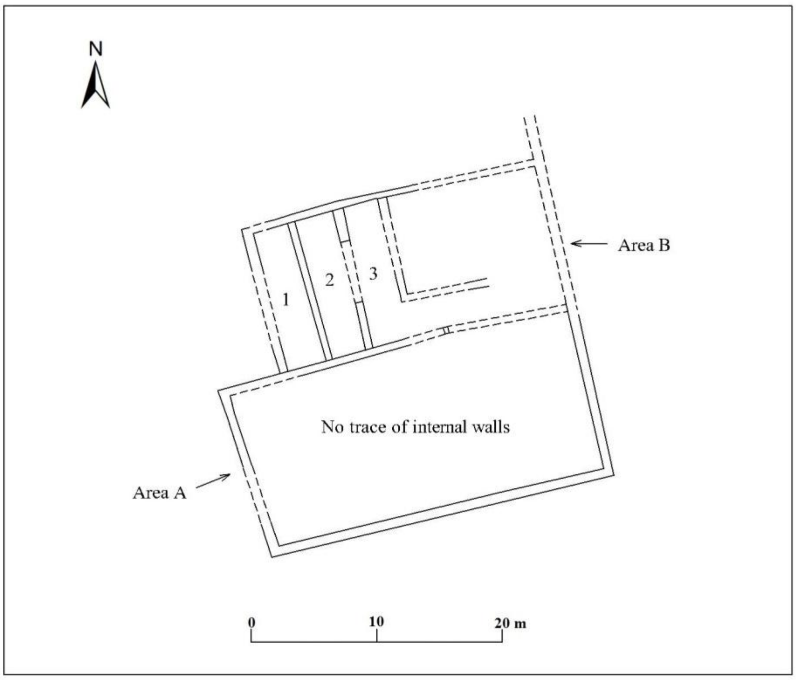

Figure 9-105: Plan of site APSC3.

9.2.15.3.2 Site APSC5

This site is a set of sporadic walls forming rooms. It seems that the main facade of the building is towards the east. The 17.71 m long and 0.65 m wide wall extends from south to north. To the north in front of this wall is part of an *ops signinum* pavement or floor of a collapsed rectangular basin (Figs. 9-106 and 9-107). The remaining floor is about 1.5 m from north to south, and 0.5 m to 1 m from east to west. It is impossible to reconstruct the building without large-scale excavations.

There are a number of rooms present; for instance, room (1) measures 4.29 m x 3.38 m to the north of the building. Another possible room (2) is located east of room 1. A third possible chamber is to the south of rooms 1 and 2. The walls of all three rooms continue towards the east. There are other irregular walls which appear and disappear to the south and south-east of these rooms.

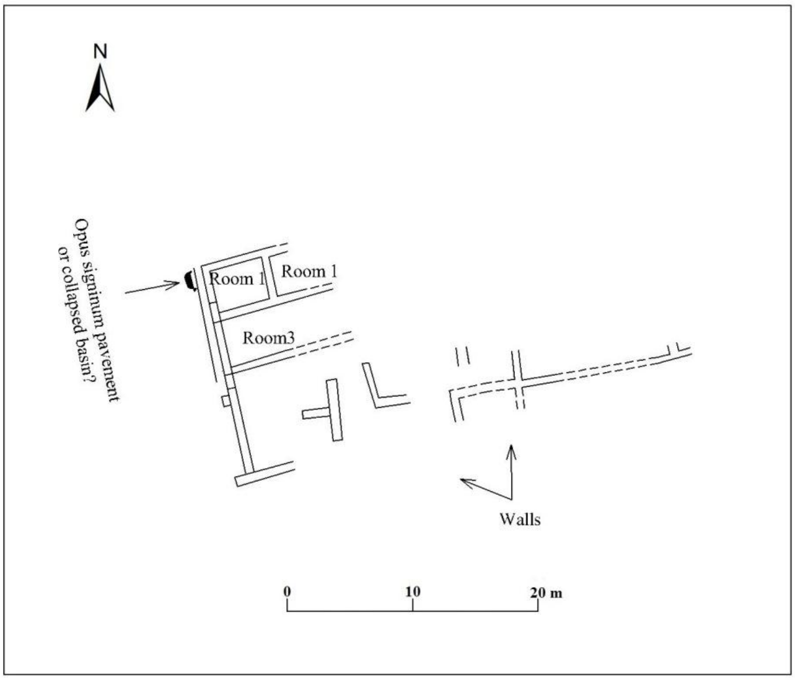

Figure 9-106: Plan of site APSC5.

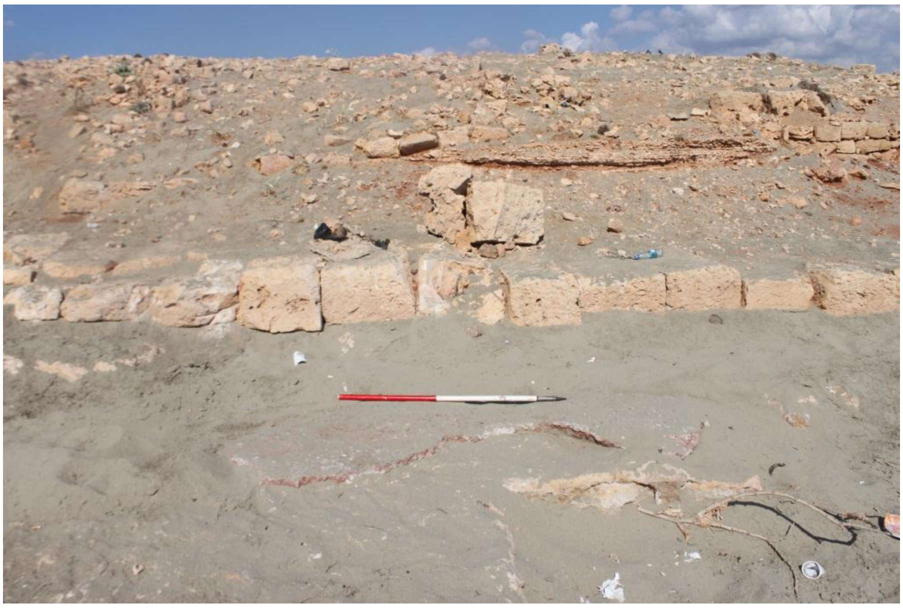

Figure 9-107: The western wall and part of the ground mortar within site APSC5.

9.2.15.3.3 Site APSC6

This site lies a few meters to the north of site APSC5. It is a group of partially uncovered unconnected walls (Fig. 4-108). However, it is more likely that they connect with other features to the east, west, and north.

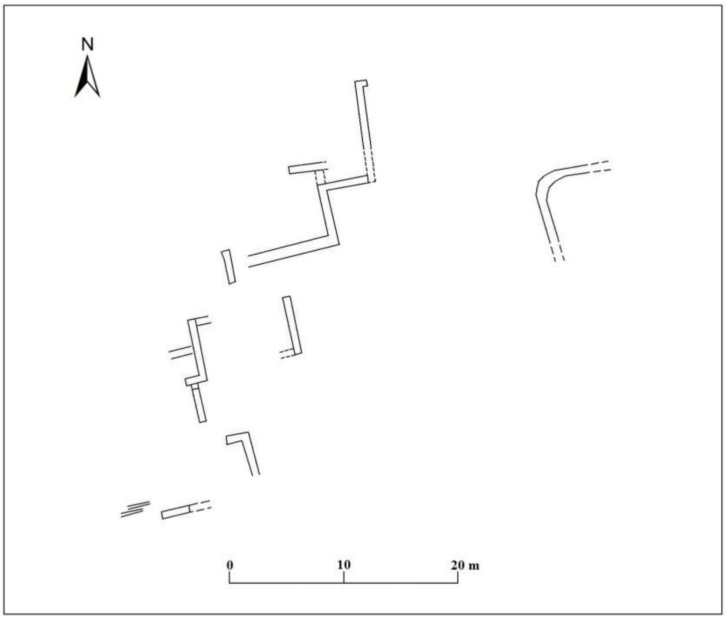

Figure 9-108: General plan of the walls within site APSC6.

9.2.15.3.4 Site AHCS10

This site contains the remains of many walls, which form rooms, gates, basins, pavements and a mosaic floor in the vertical section of the escarpment overlooking the sea (Figs. 9-103 and 9-109). These remains extend for 180 m. The condition of this area is very bad and susceptible to permanent drifting.

Figure 9-109: Google Earth image shows the position of some archaeological remains in the vertical cliff (PASC10).

9.2.15.3.5 Site APSC11

This site lies at the end of a cliff to the east, and is 2.5 m to the south of the cliff's edge. It is a rectangular building whose outer walls run for 6.55 m from south-west to north-east and 7.3 m from north-west to north-east. The building is divided into two unequal spaces or rooms by a wall. Room 1 measures 1.38 m x 5.57 m, while room 2 is 3.65 m x 5.35 m (Fig. 9-110).

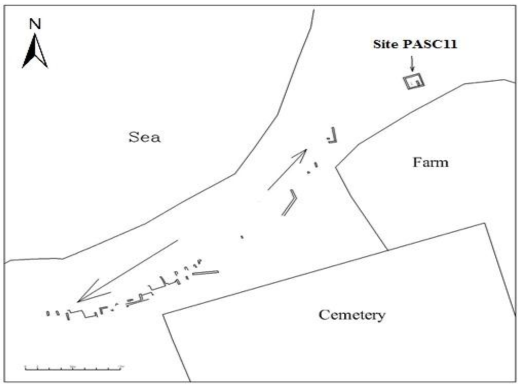

Figure 9-110: Sites PASC10 and PASC11.

9.2.15.4 Industrial features

9.2.15.4.1 Site APSC4

This site is a 200 m^2 pottery dump, which lies about 90 m to the north-west of site APSC3. The site might be connected to the pottery kilns located nearby, or more likely there is a kiln site under the dump as some firebricks and overfired wasters can be seen (Fig. 4-111).

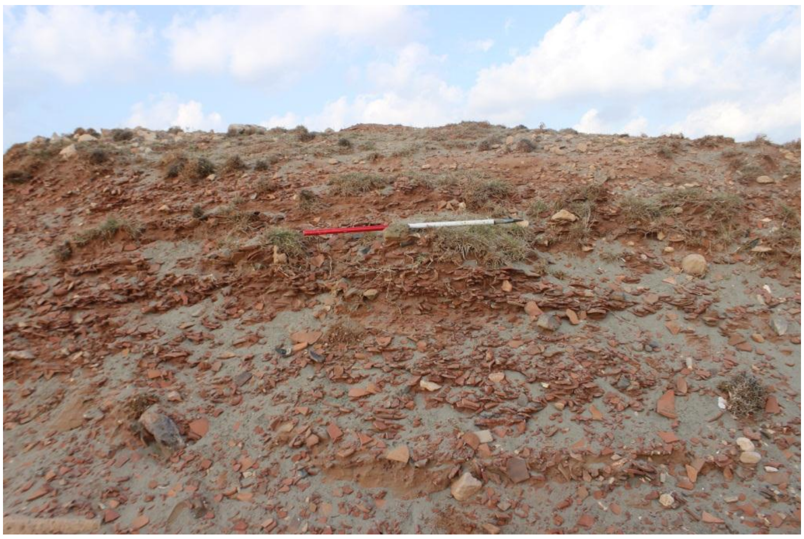

Figure 9-111: Site AHCS4. Looking east.

9.2.15.4.2 Site APSC7

This site is located to the north-east of site APSC6 and consists of two parts. The first rises about 7 m above sea level and is occupied by three (1, 2 and 3) pottery kilns. Generally, the kilns are rectangular and built in a row running from east to west. Kiln 1 lies to the east of kilns 2 and 3, and is the largest at 3.73 m x 2.87 m. Meanwhile kilns 2 and 3 measure 1.54 m x 2.70 m and 2.48 m x 2.62 m respectively. It is important to note that large-scale excavations are needed to get solid information about their shape. The western wall of kiln 3 continues to the north towards the sea for a distance of 21.73 m. Another sporadic wall 1.6 m to the front of the previous wall runs from east to north for a distance of 15 m (Fig. 9-112).

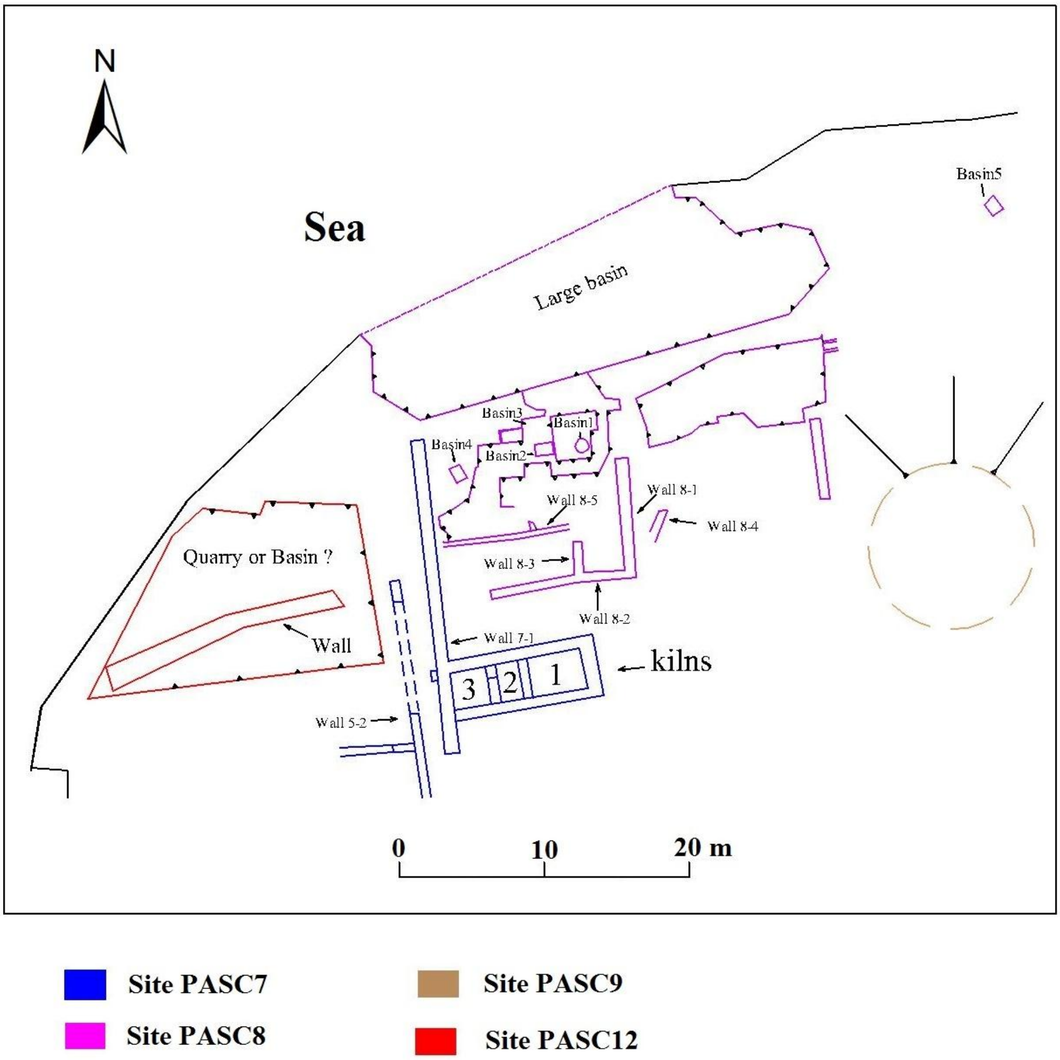

Figure 9-112: Plan of sites APSC7, APSC8, APSC9 and APSC12.

9.2.15.4.3 Site APSC8

This site is 7 m north of AHCS7 (Fig. 9-112). It seems that the site served as a courtyard for the pottery kilns (Site APSC7). It contains four basins and a number of walls which form rooms. Wall 8-1 falls smoothly from the supper area in the south, north of site APSC7, to the north towards the sea for a distance of 8.32 m. Wall 8-2 is connected to wall 8-1 from the south, and runs towards the west for 10.14 m. There is another wall (8-4) parallel to wall 8-1 from the north, which appears for only 2 m. The wall was built diagonally as a revetment wall.

2.81m from the corner of walls 8-1 and 8-2 is another wall (8-3) which runs to the north. Another wall (8-5) in front of wall 8-3 runs from east to west for 8.79 m. On the opposite side of the walls is a set of 4 basins cut into the rock. Basin 1 is circular and measures 1.6 m, and is cut into the higher level of the rocky ground. Basin 2 lies 1.35 m west of basin 1, and cut into a lower level of ground than basin 1.

The third basin (3) can be identified to the north of basin 2. Unfortunately, we can trace just a small part of its two sides as it has been eroded by the sea. On the western side of the interior wall of the basin is waterproof mortar.

Basin 4 lies to the west of basin 2 located in the upper rocky ground. It is rectangular in shape and measures 1.8 m x 0.78 m. The depth of these basins cannot be identified as they are full of sand. Another rectangular basin of 1.19 m x 0.83 m can be found 32 m to the north-east of basin 1. It is worth mentioning that the floor where basins 1, 2, 3 are located have different levels to the actual ground level itself.

Remarkably, there is a large basin cut into the rock lying in front of these features. It seems to be connected to the sea from the north, and measures 32 m x 9.59 m. It is difficult to determine its depth and how it connects to the sea as it is full of water and can only be traced in its upper limits.

9.2.15.4.4 Site APSC9

This site can be identified about 22 m to the east of kiln 1 (site APSC7). The area is covered with small burnt stones and fragments of firebricks and pottery sherds. The provisional interpretation is therefore that is was a kiln site. (Fig. 9-112).

9.2.15.4.5 Site APSC12

This site lies west of a cliff, and is about 1.36 m to the west of wall 7-2 of site APSC7 (Fig. 9-112). It is not clear if this site was a large basin, or a quarry used in a later period as a basin. The south-west and western sides are hit directly by waves which cause erosion to these parts. The total area of this cut measures 189 $m^{2.}$

The eastern and southern sides are 11 m and 20 m respectively. Discernible are the remains of a wall running 7 m from the eastern side, which then deviates gradually and goes in a straight-line toward the south-west (sea side) for 10 m.

9.2.15.4.6 Site APSC13

This site lies 12 m to the west of site APSC5. It is a set of vats (numbered from 1 to 8) on the rocky area overlooking the sea (Fig. 9-113). All the vats cut into the rock are circular in shape and lined with *opus signinum.* Their diameters are 0.90 m, 0.80 m, 0.90 m, 0.80 m, 0.80 m, 0.70 m, 0.70 m, and 0.80 m respectively, with unidentified depths. There are two rows of small slots measuring 0.2 m in diameter with a depth of 0.4 m. The first row contains 8 slots, while the second row contains of 11.

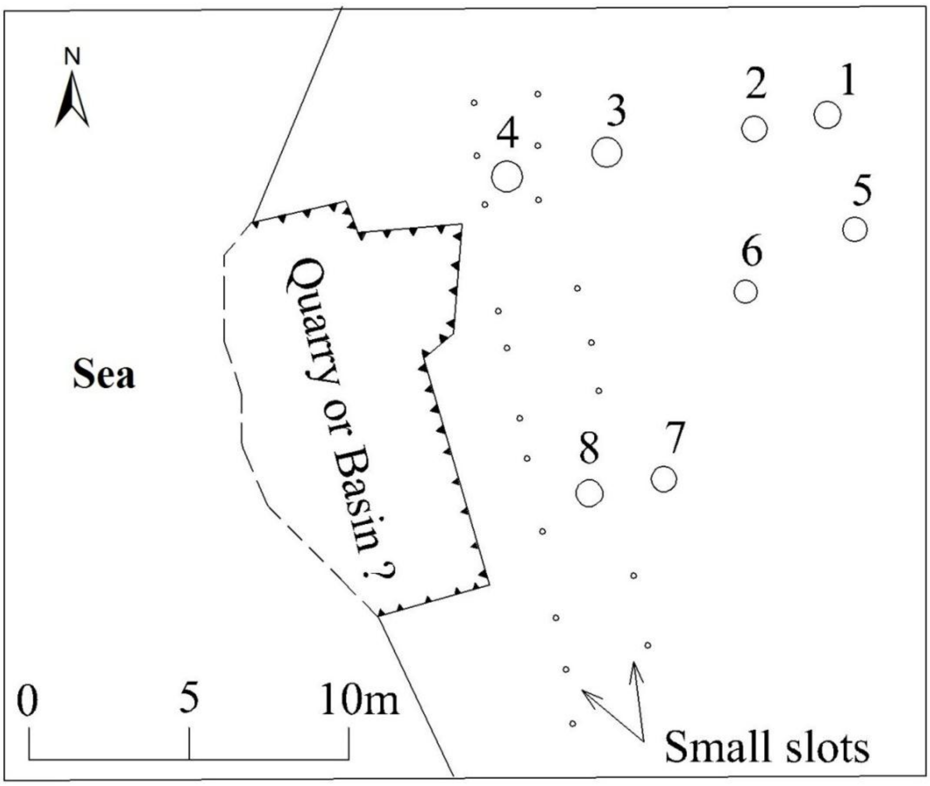

Figure 9-113: The distribution of vats within site APSC13.

9.2.15.4.7 Site APSC14

This site occupies a small rocky island adjoining the shore about 200 m to the west of site APSC13. The depth of the water around the island varies. For instance, on the shore side the water does not exceed 0.5 m in depth, whereas on the other sides the water is 1.5 m to 2.5 m deep. The site consists of 12 circular vats, which were built in line (Fig. 9-114), cut into the rock. These vats vary in size with diameters of 1.1 m, 0.85 m, 1.1 m, 1.15 m, 1.6 m, 2.8 m, 1.7 m, 0.9 cm, 2.2 m, 1.7 m, 2.3 m and 2.4 m. In this area are also a number of small slots about 0.2 m long cut into the rock. This might suggest that a roof covered the vats, and that the slots were post-holes to support wooden columns holding the roof. All the vats in both areas are lined with *opus signinum*.

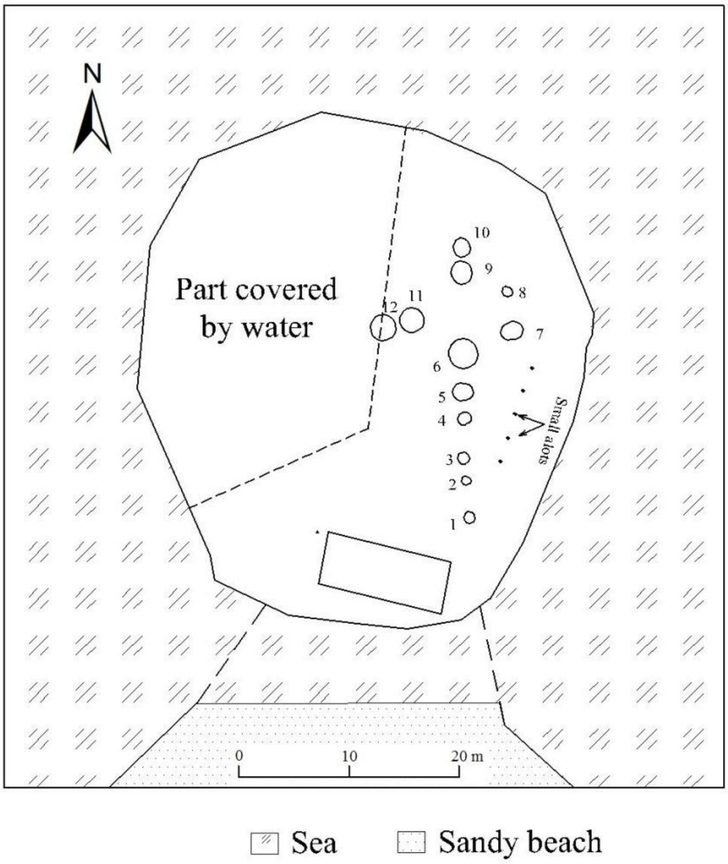

Figure 9-114: General plan of site APSC14

9.2.15.5 Other features (Tombs and Quarries)

A number of tombs cut into the rock are located to the south-east and south-west of the basin areas. However, time limitations meant I was not able to document these during my field survey.

9.2.15.6 Conclusion

There were 14 sites at Aptouchou. Five of them were located along the shore, while seven were situated in the hill area (Table 9-5). Seven of the documented sites seem to have had an industrial function. These sites are distributed between the hill and the shore (Fig. 9-115 and 9-116). All the sites recorded along the shore appear to have been involved in industrial activities. Other recorded sites include buildings and a set of walls which are difficult to analyse, although their location near to the industrial features suggests they might be related to these activities or were used for storage.

	Site Location			Site Type		
Sub-Site	Shore area	Top of the Hill	Cliff area	Buildings and Walls	Industrial Features	Tombs and Quarries
APSC1				?		
APSC3		√		√		
APSC4		√			√	
APSC5		√		√		
APSC6				√		
APSC7		√			√	
APSC8	√				√	
APSC9		√			√	
APSC10			√	√		
APSC11		√		√		
APSC12	√				√	
APSC13	√				√	
APSC14	√				√	

Table 9-4: The archaeological remains at ancient Aptouchou.

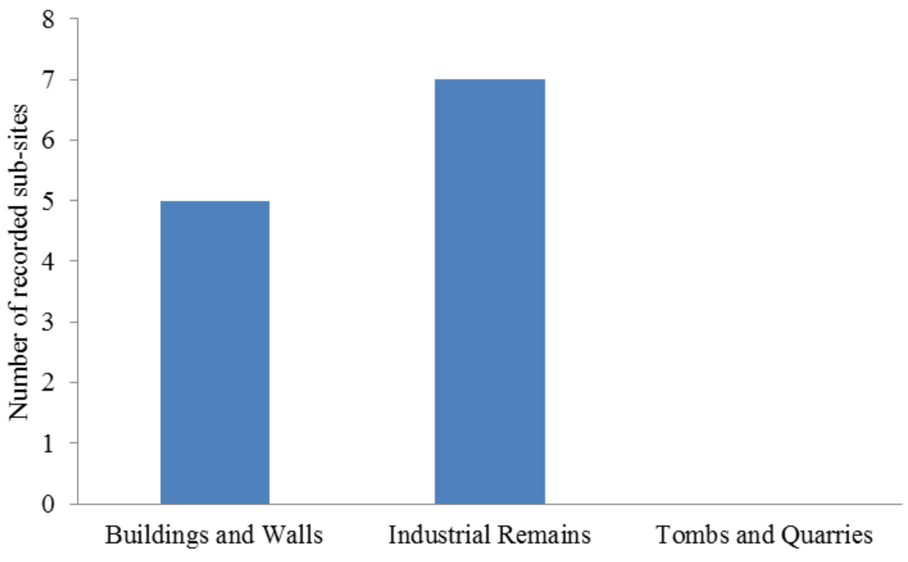

Figure 9-115: The archaeological remains at ancient Aptouchou.

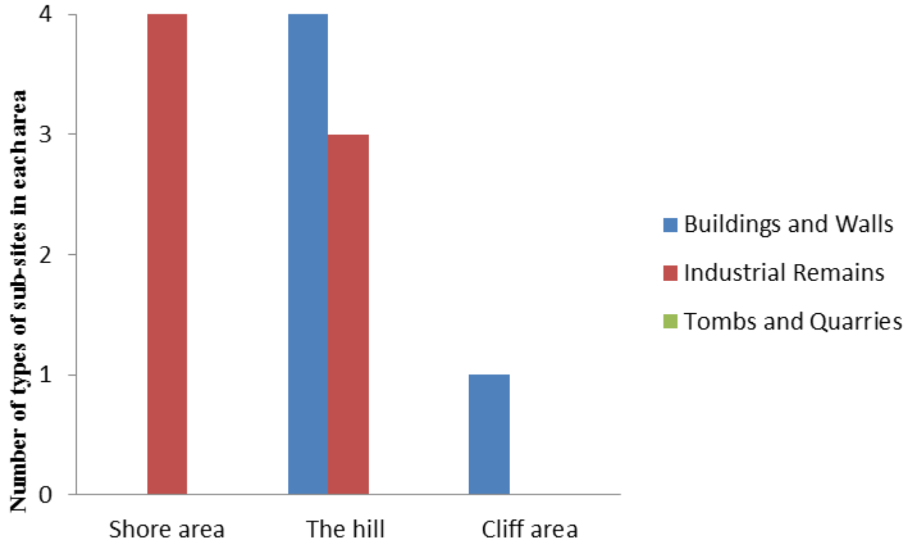

Figure 9-116: The distribution of archaeological remains at Aptouchou.

9.2.16 Kainopolis (El- Agla)

9.2.16.1 Introduction

Kainopolis lies 30 km north-west of Phycus (Zawiet el-Hamama) and 35 km east of the ancient site of Ptolemais (Tolmeta). The site was visited and surveyed during the three stages of my fieldwork (SCSC) for assessment, extensive and intensive surveys. During this work 15 sub-sites were recorded and documented (see Chapter 3). The site was given the code AGSC, and each sub-site had the same code followed by a number (see section 3.4.5.12 in Chapter 3).

9.2.16.2 Location of the sites

The sites documented at ancient Kainopolis (el-Agla) were distributed between three main loci (Fig. 9-117 and Table 9-6). The geographical locations of these three areas are the foreshore area, the hilltop area, and the foothills. The first area has an industrial nature, as large quantities of industrialised evidence are scattered along the shore plain. The coastal plain of Kainopolis (el-Agla) seems to be the narrowest coastal plain along the Cyrenaican coast (see section 3.2 in Chapter 3) and is only about 150 m wide. Seven sub-sites were recorded (KASC1-7).

The second position occupies the top of the hill which rises about 30 m above sea level. This area seems to have had a civilian character. There were seven sub-sites in this part of Kainopolis (KASC8-14).

The third part, the foothill area, lies 200 m away to the west of the opposite slope of the hilltop and about 600 m south-west of the shoreline remains. The area seems to have served as a necropolis, as a number of tombs were recorded here (KASC15).

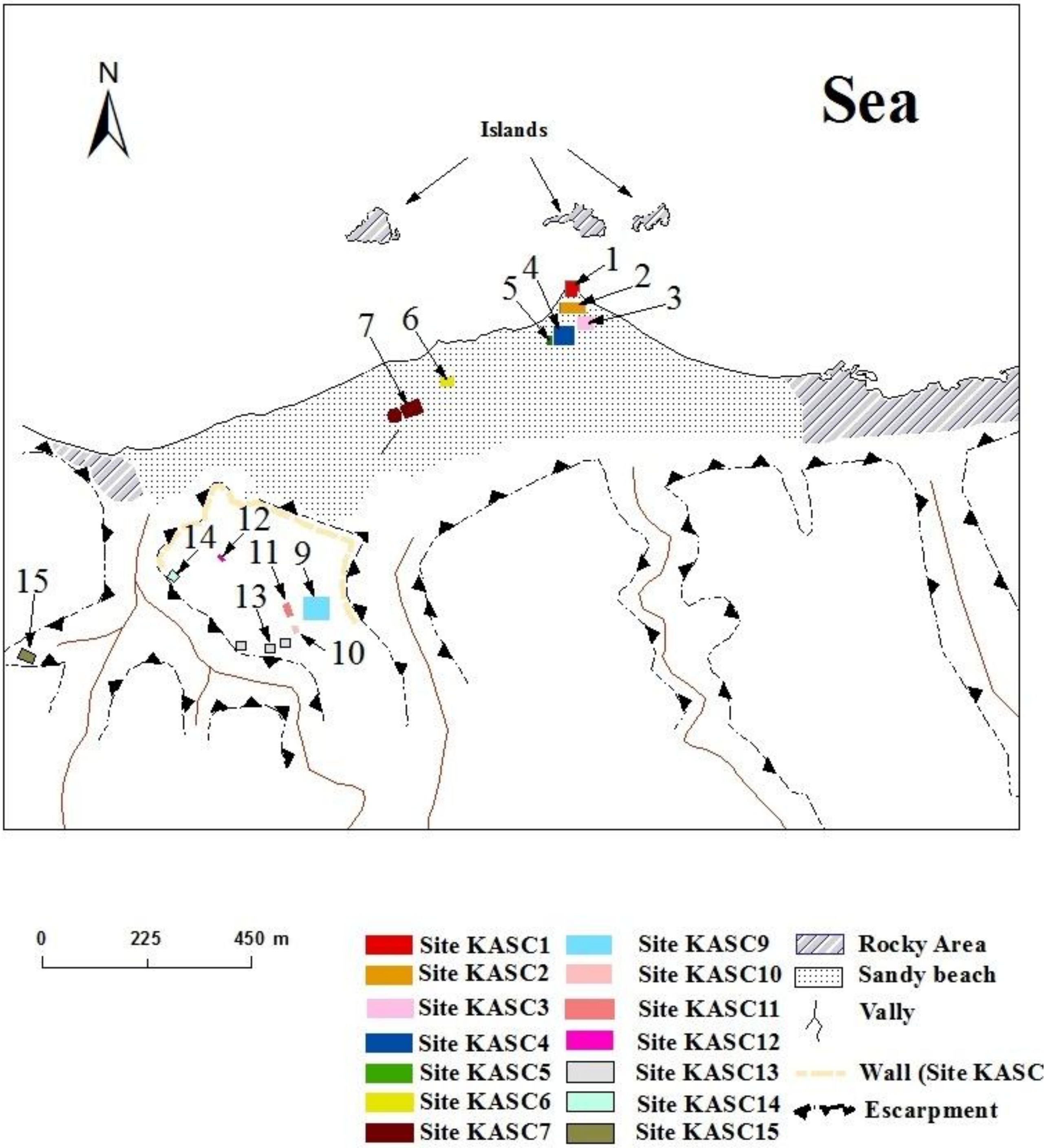

Figure 9-117: The distribution of sites at Kainopolis (el-Agla).

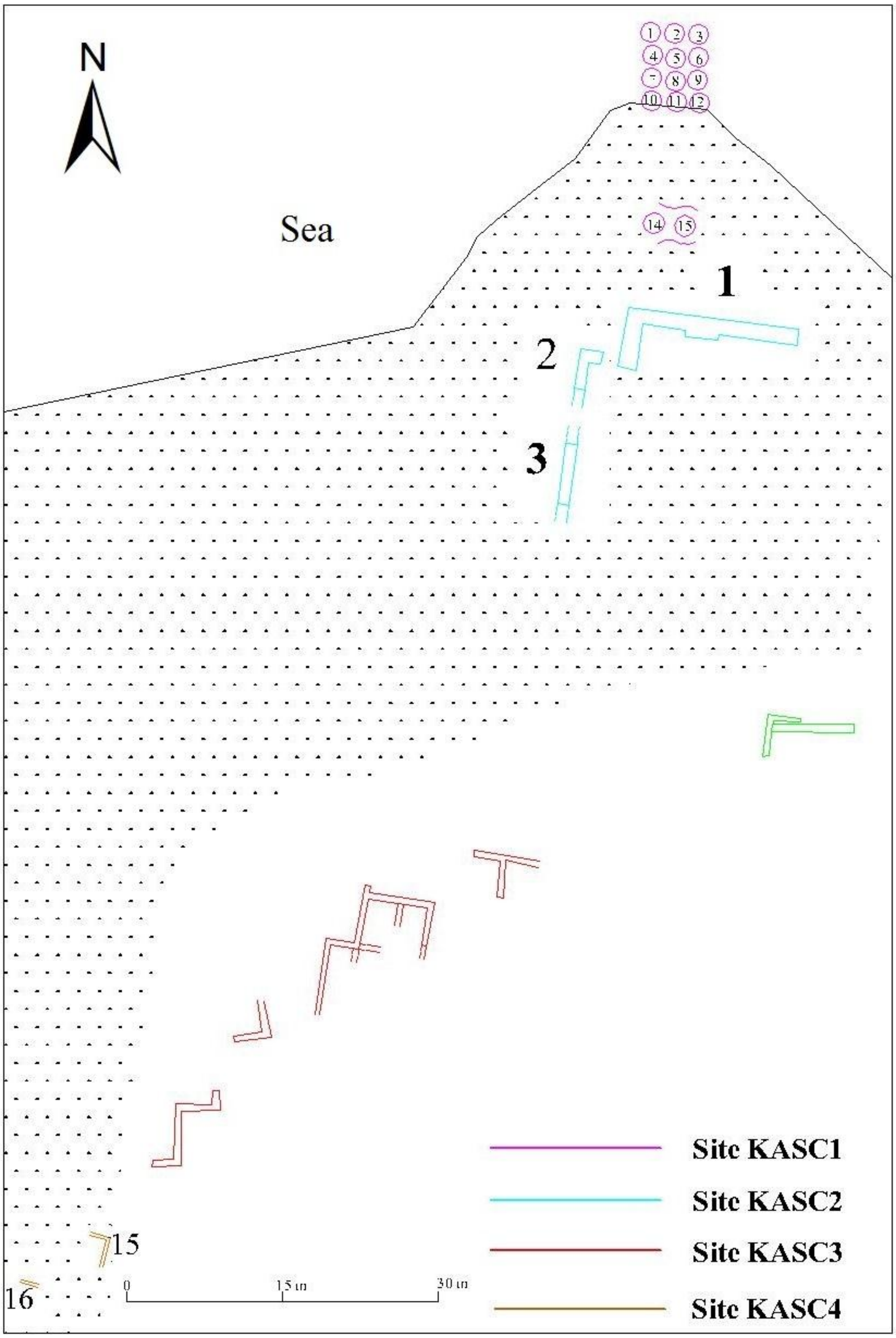

Figure 9-118: Plan showing the distribution of sites KASC1, KASC2, KASC3 and KASC4.

Sub-Site	Site Location		
	Shore area	Top of Hill	Foothill
AGSC1	√		
AGSC2	√		
AGSC3	√		
AGSC4	√		
AGSC5	√		
AGSC6	√		
AGSC7	√		
AGSC8		√	
AGSC9		√	
AGSC10		√	
AGSC11		√	
AGSC12		√	
AGSC13		√	
AGSC14		√	
AGSC15			√

Table 9-5: The distribution of sites within Kainopolis.

9.2.16.3 Buildings and walls

9.2.16.3.1 Site KASC2

This site is located along the shore, and consists of a set of 3 walls located 10 m to the south of site KASC1 (see below). They appear to be part of a building, which seems to have collapsed in a later period. Wall 1 is in the shape of the letter L. Its long side measures 16.46 m and is about 1m high. It runs from west to east, while the short side runs from north to south for 5.73 m. Wall 2 also forms the shape of the letter L, but seems to be smaller than wall 1. Its longer side runs from north to west for 3.89 m, while the shorter side runs from west to east for 2.17 m. Both sides are 0.5 m high. Wall 3 is parallel to wall 2, and they appear to have been connected. It is 5.88 m long and less than 0.3 m high. All the walls appeared to be connected, forming a building which seems to have served site KASC1 (Figs. 9-118 and 9-119).

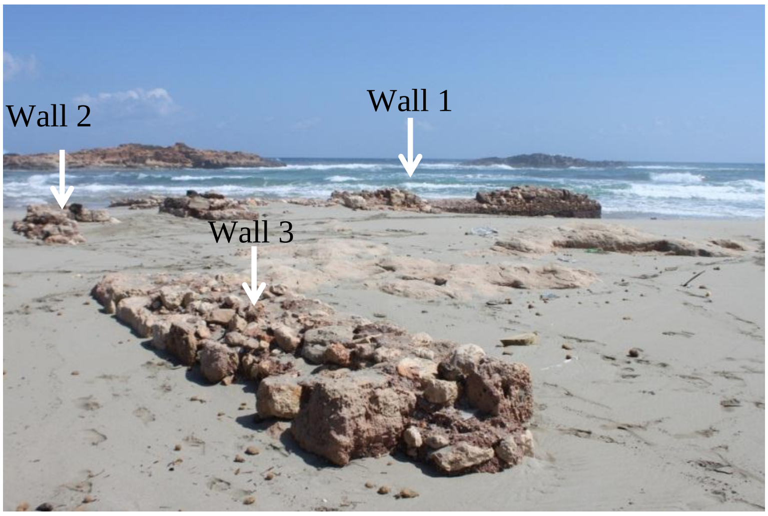

Figure 9-119: Walls (1, 2 and 3) within site KASC2. Looking north-east.

9.2.16.3.2 Site KASC3 and Site KASC4

These sites seem to be a set of buildings, considerable parts of which are covered by sand. In some cases it is possible to trace the outlines of walls, which seem to form square and rectangular rooms. Traces of burning appear on some of the interior walls of some rooms (Figs. 9-118 and 9-120).

Figure 9-120: Outline of rooms at site AGCS3 and traces of burning in the north-east corner. Looking north-east.

9.2.16.3.3 Site KASC8

The remains of an enclosure extending from the east, north and west for a distance exceeding 900 m are apparent. There are no traces of the enclosure to the south and south-eastern sides. Both sides are higher than other parts of the hill and are impossible to climb. The western side of the fence seems to be built of two layers of unshaped and unequally-sized limestone pieces.

9.2.16.3.4 Site KASC9

This area is occupied by a massive ruined church. The building has a rectangular outer wall measuring 32.8 m from north to south and 36 m from west to east. At the western end is an apse. The main narthex is divided into three naves by two rows containing 8 piers *in situ* (Figs. 9-121).

The middle nave is about 6.3 m wide and 20 m long, while the other two are smaller 2.5 m wide. On the north side of the church walls are rectangular and square rooms (rooms 1-4) measuring 3.7 m x 8 m, 5 m x 3.7 m, 3.4 m x 3.7 m and 4 m x 3.7 m respectively. Abdussaid et al. (1984) mentioned that there are traces of a second floor on this side, and a mosaic pavement in the middle nave (Ward-Perkins et al. 2003).

However, during my visits to the site in 2010 and 2012 there were no signs of a second storey or a vaulted area. This might be due to the severe damage that occurred to the building. Also, the demolition of a major part of the church prevented the identification of any mosaic pavements, whether in the narthex or in any other part of the church. The building has two gates, a main entrance in the eastern wall facing the apse, and is about 10 m wide. The secondary door is located in the middle of the northern side of the church’s wall. This gate seems to open onto another collapsed corridor or courtyard, as some walls and remains can be traced.

The external walls have been reinforced by a sloping revetment. This church’s structure is reminiscent of other church buildings in Cyrenaica (Ward-Perkins et al. 2003). An illegal pit has been dug recently to the north-west of the main nave, suggesting that a cellar or basement was cut into the rock beneath the main nave. However, it is difficult to prove as an accumulation of the church’s building materials covers the whole area. Medium-sized white marble columns can be found in this pit.

There appears to be another corridor or courtyard attached to the church from the northern side which has a 1 m wide entrance in the east. The inside columns of the church were white marble, and the CSCS team recorded a white marble column in the north-western part of the nave (Fig. 9-122). This column is similar to the western church columns at Latrun and the Middle church of Apollonia (Laronde and Michel 2004).

Figure 9-121: The middle nave, pillars and apse. Looking west.

Figure 9-122: The marble columns found in the church.

9.2.16.3.5 Site KASC10

30 m from the south-west corner of the church are the remains of a more-or-less square building measuring 16 m from north to south and 14 m from east to west. The condition of this building is very poor. Outlines can be detected only for some parts of the walls and gates, and are less than 1m wide. The function of the building is also unclear (Fig. 9-123).

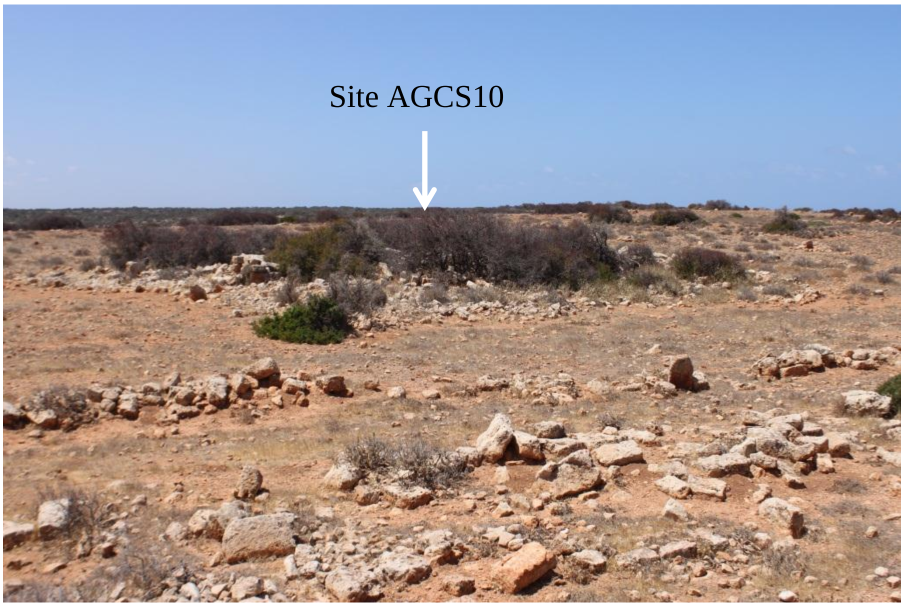

Figure 9-123: General view of site KASC10. Looking south-west.

9.2.16.3.6 Site KASC11

Another building lies 26 m west of site KASC9 and 24 m north of site KASC10. It is in a poor and decaying condition. Only the accumulation of stones and masonry can be seen. The general area of occupation of the building materials is 28 m from south to north and 14 m from east to west (Fig. 9-124).

Figure 9-124: General view of site KASC11. Looking south.

9.2.16.3.7 Site KASC12

To the north-west of sites KASC9 and KASC11 is another rectangular building in poor condition which can only just be traced through its walls.

9.2.16.3.8 Site KASC14

This site is located to the south of the hilltop 38 m to the west of site KASC13. The zone is a rectangular fortification or watch tower measuring 18.1 m from west to east and 14.7 m from south to north (Fig. 9-125). Laronde (1983) provides different dimensions: a square shape measuring 25 m x 25 m. The internal walls have been supported by an external sloping revetment. The remaining walls are about 1 m high in some parts, and less than 1 m in other areas. 8.4 m to the external wall and 19 m to the east side of the building is a longitude wall running from south to north. It is 0.6 m wide and about 0.75 m high (Fig. 9-126).

Figure 9-125: Site KASC14 and part of the enclosure (KASC8). Looking south.

Figure 9-126: The eastern wall within site KASC14. Looking east.

9.2.16.4 Industrial features

9.2.16.4.1 Site KASC1

This site contained a set of twelve vats (1 to 12) lying in shallow water and installed in four rows (Figs. 9-118 and 9-127). Each row consists of three vats which were 2 m in diameter. As they are covered by water and sand their depths could not be identified, and it is difficult to assess whether they are lined with *opus signinum*. This set of vats is located a few meters to the south of two islands (1 and 2), which along with island (3) to the west seems to form an anchorage for a port (Fig. 9-128). These islands seem to have a group of tanks cut into the rock.

The second set of vats (13 and 14) is located 10 m to the south of the first set, and consists of two circular vats built of small stones mixed with *opus signinum* and small ceramic fragments (Fig.9-129). They are about 2 m in diameter, while their depths could not be identified as the vats were above ground level and what remains does not exceed 0.2 m in height.

Figure 9-127: Vats (1-12) within site KASC1. Looking north.

Figure 9-128: Google Earth image showing the three islands at the ancient site of Kainopolis (el-Agla).

Figure 9-129: Vats (13 and 14) within site KASC1. Looking east.

9.2.16.4.2 Site KASC5

To the south-west of vats 13 and 14 are vats 15 and 16, which are built of stones and lined with a thick layer of *opus signinum* (Fig. 9-130). It is difficult at the moment to understand the whole area without excavations. However, by tracing what appears on the ground it seems that they are rectangular in shape and therefore similar to vat 17 to the west.

Figure 9-130: Vat 15 within site KASC5. Looking south.

Figure 9-131: Vat 17. Looking north-west.

9.2.16.4.3 Site KASC6

Vat 17 built of stone and lined with a thick layer of *opus signinum* is located to the south-west of vat 16. Unlike the previous examples, this one is rectangular with a dimension of 1.5 m x 2 m. Only its floor still exists (Fig. 9-131).

9.2.16.4.4 Site KASC7

The site lies a few hundred meters to the west of site KASC6 and about 50 m to the south of the sea. It is a building now covered in sand. However, some of the walls, rooms and gates can be traced. At the forefront of the site on the west side is a large circular vat built of stones and lined with *opus signinum*. Massive amounts of pottery sherds and firebrick fragments are present in the adjacent area, which seems to indicate that there might have been a pottery kiln somewhere nearby (Figs 9-132, 9-133 and 9-134).

Figure 9-132: Part of the remains of site KASC7. Looking south-west.

Figure 9-133: Part of the remains of site KASC7. Looking south-west.

Figure 9-134: Pottery sherds and fragments of firebricks scattered in the area. Looking west.

9.2.16.5 Other features (Tombs and Quarries)

9.2.16.5.1 Site KASC13

At the southern edge of the hilltops is a quarry which occupies an area of 450 m. It appears that all the buildings in this area were built of stones cut from this source.

9.2.16.5.2 Site KASC15

This site consists of a set of tombs cut into the rock. Two types of tombs were recorded. The first type contains four groups of tombs cut into the rock. The first set consists of two tombs (Tombs 1 and 2), both of which have an entrance 1 m wide and an exposed height of about 1 m. The entrances lead to two longitudinal rooms opening on to each other containing two graves. To the right of the entrance of tomb 1 is a rectangular niche in the eastern side of the main foyer of the tombs (Fig. 9-135). This group takes the highest position between the other two groups.

The second group is located in a lower position a few meters to the north-west of the first group. The area contains three tombs (Tombs 3, 4 and 5) (Fig. 9-136), each of which has an entrance 1 m wide and an exposed height of less than 0.75 m. Tombs 3 and 4 have the same character as tombs 1 and 2, with their entrance leading to longitudinal rooms. Tomb 3 contains three burial places, while tomb 4 contains two graves. Tomb 5 is different to the other category within this set as the gate leads to a square burial room. The third group has 3 tombs (Tombs 6, 7 and 8) (Fig. 9-137) which have the same character and features as tombs 1, 2, 3 and 4. This group lies in a lower position a short distance to the north-west of the previous group. All the previous groups share the same general characteristics, decorations and motifs. On both sides of the entrances are Doric fluted columns, on top of which are architraves and friezes with triglyph decorations. There are cornices which have been decorated with the shapes of eggs and tongues. Some of these features have fallen down, while others are still *in situ.*

The last set in this type is group four, which is located a few meters north-west of group three. This group is very different from the others. It contains one tomb (Tomb 9) (Fig. 9-138) which has a single entrance leading to a square room with a rectangular niche in its southern wall. In the south-west corner of this room is another gate leading to another square room. On top of the main entrance is a small niche. The second type of tombs are stone coffins distributed around the first type (Fig. 9-139).

Figure 9-135: Group 1 tombs 1 and 2 within site KASC15. Looking south.

Figure 9-136: Group 2 tombs 3, 4 and 5 within site KASC15. Looking south-west.

Figure 9-137: Group 3 tombs 6, 7 and 8 within site KASC15. Looking south.

Figure 9-138: Tomb 9 within site KASC15. Looking south.

Figure 9-139: Example of a stone grave from within the KASC15 area.

9.2.16.6 Conclusion

According to the recorded initial archaeological evidence, the urban aggregation of Kainopolis (el-Agla) seems to have been well-established. The shore area seems to have been assigned to industrial and commercial activities (see Chapter 5). Interestingly, all five sites that had apparent manufacturing characteristics were distributed along the shoreline, with a total absence of such features on other parts of the site (top hill or foothill) (Table 9-7 and Fig 9-140 and 9-141). On the other hand, the top hill area appeared to be allocated to administrative and civic activities, as the more substantial buildings such as the church and fort seemed to be situated there.

Sub-Site	Site Location			Site Type		
	Shore area	Top of Hill	Foothill	Buildings and Walls	Industrial Features	Tombs and Quarries
KASC1	√				√	
KASC2	√			√		
KASC3	√			√		
KASC4	√				√	
KASC5	√				√	
KASC6	√				√	
KASC7	√				√	
KASC8		√		√		
KASC9		√		√		
KASC10		√		√		
KASC11		√		√		
KASC12		√		√		
KASC13		√				√
KASC14		√		√		
KASC15			√			√

Table 9-6: The archaeological remains recorded at ancient Kainopolis.

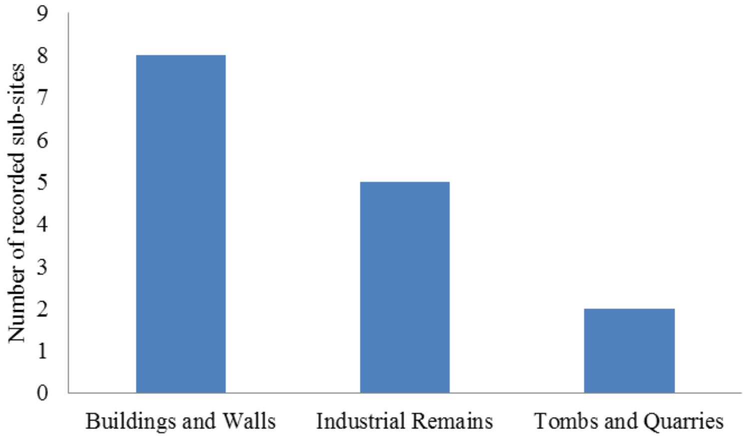

Figure 9-140: The archaeological remains of ancient Kainopolis.

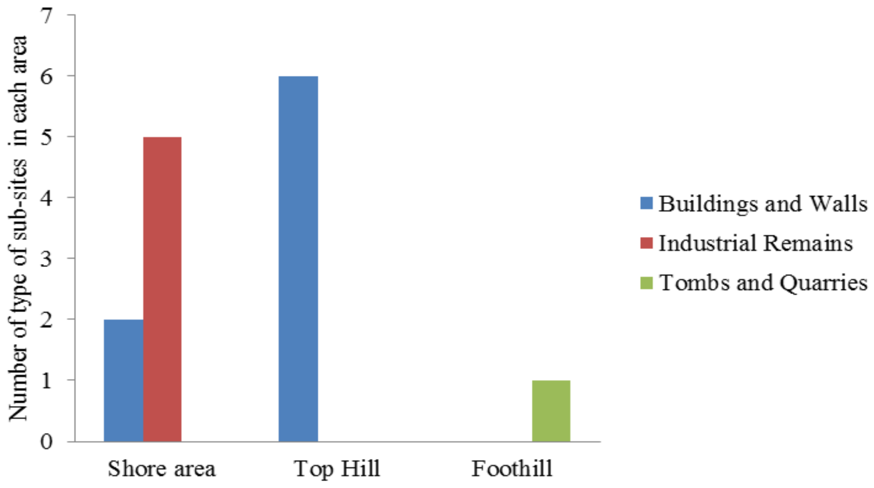

Figure 9-141: The distribution of archaeological remains.

However, the opposite foothill was devoted to the necropolis, which can be demonstrated through the number of tombs scattered there. The residential part, on the other hand, was could not be identified as my field survey was confined to the three mentioned areas. However, the site might extend to the south, where agriculture activities may have taken place.

9.3 General conclusion

The huge number of structural remains recorded by the SCSC survey indicates that the coast of Cyrenaica was very active. This is particularly remarkable if we take into account that my study area concentrated on only a small part of the Cyrenaican coast. The survey covered only 12% of the total coastal strip of Cyrenaica, yet still produced over 144 sites. Furthermore, more than 22% (Fig. 9-142 and Table 9-142) of these recorded sites seemed to have had a considerable role in industrial and productive activities (see Chapter 5 for more discussion about these productive sites).

The large number of documented buildings (or signs of buildings), which amount to about 44% of the documented sites, also led us to rethink the role and scale of habitation on this coastal stretch of the Mediterranean. However, further investigation along with an extension of the survey area to the east and west is needed to produce more information about ancient coastal settlements and activity along the Cyrenaican coast. The overall picture of these recorded features highlights the huge importance of the area, and its significance in antiquity as an active settlement which seems to have been underestimated.

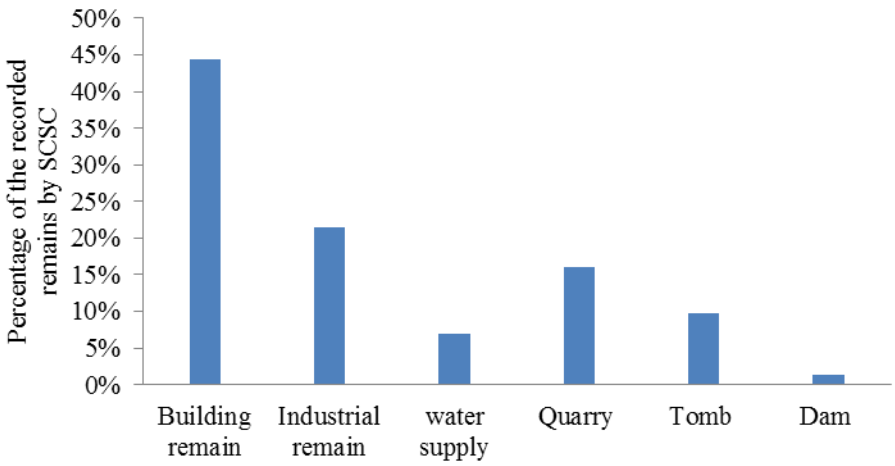

Figure 9-142: The percentage of types of recorded features within the study area.

Site	Building remains	Industrial remains	Water supply	Quarry	Tomb	Dam
Cherronesus	10	2	0	0	1	0
Noat 1	2	1	2	2	1	0
Noat 2	1	1	1	1	0	0
Mahel Mael	1	3	0	0	0	0
Sil Amer	1	1	0	0	0	0
Assa Mosa	1	1	0	0	0	0
Cape of Phycus	2	3	1	1	0	0
Phycus	22	7	3	4	1	1
El-Shmariah	2	0	0	1	0	0
Aluet Um-Elnamel	2	1	0	1	0	0
SW Aluet Um-Elnamel	0	0	1	0	0	0
El-Best	1	0	0	0	0	0
Shaat el-Marakeb	5	0	2	2	0	1
Aptouchou	5	7	0	0	0	0
El-Hesi	1	0	0	0	0	0
Kainopolis	8	4	0	1	1	0

Table 9-7: The quantity of each individual type of remains found within the study area.

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Appendices

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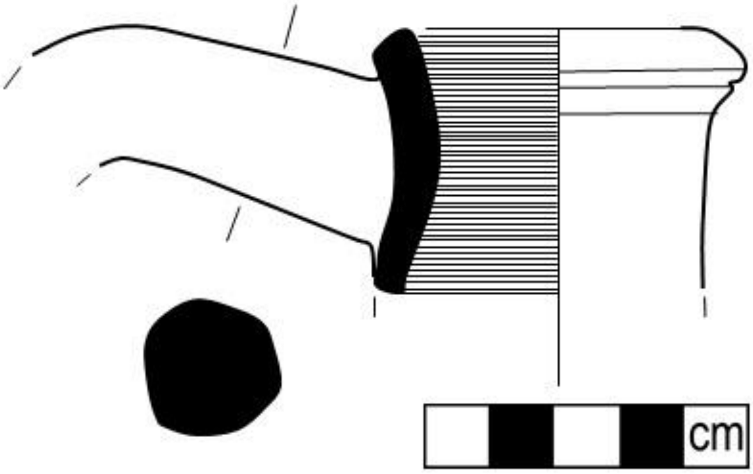

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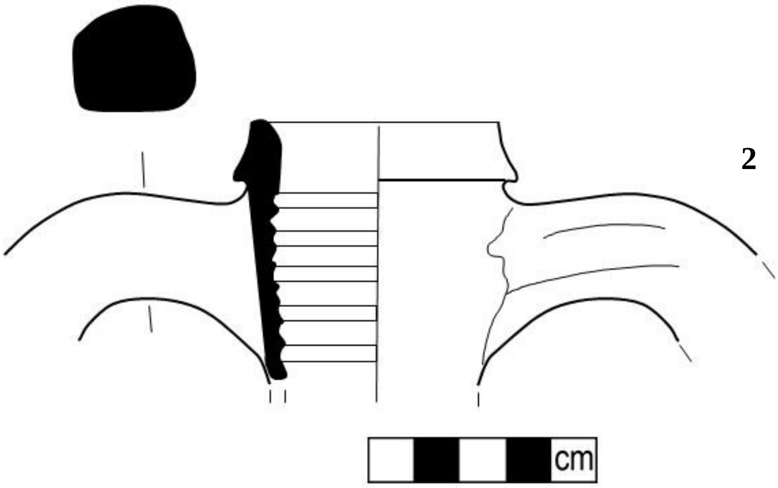

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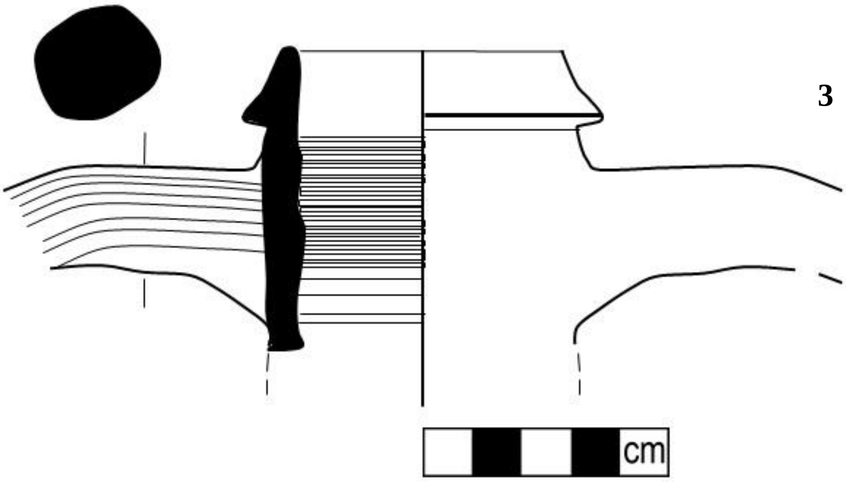

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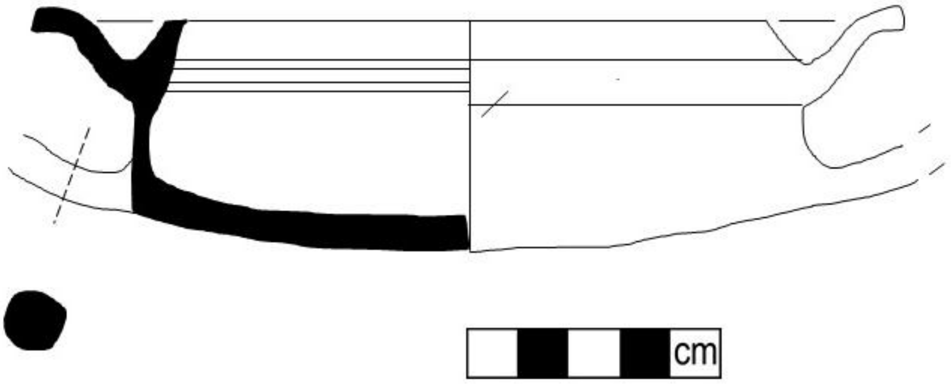

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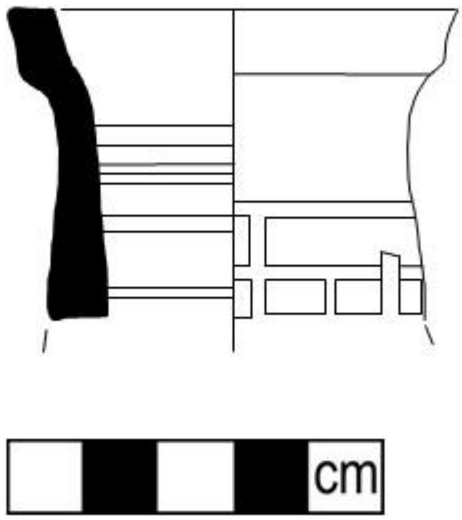

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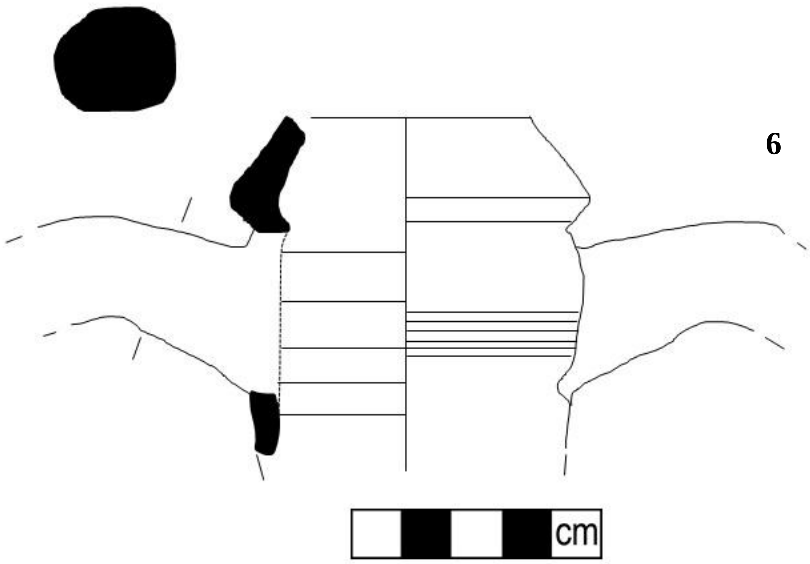

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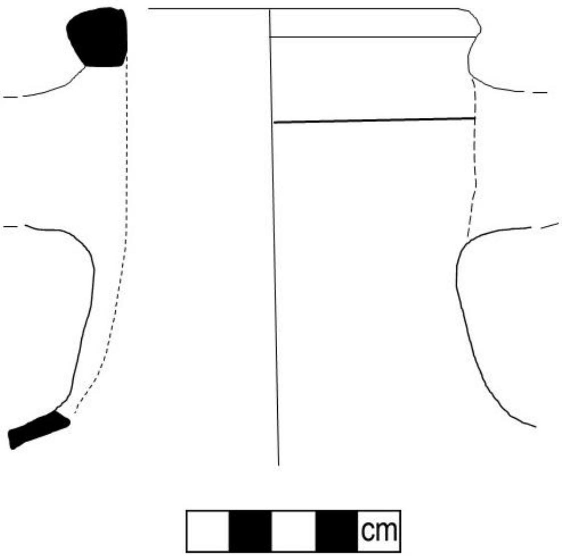

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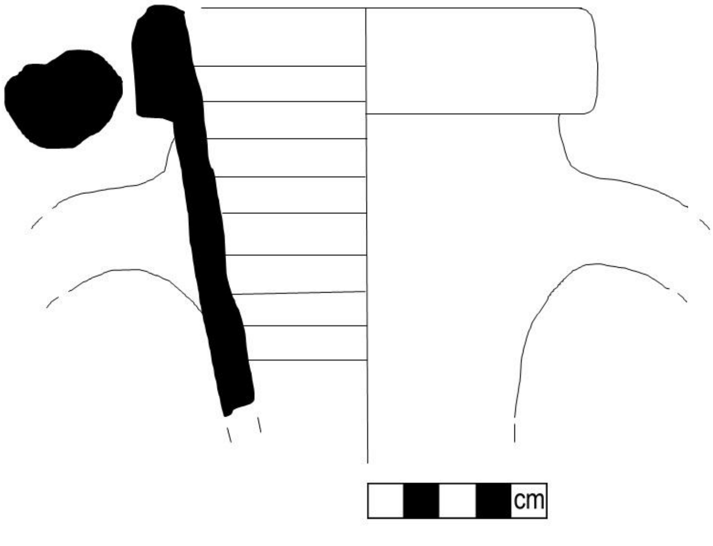

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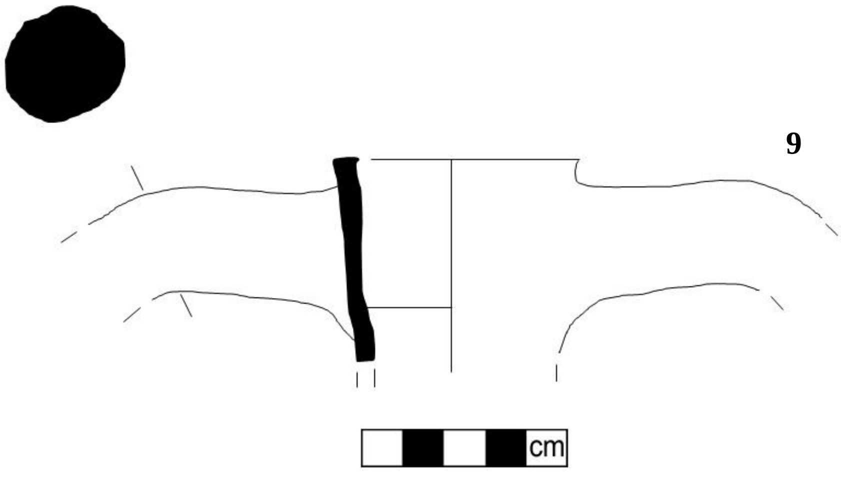

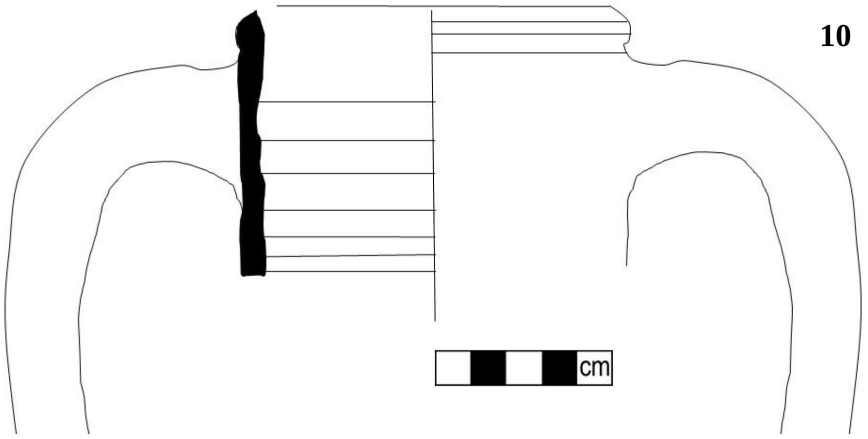

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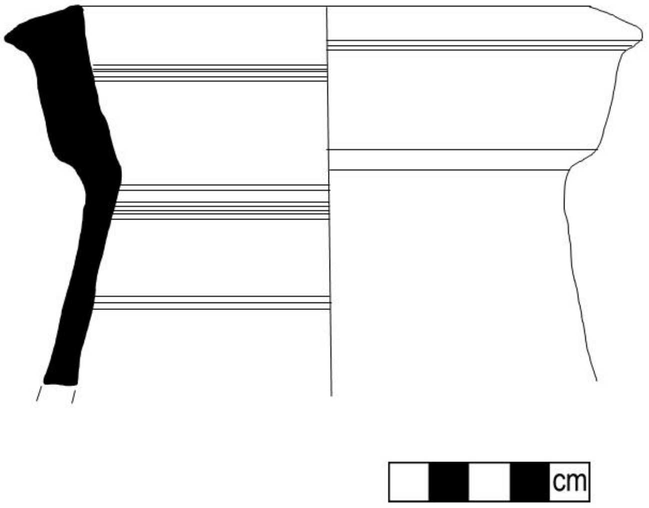

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Figure A-1: Example of pottery sherds collected and drawn by SCSC survey

Sequence	Sherd Type	Origin	Date	Collected Place
1	Mid Roman Jug	Local	MR	Cape of Phycus
2	Mid Roman Amphora	Local	MR	Aptouchou
3	Mid Roman Amphora	Local	MR	Cape of Phycus
4	Cooking Ware	Unassigned	LR?	Phycus
5	Jug Rim?	Unassigned	MR?	Cape of Phycus
6	Mid Roman Amphora 1 (Type B)	Local	MR	Cape of Phycus
7	Late Roman Amphora 1	Cilicia/Cyprus	LR	Cherronesus
8	Lamboglia 2 Amphora	Adriatic Coast	1 BC	Cherronesus
9	Amphora	Unassigned	MR?	Mahel Mael
10	Mid Roman Amphora 5 (Riley’s Type)	Sicily	MR	Aptouchou
11	Tripolitania III Amphora	Tripolitania	MR	Aptouchou

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Figure A-2: Examples of pottery collected from Cherronesus (Ras El-Tin) by SCSC

Sequence	Sherd type	Origin	Date	Collected place
1	Rhodian Amphora Handle?	Rhodes	BC	Cherronesus
2	Late Roman Amphora 1 Sherd	Cilicia/Cyprus	LR	
3	Gaza Amphora Handles	Gaza	LR	
4	Late D Ware (Cypriot Red Slip Ware)	Anatolia	LR	
5	Late C Ware (Phocean Red Slip Ware)	Phocea	LR	
6	African Red Slip Ware	Africa	LR	

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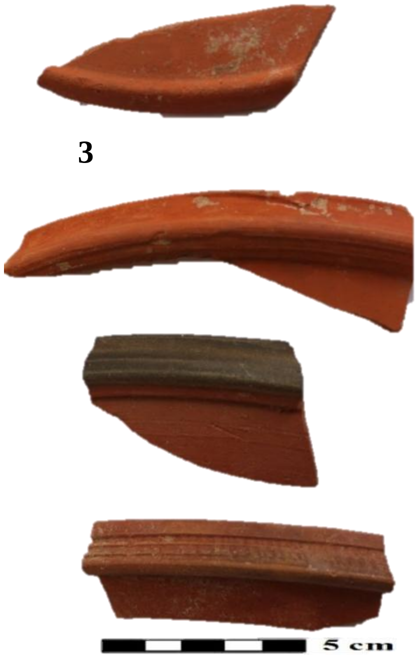

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Figure A-3: Examples of pottery collected from Phycus (El-Hamama) by SCSC survey

Sequence	Sherd type	Origin	Date	Collected place
1	Late Roman Amphora 1 Handles	Cilicia/Cyprus	LR	Phycus
2	Late Cooking Ware (casserole 38) Handles	Egypt	LR	
3	Late C Ware (Phocean Red Slip Ware)	Phocaea	LR	
4	Spatheion Amphora 1 Base	Nabeul? Tunisia	LR	
5	Handmade Cooking Ware Handles	Local	LR	
6	Samos Cistern Type's Amphora	Samos	LR	
7	African Red Slip Ware	Africa	LR	
8	African Amphora Rim (Keay 62A)	Tunisia	LR	
9	Late Roman Amphora 1b Sherd	Cilicia/Cyprus	LR	
10	Late Roman Jug 1 (Riley's Type) Sherd	Athens?	LR	

Figure A-4: Stones anchors recovered from Phycus

Figure A-5: Two coins belong to the Augustan period found at Phycus

Figure A-6: Nails collected from Phycus

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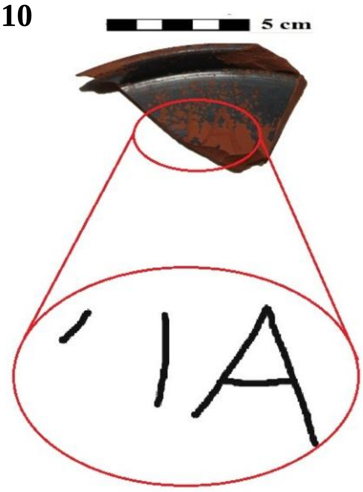

Figure A-7: Examples of pottery collected from Phycus (el-Hamama) by SCSC survey

No.	Sherd type	Origin	Date	Collected Place
1	Mid Roman Amphora Handles	Local	MR	Aptouchou
2	Aegean Cooking Ware 1 (Riley's type)	Aegean (Knossos?)	MR	
3	Tripolitania III Amphora	Tripolitania	MR	
4	Mid Roman Amphora 1 Rim	Local	MR	
5	Late Roman Amphora 1 Rim	Cilicia/Cyprus	LR	
6	Late Roman Amphora 2 Sherds	Chios/Cnidos	LR	
7	Black-Glazed Sherds	Attic?/ Campana?	4/3BC	
8	Mid Roman Jug 2 (Riley's Type) Rim	Local	MR	
9	Hellenistic Plain Ware 5 Handle (Riley's Type)	Local ?	Hellenistic	
10	Black-Glazed Sherd	Unassigned	Hellenistic	

Figure A-8: Unguentaria were collected from Aptouchou (El-Hanya). They date back from the second century AD onwards

Figure A-9: Terracotta foot found at El-Hesi

Figure A-10: Jars found at El-Hesi

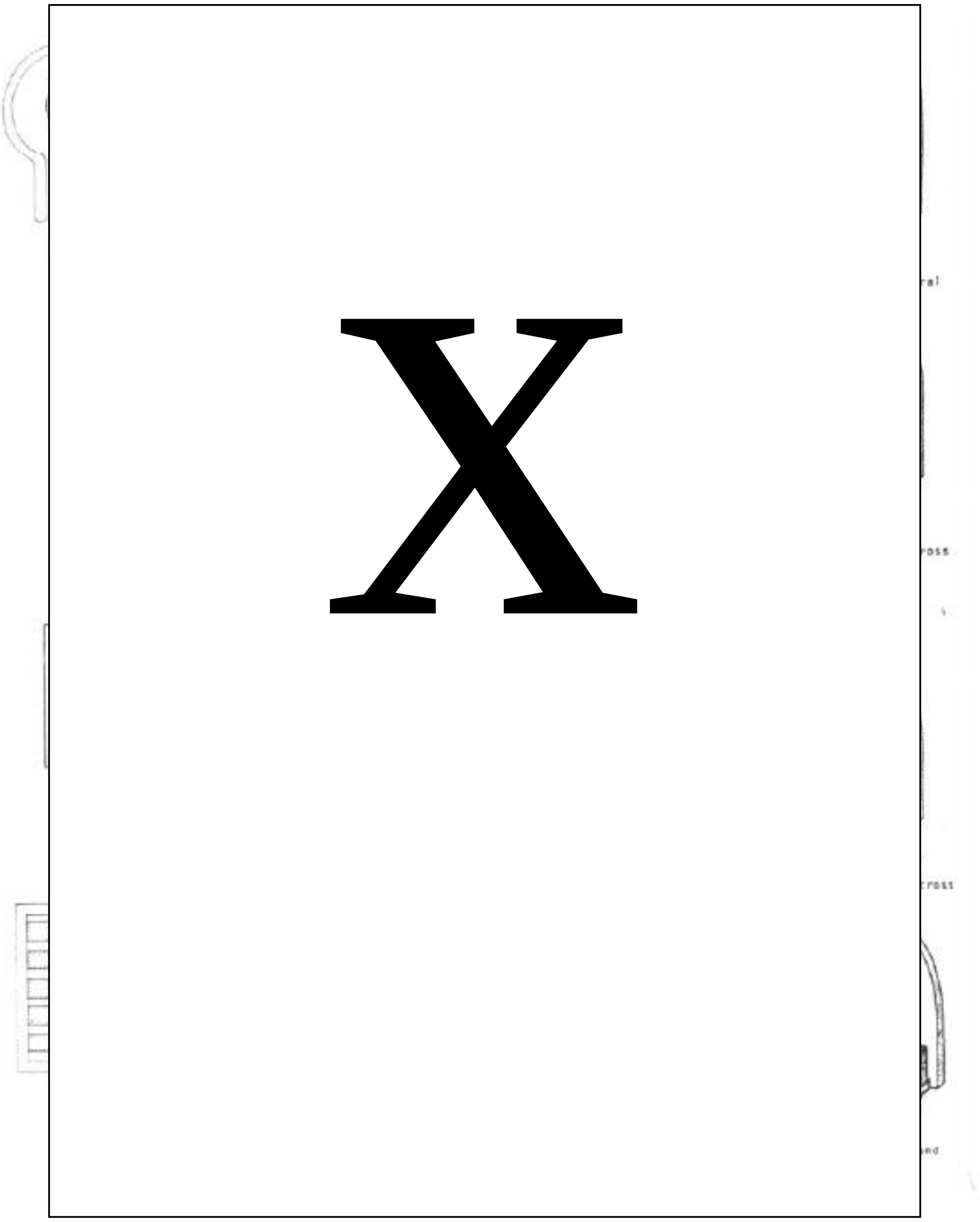

Figure A-11: Typology of Roman ceramic kilns in Italy (Caprio 1971: 407-408)

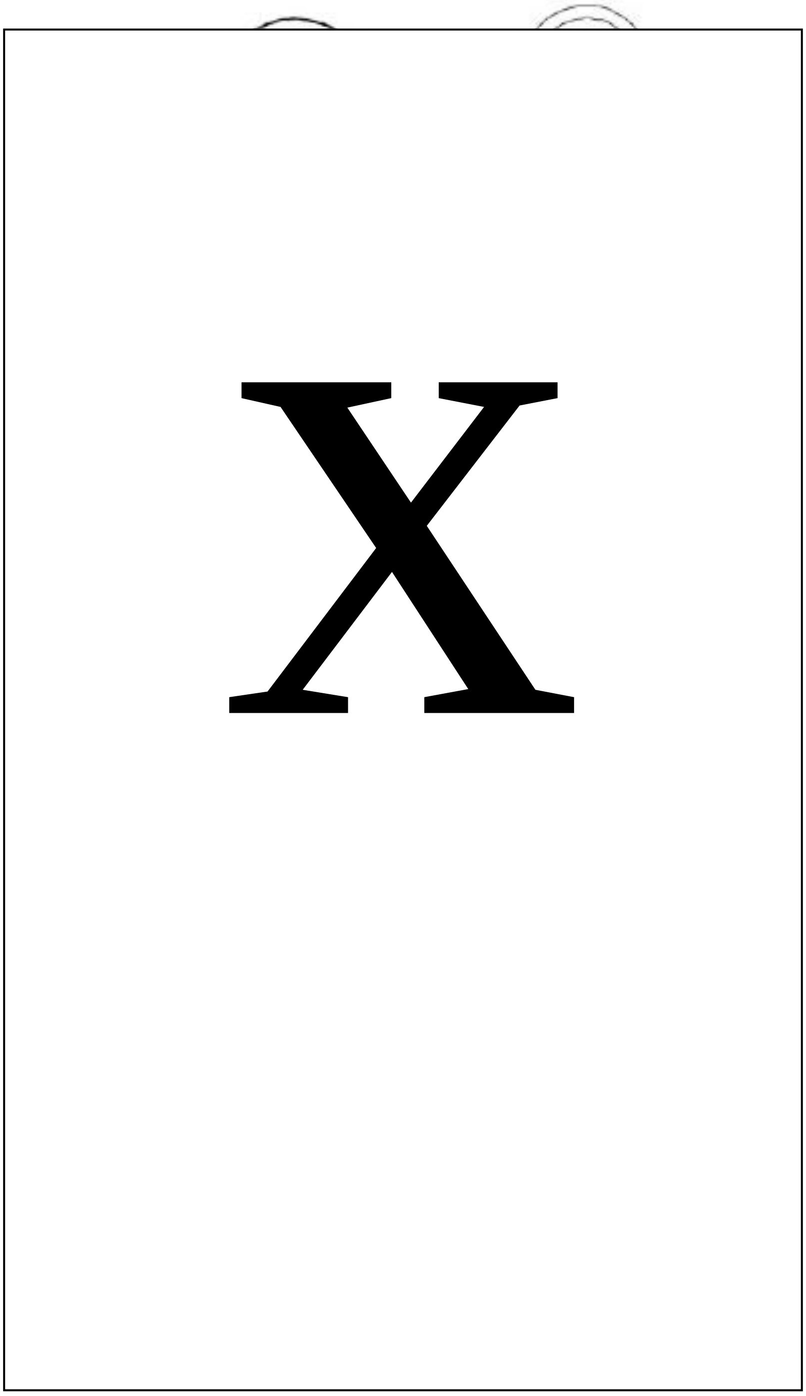

Figure A-12: Typology of circular kilns in Greece (Hasaki 2002: 501)

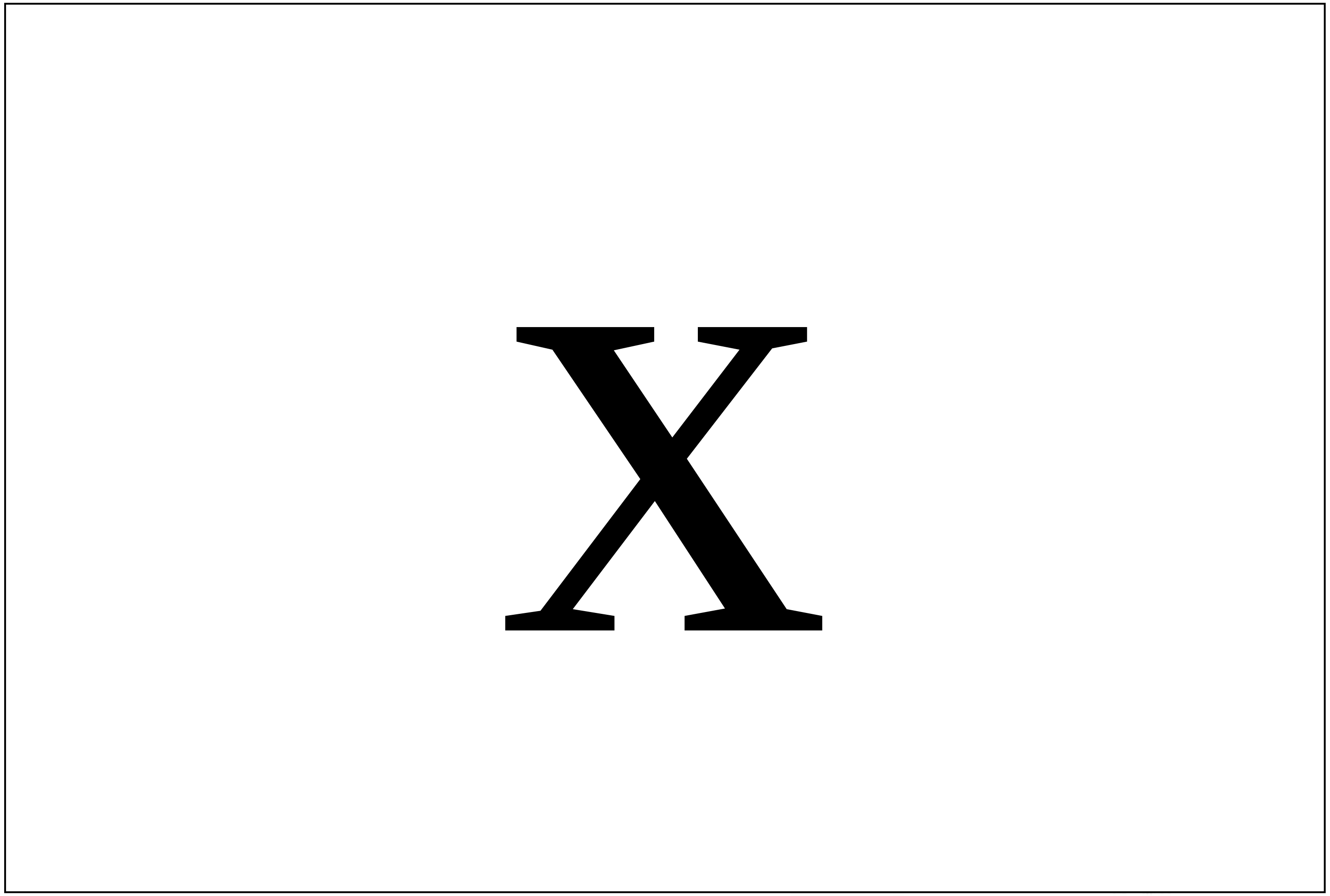

Figure A-13: Typology of rectangular kiln in Greece (Hasaki 2002: 507)

Appendix II: Tables

Ancient Name	Modern Name	No. Kilns	Dimension	Kiln's area in square meter	Kiln type			Production type							Period	Reference
					Circular	Rectangular	Oval	Amphora	Lamp	Coarser ware	Fineware	Dolia	Tile	Brick		
Euesperides	Benghazi	K1			√					√	√				4th BC	(Buzaian and Lloyd 1996)
Bernice	Benghazi	K1	1.4	1.53	√	-						√	√		H	(Lloyd 1977; Riley 1979a)
		K2	2x1.4	2.8		√						√			H	
		K3	1.8x1.55	2.79			√								ER/ MR	
		K4	1.2x0.58	0.69		√			√						MR	
		K5	1.5x0.95	1.42		√			√ ?						MR	
		K6	1.10	0.94	√				√?						MR	
Hadrianopolis	Driana	K1	6.8	36.29	√					√					MR?	(Jones and Little 1971)
Taucheira	Tocra	K1						√	√	√	√				MR	(Buzaian 2000; Riley 1979b)
		K2	2.6x2.2	5.72		√		√		√					H	
		K3	1.8	2.45	√										MR	
Ptolemais	Tolmeta	k1	1.5x1	1.5		√									MR/ LR	

Ancient Name	Modern Name	No. Kilns	Dimension	Kiln's area in square meter	Kiln type			Production type							Period	Reference
					Circular	Rectangular	Oval	Amphora	Lamp	Coarser ware	Fineware	Dolia	Tile	Brick		
Ptolemais	Tolmeta	k3				√									MR	Polish Archaeological Mission reports (2007-2009)
		k4	1.2x0.7	3.5		√			√?						MR/ LR	
Aptouchou	eL-Haniya	K1	2.5x2.5	0.8		√		√							MR	SCSC Survey
		K2	2.5x2.5	6.3		√		√							MR	
		K3	2.5x2.5	6.3		√		√							MR	
Phycus	el-Hamama	1 ?														SCSC Survey
Cape of Phycus	el-Mamloh	K1	2.7x2	6.3		√		√		√					MR	SCSC Survey
		K2	2.7x2	5.4		√		√		√					MR	
		K3	1.2x1.8	5.4			√	√		√					MR	
		K4	1.5?	2.2	√			√		√					MR	
?	Mahel Mal	K1	1.7x1.55	2.4	√ ?	√		√							MR	SCSC Survey
		K2			√ ?	√		√							MR	
		K3			√ ?	√		√							MR	

Ancient Name	Modern Name	No. Kilns	Dimension	Kiln area	Kiln type			Production type							Period	Reference
					Circular	Rectangular	Oval	Amphora	Lamp	Coarser ware	Fineware	Dolia	Tile	Brick		
Erythron	Latrun	K1		20		√		√		√					MR	(Mazou and Capelli 2011)
Naustathmos	Ras El-Tin	1?														SCSC Survey
Marmarica		8													R	(Hulin 2008; Hulin *et al.* 2009)

Table A-1: Cyrenaican pottery kilns

Region	District	No. Kiln	Kiln' structures					Dimension	Kiln's area	Production type							Reference
			Circular	Oval	Quadrangular	Simi-Circular	Other			Amphora	Coarse ware	Fine ware	Lamp	Tile	Dolia	Other	
Tripoli	Oea	4	1					1	1.57		√						Goodchild 1951
			2					1	1.57		√						
			3					1	1.57		√						
			4					2.3	3.61		√						
	Hai al-Andalus	3	A					3.66	5.74	√							Shakshuki and Shebani 1998
			B					3.1	4.86	√							
			C					3	4.71	√							
	Gargarsh	4	1					2.65	1.32		√						Bakir 1966
			2								√						
			3								√						
			4								√						
Tripoli-Homs	Kilo 102	1	1					2.6	4.08	√							Goodchild 1951
Tarhuna	Ain Scersciara	3	1					2	3.14	√	√						Goodchild 1951
			2					6	9.42	√	√						
			3							√	√						
	Tazzoli	1	?	?				2.5	3.92	√	√			√			Arthur 1982
	Gasr Ed-Dauun	1	1					2	3.14	√	√						Oates 1953
	TUT48	5	1					4.5	7.06	√							Ahmed 2010
			2					4.15	6.51	√							
			3					4.85	7.61	√							
			4					2.9	4.55	√							
			5					5.25	8.24	√							
	TUT53	1	1					2.75	4.31	√							
	GUM86	1	1					2.8	4.39	√							
	GUM90	1	1					3.75	5.88	√							

Region	District	No. Kiln	Kiln' structures					Dimension	Kiln's area	Production type							Reference
			Circular	Oval	Quadrangular	Simi-Circular	Other			Amphora	C-ware	F-ware	Lamp	Tile	Dolia	Other	
Tarhuna	TEL102	2	1					3.35	5.25	√							Ahmed 2010
			2					3.1	4.86	√							
	TUT108	3	Kiln no 3					3.35	5.25	√							
	DOG111	1	1					2.5	3.92	√							
	SRI132	2	Kiln no16					3.8	5.96	√							
			Kiln no18					4.2	6.59	√							

Table A-2: Tripolitania Roman kilns

District	No. Kiln	Kiln' structures: Circular	Oval	Quadrangular	Simi-Circular	Other	Dimension	Kiln's area	Production type: Amphora	Coarse ware	Fineware	Lamp	Tile	Dolia	Other	Reference
Kerkouane	3	1					1.4	1.54	√	√						(Fantar 1986; Leitch 2010)
		2					2	3.14	√	√						
		3					1.1	1.73							Figurines	
Dermech	3	1					4	6.28	√	√		√				(Cintas 1950)
			2				2 x 3	6	√	√		√				
			3				2 x 3	6	√	√		√				
Ras-Zbib	1		1				2 x 3	6								(Cintas 1950)
Carthage	1	1					4.2	6.59								(Leitch 2010)
	2	2					3.24	5.09								
Mactar		1					2	3.14		√						(Bourgeois and Gautier 1978)
El-Maklouba	12	10	2				1 to 4	1.57 / 6.28	√	√						(Peacock *et al.* 1989)
Byzacena	2	2					1.7	2.67	√	√					ARS	(Leitch 2010)
Mactar	1	1					2	3.14								(Bourgeois and Gautier 1978)
Leptiminus	5	Kiln A					4.9	7.69	√	√	√				Pipes ?	(Stirling 2001; Stirling *et al.* 2001)
		Kiln B					4.5	7.06	√	√	√				Pipes ?	
		Kiln C					2.8	4.39	√	√	√				Pipes ?	
		Kiln D					1.9	2.98	√	√	√				Pipes ?	
		Kiln E					2.8	4.39	√	√	√				Pipes ?	
		Kiln F					2.2	3.45	√	√	√				Pipes ?	

Table A-3: Tunisian excavated Roman kilns

Site	Quantity
Cilicia/ Cyprus	23
Samos	2
Tunisia	1
Chios	7
Tunisia	1
Total	34

Table A-4: The number of imported amphora sherds (BRH) collected at ancient Phycus (see figure 7-1)

Region	Product type				
	Wine	Oil	Fish sauce	Wine?/Fish sauce?	Wine?/Oil?
Tunisia		3.5		62	
Cilicia/ Cyprus					315
Samos	10				
Chios					135

Table A-5: The volume of imported amphora-borne identified at ancient Phycus (number in litre) (see figure 7-2)

Region	Quantity
Cilicia/ Cyprus	14
Gaza	2
Tripolitania	3
Total	19

Table A-6: Number of amphora sherds (BRH) yielded from the field survey at Cherronesus (see figure 7-3)

Period	Miscellaneous	Imported	Local	Total
Hellenistic	107	18	36	159
Late 1 BC	41	27	31	99
1 AD	386	160	51	634
2 AD	372	206	82	704
3 AD	543	529	144	1225
6 AD	258	365	16	639

Table A-7: Number of amphora sherds (BRH) collected from each period at Berenice (author's table, data from Riley 1979) (see figure 7-4)

Hellenistic	Late 1 BC	1 AD	2 AD	3 AD	6 AD	Total
18	27	160	206	507	365	1305

Table A-8: Number of imported amphora sherds (BRH) collected from each period at Berenice (author's table, data from Riley 1979) (see figure 7-6)

Region	Hellenistic	Late 1 BC	1 AD	2 AD	3 AD	6 AD
North Africa	0	1	7	7	25	6
North-West Mediterranean	6	16	66	15	13	0
East Mediterranean	12	10	87	171	469	359
Total	18	27	160	193	507	365

Table A-9: Number of imported amphora-borne products from North Africa, North-West Mediterranean and East Mediterranean (author's graph, data from Riley 1979) (see figure 7-7)

Region	Hellenistic	Late 1 BC	1 AD	2 AD	3 AD	6 AD
North Africa	0	1	7	7	25	6
Italy	6	16	59	10	0	0
Spain	0	0	7	5	4	0
France	0	10	0	0	9	0
Aegean	11	0	87	170	459	32
Anatolia or Cyprus	1	0	0	1	10	304
Levant	0	0	0	0	0	15
Egypt	0	0	0	0	0	8

Table A-10: The number of amphora-borne products identified at Berenice by region (author's table, data from Riley 1979) (see figure 7-9a-f)

Region	Identified quantity
Sicily	6
Rhodes	9
Kos	2
Knidos	1

Table A-11: The number of imported amphora-borne products identified at Berenice in the Hellenistic period (author's table, data from Riley 1979) (see figure 7-10).

Region	Identified quantity
Sicily	49
Thasos/Mende/NA unknown type	53
Chios/Samos/ Kos/Knidos/Rhodes	117
Marseille?	2
Cyprus	2
Punic	72
Corinth	25
Corinth? Corcyra?	498

Table A-12: The number of imported amphora-borne products identified at Euesperides in the Hellenistic period (author's table, data from Göransson 2007) (see figure 7-11)

Region	Identified quantity
Sicily	2
Campania	14
Carthage	1
Rhodes	8
Knidos	2

Table A-13: The number of imported amphora-borne products identified at Berenice in the late first century BC (author's table, data from Riley 1979) (see figure 7-12)

Region	Identified quantity
Campania	46
Adriatic sea	13
South	4
Baetica	3
Tripolitania	7
Rhodes?	29
Unknown Aegean	58

Table A-14: The number of imported amphora-borne products identified at Berenice in the first century AD (author's table, data from Riley 1979) (see figure 7-13)

Region	Identified quantity
Campania	10
South Spain	5
Tripolitania	7
Kos	7
Rhodes	7
Not specified	22
Crete	134
Cyprus?	1

Table A-15: The number of imported amphora-borne products identified at Berenice in the second century AD (author's table, data from Riley 1979) (see figure 7-14)

Region	Identified quantity
Baetica	4
Gaulish region	9
Tripolitania	7
Tunisia	15
Algeria	3
Rhodes	3
Crete	268
Samos?	188
Cyprus?	10
Total	507

Table A-16: The number of imported amphora-borne products identified at Berenice in the third century AD (author's table, data from Riley 1979) (see figure 7-15).

Region	Identified quantity
Tunisia	6
Chios	32
Cyprus?	304
Gaza	13
Caesarea	2
Egypt	8
Total	365

Table A-17: The number of imported amphora-borne products identified at Berenice in the sixth century AD (author's table, data from Riley 1979) (see figure 7-16).

Period	Wine	Oil	Fish sauce	Unknown	Total
Hellenistic	286	0	0		286
L1BC	450	0	0		450
1AD	915	160	132	82	1207
2AD	325	410	132		867
3AD	98	795	65		958
6AD	3941	3904	14		7859

Table A-18: The volume of imported products according to the recorded amphora sherds (number in litre) (see figure 7-17a-f).

Region	volume
Sicily	130
Rhodes	87
Kos	30
Knidos	39
Total	286

Table A-19: The possible volume of imported products according to the recorded amphora sherds at Berenice in the Hellenistic period (number in litre) (see figure 7-18).

Region	Type of product	
	Wine	Fish
Sicily	52	
Campania	120	
Tunisia		0
Rhodes	98	
Knidos	78	
Total	348	

Table A-20: The possible volume of imported products according to the recorded amphora sherds at Berenice in the Late First century BC (number in litre) (see figure 7-19).

Region	Product type		
	Wine	Oil	Fish
Campania	102		
South Spain			132
Tripolitania		410	
Crete	0		
Rhodes	121		
Aegean (Unknown)	0		
Kos	102		
Cyprus ?	0	0	0

Table A-21: The possible volume of imported products according to the recorded amphora sherds at Berenice in the second century AD (number in litre) (see figure 7-21).

Region	Product type		
	Wine	Oil	Fish
Baetica		75	
South Spain			35
Gaulish region		?	
Algeria		?	
Tripolitania		510	
Tunisia	30	210	30
Rhodes ?	46		
Crete	0		
Samos ?	52		
Cilicia/ Cyprus	?	?	
Total	98	795	65

Table A-22: The possible volume of imported products according to the recorded amphora sherds at Berenice in the third century AD (number in litre) (see figure 7-22).

Region	Product type			
	Wine	Oil	Fish	Unknown products
Tunisia	?	?	?	21
Chios	?	?		495
Cilicia?/ Cyprus?	?	?		3395
Gaza	?		?	150
Caesarea	50			
Egypt	18			
Total	4129			

Table A-23: The possible volume of imported products according to the recorded amphora sherds (BRH) at Berenice in the sixth century AD (number in litre) (see figure 7-23).

Site	Quantity
Egypt	1
Phocaea	5
Tunisia	7
Total	13

Table A-24: The number of imported finewares identified at Phycus in late Roman period (see figure 7-24).

Site	Quantity
South Anatolia	3
Tunisia	7
Phocaea	2
Total	12

Table A-25: The number of imported finewares identified Cherronesus in late Roman period (see figure 7-25).

Region	Hellenistic	1 BC	1 AD	2 AD	3 AD	4 and 5 AD	6 and 7 AD
North Africa	0	0	615	871	3739	865	984
North-West Mediterranean	1402	199	1735	212	0	0	0
East Mediterranean	561	583	1347	491	72	329	245
Total	1963	782	3697	1574	3811	1194	1229

Table A-26: Number of imported fineware from North Africa, north-west Mediterranean and east Mediterranean identified at Berenice (author's table, data from Kenrick 1987) (see figure 7-26a-g).

Period	North Africa	Italy	France	Greek mainland	Aegean	Anatolia	Cyprus	Levant	Total
Hellenistic	0	1402	0	323	238	0	0	0	1963
1 BC	0	199	0	0	135	0	0	448	782
1 AD	0	2338	12	106	89	168	28	1020	3761
2 AD	871	212	0	0	204	218	16	26	1329
3 AD	3739	0	0	13	59	0	0	0	3811
4-5 AD	865	0	0	0	319	10	0	0	1184
6-7 AD	948	0	0	0	13	7	0	0	961

Table A-27: The number of imported finewares identified at Berenice by region (author's graph, data from Kenrick 1987) (see figure 7-27a-e).

Site	Quantity
Knidos	27
Ionia	211
Athens	323
Apulia	462
Naples / Ischia	940
Total	1936

Table A-28: Number of imported fine-wares identified at Berenice in the Hellenistic era (author's table, data from Kenrick 1987) (see figure 7-28).

Site	Identified quantity
Knidos	65
Ionia	70
Syria	448
Central Italy	57
Sicily	142
Total	782

Table A-29: Number of imported fine-wares identified at Berenice in the first century BC (author's table, data from Kenrick 1987) (see figure 7-29).

Site	Identified quantity
Candarli	25
Knidos	64
South-West Anatolia	32
Tralles	136
Cyprus	28
S.Russia/ Rumania - Bulgaria	106
Syria	1020
Gaulish region	12
Arezzo	2338
Total	3761

Table A-30: Number of imported fine-wares identified at Berenice in the first century AD (author's table, data from Kenrick 1987) (see figure 7-30).

Site	Identified quantity
Tralles	218
Knidos	31
Candarli	173
Cyprus	16
S.Russia/ Rumania - Bulgaria	27
Syria	26
Tunisia	871
Arezzo	212
Total	1574

Table A-31: Number of imported fine-wares identified at Berenice in the second century AD (author's table, data from Kenrick 1987) (see figure 7-31).

Site	Identified quantity
Candarli	59
Corinth	13
Tunisia	3739
Total	3811

Table A-32: Number of imported finewares identified at Berenice in the third century AD (author's table, data from Kenrick 1987) (see figure 7-32).

Site	Identified quantity
Phocaean	319
South of Anatolia	10
Tripolitania	152
Tunisia	713
Total	1194

Table A-33: Number of imported finewares identified at Berenice in the fourth and fifth centuries AD (author's table, data from Kenrick 1987) (see figure 7-33).

Site	Identified quantity
Phocaean	13
Southern Anatolia	7
Tripolitania	85
Tunisia	863
Total	968

Table A-34: Number of imported finewares identified at Berenice in the sixth and seventh centuries AD (author's table, data from Kenrick 1987) (see figure 7-34).

Period	North Africa	North-West Mediterranean	East Mediterranean
100 BC-100 AD	5	92	84
100 AD-200 AD	37	0	43
200AD-300 AD	106	0	11
300AD-450 AD	135	0	17
450AD-525AD	36	0	35
525AD-650AD	47	0	16

Table A-35: Number of imported fineware from North Africa, the North-West Mediterranean and East Mediterranean identified at Ptolemais (author's table, data from Domżalski 2012) (see figure 7-35a-f).

Period	North Africa	Tripolitania	Italy	Greece	Aegean	Anatolia	Cyprus	Levant
100 BC-100 AD	5		92		5	11	5	63
100 AD-200 AD	37				17	13	6	7
200AD-300 AD	106				5	6		
300AD-450 AD	132	3		1	15	1		
450AD-525AD	36				29	6		
525AD-650AD	47				13	3		

Table A-36: Numbers of imported fineware to Ptolemais by region (author's table, data from Domżalski 2012) (see figure 7-36a-f).

<table>
<tr><th>Site</th><th>Identified quantity</th></tr>
<tr><td>Site</td><td>Quantity</td></tr>
<tr><td>Campanian/ Etrurian</td><td>92</td></tr>
<tr><td>Syria</td><td>63</td></tr>
<tr><td>Tralles</td><td>11</td></tr>
<tr><td>Candarli</td><td rowspan="3">15</td></tr>
<tr><td>Cyprus</td></tr>
<tr><td>Tunisia</td></tr>
<tr><td>Total</td><td>181</td></tr>
</table>

Table A-37: Number of imported fineware to Ptolemais by region in 100BC – AD 100 (author's table, data from Domżalski 2012) (see figure 7-37).

<table>
<tr><th>Site</th><th>Identified quantity</th></tr>
<tr><td>Tunisia</td><td>37</td></tr>
<tr><td>Candarli</td><td>17</td></tr>
<tr><td>Tralles</td><td>13</td></tr>
<tr><td>Syria</td><td rowspan="2">13</td></tr>
<tr><td>Cyprus</td></tr>
<tr><td>Total</td><td>80</td></tr>
</table>

Table A-38: Number of imported fineware to Ptolemais by region in AD 100 – AD 200 (author's table, data from Domżalski 2012) (see figure 7-38).

Site	Identified quantity
Tunisia	106
Candarli	5
Tralles	6
Total	117

Table A-39: The number of imported finewares identified at Ptolemais in the third century AD (author's table, data from Domżalski 2012) (see figure 7-39).

Site	Identified quantity
Tunisia	132
Phocaean	15
South Anatolia/Tripolitania/Athens	5

Table A-40: The number of imported finewares identified at Ptolemais in the fourth and first half of fifth century AD (author's table, data from Domżalski 2012) (see figure 7-40).

Site	Identified quantity
Tunisia	36
Phocaean	28
South Anatolia	6
Knidos?	1

Table A-41: The number of imported fine-wares identified at Ptolemais in the second half of the fifth and first quarter of sixth century AD (author's table, data from Domżalski 2012) (see figure 7-41)

Site	Identified quantity
Tunisia	47
Phocaea	13
South Anatolia	3
Egypt	1
Total	64

Table A-42: The imported finewares to Ptolemais after the first quarter of sixth century AD to the seventh century AD (author's graph, data from Domżalski 2012) (see figure 7-42).

Period	source	Amphora Type	Parallel type	Content	Capacity	Quantity			Volume
						Rim	Base	Handle	
Hellenistic	Sicilia	H amphorae 7	Graeco-Italic amphora	Wine ?	12-26 L	5	0	1	130
	Rhodes	H amphorae 3	Rhodian Amphora	Wine	23 -29 L	3	2	4	87
	Kos	Double Hendle	Dressel 2-4	Wine	25-30 ? L			2	30
	Knidos	H amphora 4	Knidian amphora	Wine	29-39 L		1		39
Late 1 BC	Sicilia	H amphorae 7	Graeco-Italic	Wine ?	12-26 L	2	0	0	52
	Campania/ Latium	H amphora 9	Dressel 1	Wine	24 L	5	0	0	120
	Kouass/ Carthage	H amphora 12	Carthage Type Iib-c	Fish sauce ?	?	1	0	0	?
	Rhodes	H amphorae 3	Rhodian Amphora	Wine	23 -29 L	1	0	2	29
	Kos	Double Hendle	Similar to Dressel 2-4	Wine	25-34 L	3	0	59	102
	Rhodes ?	Horned Handles / ER 3	Rhodian Amphora ?	Wine ?	23 ? L	0	0	5	69
	Knidos	H amphora 4	Knidian amphora	Wine	29-39 L	0	2	0	78
1AD	Campania ?	Double hand	Dressel 2-4 ?	Wine ?	25-34 L	1	0	10	170
	Campania/ Latium	ER amphora 4	Dressel 2-4	Wine	25-34 L	8	8	20	340
	Adriatic sea/ Istria	ER amphora 5	Dressel 6	Wine	?	3	1	9	?
	South Spain	ER amphora 6	Dressel 7-11	Fish sauce	27-33 L	4	0	0	
	Baetica	ER amphora 9	Dressel 20	Wil	80 L	0	0	3	
	Tripolitania	ER amphora 11/ H 13	Trpolitania amphora II ?	Fish sauce ?/ Wine ? Oil ?	82 L	1	0	0	82?
	Tripolitania	ER amphora 11b	Tripolitania I	Oil	60 L	2	0	0	
	Tripolitania	ER amphora 11a	Tripolitania I	Oil	60 L	4	0	0	
	Rhodes ?	Horned Handles / ER 3	Rhodian Amphora ?	Wine ?	23? L	4	0	18	207
	Rhodes	H amphorae 3	Rhodian Amphora	Wine	23 -29 L	0	0	7	116
	Not specified	ER amphora 1		?		16	7	35	?

Period	source	Amphora Type	Parallel type	Content	Capacity	Quantity			Volume
						Rim	Base	Handle	
2AD	Campania/ Latium ?	ER amphora 4	Dressel 2-4	Wine	25-34 L	3	1	6	102
	South Spain	ER amphora 6	Dressel 7-11	Fish sauce	27-33 L	3	0	1	
	South Spain	ER amphora 7	Dressel 38/ Ostia LXIII	Fish sauce	27-33 ? L	1	0	0	
	Tripolitania	ER amphora 11a	Tripolitania I	Oil	60 L	4	0	0	
	Tripolitania	MR amphora 14	Tripolitania II and III ?	Oil	80-85 L	2	0	0	
	Crete/ Keratokambos	MR amphora 2		Wine ?	?	36	1	97	?
	Rhodes	H amphorae 3	Rhodian Amphora	Wine	23 -29 L	0	0	1	29
	Not specified	ER amphora 1				6	0	16	?
	Kos	ER amphora 2	Koan amphora	Wine ?	26-34 L	2	0	6	102
	Rhodes	ER Roman 3	Rhodian Amphora	Wine ?	23 ? L	0	0	1	23
	Rhodes ?	Horned Handles / ER 3	Rhodian Amphora ?	Wine ?	23? L	0	0	5	69
	Cyprus ?	MR amphora 4		?		0	0	1	
3AD	Baetica	ER amphora 9	Dressel 20	Oil	70-75 L	1	0	1	
	Tejo and Sado valleys	ER amphora 8	Dressel 14	Fish sauce	30-35 L	0	0	2	
	Gaulish region	MR amphora 11	Ostia LX, Peacock and Williams class 27	Wine/ Fish sauce ?	?	2	1	3	?
	Gaulish region ?	MR amphora 13	Dressel 29 ?	?	?	0	2	1	?
	Algeria	MR amphora 12	Dressel 30 / Ostia V/ Peacock and Williams class 38	Oil	?	1	1	1	
	Tripolitania	MR amphora 14	Tripolitania II and III ?	Oil	80-85 L	6	3	1	

Period	source	Amphora Type	Parallel type	Content	Capacity	Quantity			Volume
						Rim	Base	Handle	
3 AD	Tunisia	MR amphora 16	African I, Ostia IV, Peacock and Williams class 33	Oil	39-42 L	4	2	7	
	Tunisia	MR amphora 16A	African Ia	Oil	39-42 L	1	0	0	
	Tunisia	MR amphora 17	African grand amphora III?	Wine? / Fish sauce	25-30 L	1	0	0	30 ?
	Rhodes ?	Horned Handles / ER 3	Rhodian Amphora ?	Wine ?	23? L	0	0	3	46
	Crete/ Keratokambos	MR amphora 2	Peacock and Williams class 41	Wine ?		89	7	172	?
	Simos or WAM	MR amphora 3		?	6.5 L	2	8	4	13
	Samos ?	MR amphora 7	Ostia VI ; Kapitän 2	Wine ?	?	18	17	139	?
	Cyprus ?	MR amphora 4	Pompeii (CIL IV, 2, type XXVII-XXVIII)	?	?	4	0	6	?
6AD	Tunisia	LR amphora 8a	Peacock and Williams class 51; Spatheion 1a	Oil / Wine?/ Fish sauce ?	3.5 L	2	0	0	7?
	Tunisia	LR amphora 8b	Peacock and Williams class 51; Spatheion 1b	Oil / Wine?/ Fish sauce ?	3.5 L	4	0	0	7?
	Chios	LR amphora 2	Peacock and Williams class 43; Carthage late amphora 2	Wine and Oil	40-45 L	11	1	20	495?
	Cilicia/ Cyprus	LR amphora 1	Carthage LR amphora 1; Peacock and Williams class 44	Wine/ Oil ?	30-35? L	97	34	150	3395 ?
	Cilicia/ Cyprus	LR amphora 1b	?	?	?	9	0	8	?
	Cyprus	LR amphora 13	Peacock and Williams class 54	?	?	1	2	3	?
	Gaza	LR amphora 3	Carthage LR amphora 4	Wine / Fish sauce ?	?	6	4	3	?
	?	LR amphora 5		?	?	1	0	0	?
	Caesarea	LR amphora 4	Carthage LR amphora 5/ Peacock and Williams class 46	White wine	20-25 L	0	0	1	25
	Nile clay	LR amphora 6	Carthage LR amphora 7; Peacock and Williams class 52	Wine	6 L	2	3	3	12

Table A-43: Type of amphorae and contents that recorded at Berenice (Data from Riley 1979a, calculations and verification of amphorae contents from the author).

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