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Cover photo: The Kibotos or box-shaped harbour (Survey Site 09 of the Lake Mareotis Research Project) on the south sh of Lake Mareotis, August 2007 (photo: Athena Trakadas).

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Lake Mareotis Research Project

Lucy Blue

Alexandria was by any standards one of the great cities of the Mediterranean. Since its foundation in 331 BC and for almost a millennium to follow, it was the political, economic and cultural capital of Egypt, and one of the most significant emporia and complex ports in the Hellenistic and Roman worlds. As such, Greco-Roman Alexandria has been the subject of much historical and archaeological research (Fraser 1972; Haas 1997; Empereur 1998; Goddio, et al. 1998) that has revealed the wealth of the city, much of which was generated by trade through its important and monumental harbour. However, the complexity of the Alexandria harbours system, which included not only harbours on the sea, but also on Lake Mareotis, has never been thoroughly understood. The significance of Lake Mareotis in the history of the Greco-Roman port-city of Alexandria, is undeniable (Fig. 1). Settlements and industrial units located along the shores of Lake Mareotis, located to the south and west of the city, are known to have produced amongst other things, glass, textiles, pottery and wine (Empereur & Picon 1998), all of which were transported to the city. Yet the dynamics of this productive hinterland have not been fully appreciated in terms of the important contribution the region made to the economy of Alexandria and thus to Egypt as a whole.

In this context, the Lake Mareotis Research Project set out to investigate and determine the role of the lake, the function of the sites around its shores and the part they played in supporting the metropolis of Alexandria in antiquity.

Context of the Lake Mareotis Research Project

The Lake Mareotis Research Project is a collaboration between the Centre for Maritime Archaeology, at the University of Southampton, and Department of Underwater Antiquities (DUA) of the Supreme Council of Antiquities (SCA), Alexandria. The project first started in 2004 when a British Academy Small Grant was awarded to support a pilot survey season in the western arm of the lake, to the west of Alexandria. The survey covered an area of approximately 40 km east-west by 3 km wide, along the shores of the western extension of Lake Mareotis, from Sidi Kerir to El-Hammam. During this first season over 60 sites where identified, many equating to new discoveries (Blue & Ramses 2005). The potential wealth of the sites in the area was thus realised and subsequently further funding was sought and awarded from both the British Academy and the Leverhulme Trust to conduct a more detailed survey on both shores of Lake Mareotis and on an island that is located in the eastern region of the survey area.

The principal objective of the Lake Mareotis Research Project was to undertake a detailed systematic survey of the western extension of the lake in order to record, quantify and assess the archaeological resources of the area in a comprehensive manner. As a result, we hoped to determine a better understanding of the nature and extent of economic and maritime activities in the Mareotic region and to explore the relationship between the component parts of this complex system and how they developed and changed over time, in order to determine a more comprehensive understanding of the economic functions of ancient Alexandria.

Environmental and Political Context of Lake Mareotis

Lake Mareotis represents one of the most distinctive geomorphological features along the north-west coast of Egypt (Warne & Stanley 1993). It is unique compared to other lakes on the north coast of Egypt, being the only one with no direct connection to the Mediterranean Sea, but originally with direct access to the River Nile and hence to the whole of Egypt. Therefore, it is believed that the location and characteristics of Lake Mareotis gave the city of Alexandria one of its major advantages (Strabo 17.1.7).

In ancient times, Lake Mareotis was connected to and fed by the Canopic Branch of the River Nile (Strabo 17.1.7). By the 12th century the lake had silted up but prior to its silting it was much larger and deeper (Warne & Stanley 1993: 53-8; Said 2002). The main body of Lake Mareotis currently covers an area of about 90 km^2 and is defined to the north by a chain of lithified carbonate ridges extending parallel to the northern shoreline of the lake and the Mediterranean coast (Fig. 2). It is nearly rectangular in shape and extends south of Alexandria for about 12 km, merging along its southern and eastern shores into the Western Deltaic region. It would once have extended considerably further south, quite possibly a navigable distance of about 50 km. It is separated from the lake's main body by causeways and shallows and its relative size varies according to the season.

Thus at present, Lake Mareotis is a body of shallow brackish water that occupies about 13% of an extensive sub-sea-level depression that is sometimes referred to as the Maryut Depression. The remaining 87% of the depression has been drained and is now used primarily for agriculture. The main body of the lake is heavily polluted by untreated sewage and industrial waste. It has also been divided into many sub-basins which are used for industrial and agricul-

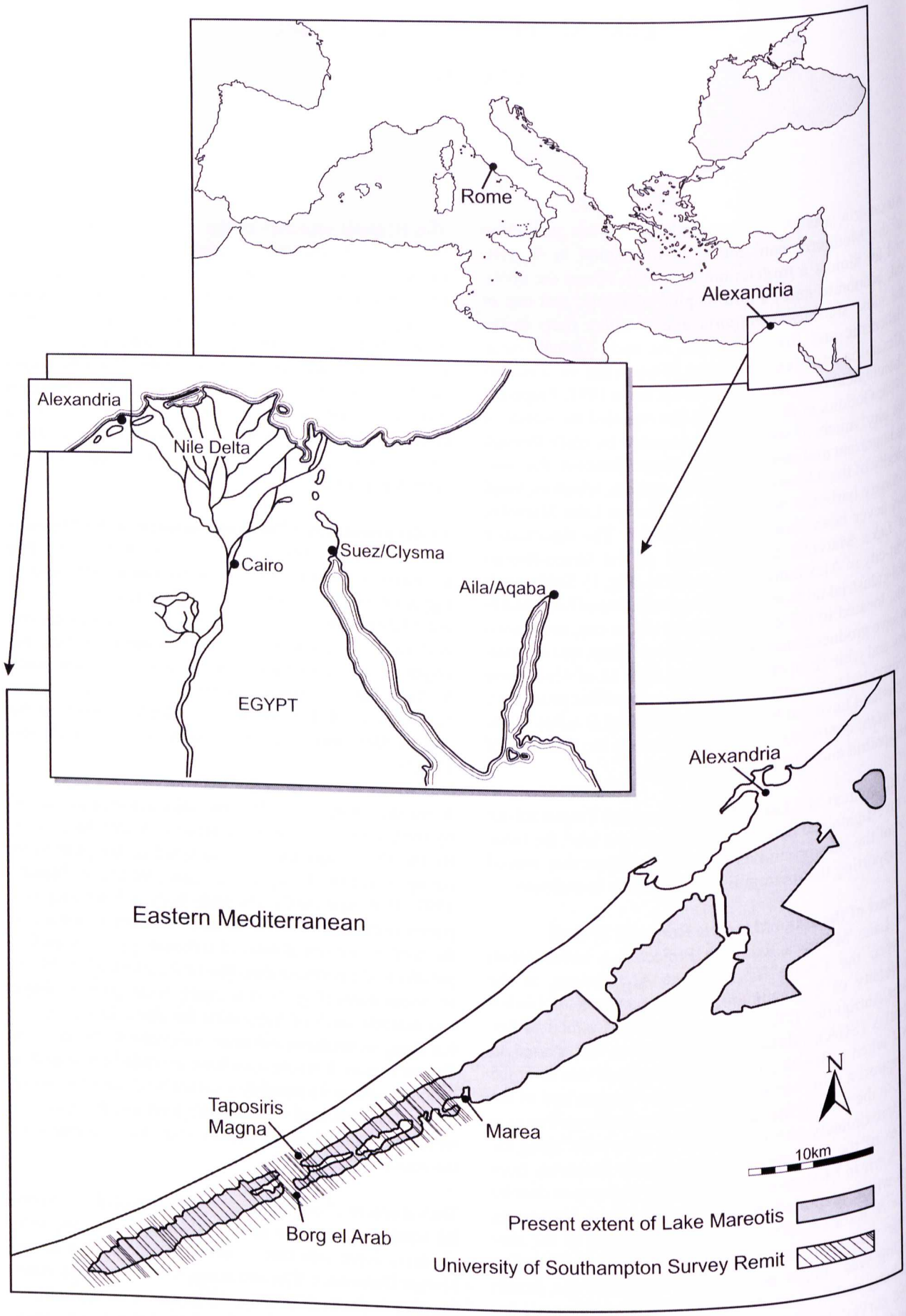

Fig. 1: Location of Alexandria and Lake Mareotis (Lake Mareotis Research Project).

tural purposes. Moreover, the shores of the lake are subject to continuous irrigation, drainage and reclamation, which means that it is constantly changing and unstable (Warne & Stanley 1993: 29-30; Frihy, et al. 1996: 282). The average depth of the remaining lake is less than 1 m, although it is assumed to have been greater in antiquity to allow boats to sail safely.

Due to its location and characteristics, Lake Mareotis played a significant role in the internal and international transport system of Greco-Roman Egypt (Rodziewicz 1998), particularly after it had been connected to the sea by a navigation canal at Alexandria (Strabo 17.1.7: 31). It became an important conduit of communication between the River Nile and the Mediterranean Sea, and river boats would have transported trade goods from the Nile Valley to the harbours of Mareotis and onwards to Alexandria and beyond. As indicated, Mareotis also supported economic activities around its shores such as the cultivation of vines and grain, and the manufacture of ceramics, wine and glass (Empereur & Picon 1998).

However, despite the important role of Lake Mareotis, previous research conducted in the region has been largely limited to specific areas and topics, such as the work of El-Fakharani (1983) amongst others, on the Byzantine port of Marea (Philoxenite) (see now Haggag, Babraj & Szymańska, Rodziewicz and Pichot this volume), Empereur & Picon (1998) on the amphorae and wine production in Mareotis (also see Dzierzbicka this volume), and Boussac & El Amouri (this volume) on the Hellenistic port of Taposiris Magna. In addition, rescue work has been undertaken by the Supreme Council of Antiquities (SCA) at a number of smaller sites around the shores of the lake largely in advance of development.

The majority of known sites have not been systematically studied however, and the pilot survey conducted in 2004 revealed that only a fraction of the available evidence is currently recognised. In addition, as indicated previously, the area is massively under threat from development and pollution. Large sections have been quarried, particularly of the northern limestone ridge of the study area, while extensive sections of the remaining lake are being exploited for aquaculture and its shores cultivated for agriculture. Much of the land has been sold for development, and along the edges of the lake harmful polluting industries such as salt factories, geochemical and petrochemical processing plants, as well as numerous sewage plants, all present a real threat to this lacustrine environment – the landscape is constantly changing and with it the archaeological record is being destroyed (see Ramses & Omar this volume). For all these reasons it was determined that a comprehensive survey of the area was essential in order to record what remains before the information is lost forever.

Objectives of the Lake Mareotis Research Project

The objectives of the collaborative Lake Mareotis Research project were to:

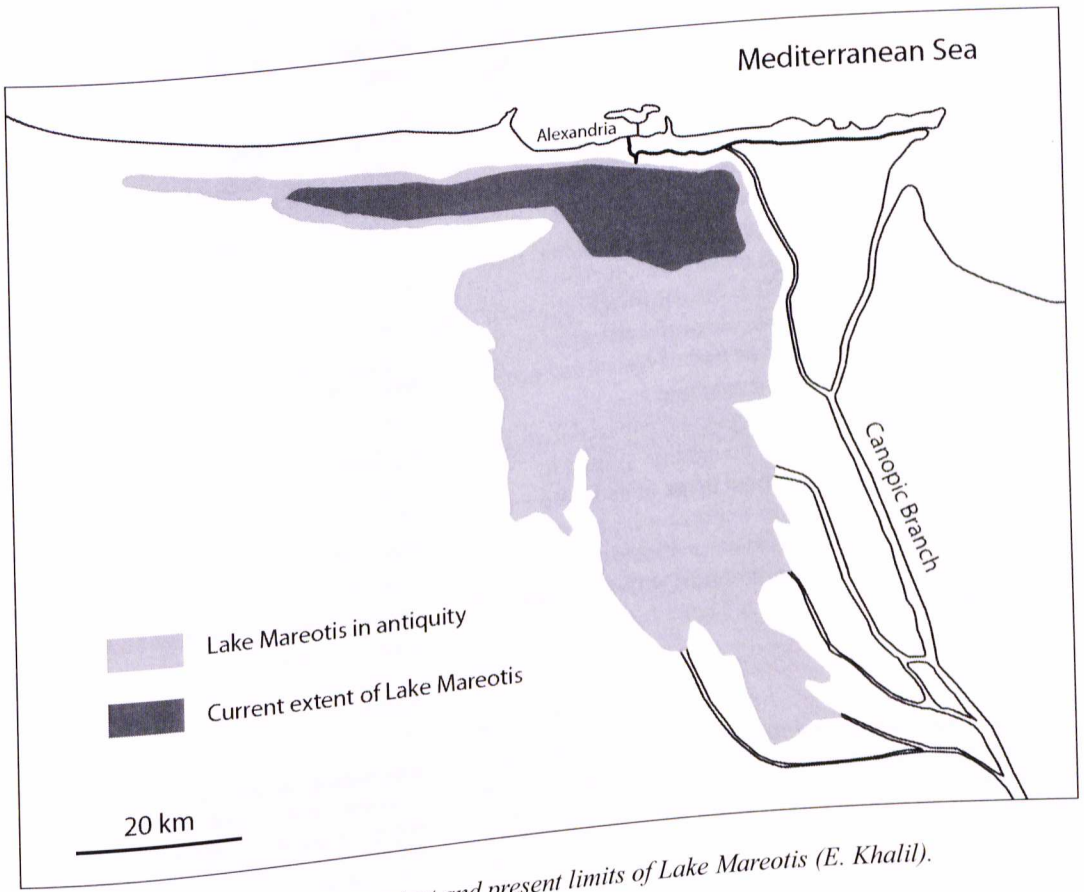

Fig. 2: An approximation of the ancient and present limits of Lake Mareotis (E. Khalil).

- Systematically survey the western arm of Lake Mareotis (shores 40 x 3 km wide, and Mareotis Island,[1] 3.7 km in length and up to 680 m wide), bearing in mind the complex palaeogeographical history of the lake.
- Record, quantify and assess the archaeological resource.
- Determine the extent, chronology and, where possible, function, of each site.
- Determine the nature and the extent of the economic and maritime activities of the region.
- Determine the significance of the Mareotic region in relation to Alexandria, particularly during the Hellenistic, Roman and Byzantine periods when the lake is believed to have been most active.
- Identify the degree of threat to the archaeological resource in relation to each site before it is lost to development and pollution.

Methodology

As a result of the pilot survey conducted in 2004 a total of over 60 sites were identified, as previously mentioned. Some of these sites were already documented in the archaeological record, some having been partially excavated by the Western Nile Delta section of the SCA and foreign missions, or noted but not recorded in detail in previous publications. However, at least half of the sites identified are believed to be new discoveries. The sites were prioritised on the basis of their maritime significance, particularly where maritime installations such as moles, jetties, quays, mooring rings etc., had been identified. GPS coordinates were taken to fix the position of each site located, each site was photographed and basic data pertaining to its nature were recorded. Since 2004 four further seasons of survey have been conducted between autumn 2006 and summer 2008, with the objective of recording in detail the maritime installations and to place the sites in their environmental and economic context. In order to achieve these objectives, the following methodology was implemented:

- A desk-based assessment of the region was undertaken with the aid of high resolution Quickbird satellite images, to establish the nature and extent of the sites already identified. This information along with all the data acquired as part of the survey project, is archived in a GIS-based database.
- Each site was surveyed using a GPS-based Real Time Kinematic (RTK) satellite navigation system to produce detailed topographic maps of each site.
- Specific buildings and/or features were planned using a Leica TCR705 Total Station, and the data was downloaded in the field into AutoCAD via TheoLt software.
- A Fluxgate Radiometer Magnetometer geophy survey was conducted to establish the layout of structures beneath the surface at specific sites.[2]
- Ceramic survey was undertaken to determine chronology, nature and function of each site.
- Sedimentological survey to determine changin levels and identify geomorphological changes v conducted at selected sites.
- Limited site-clearing to articulate walls and id more detailed building phases, was undertaken.
- A photographic archive was compiled of each and features within the site.

Analysis of the five survey seasons conducted in th ern arm of Lake Mareotis between 2004 and 2008 is complete, and brief preliminary observations are pr in this paper. The final results will be published in a monograph detailing the work undertaken and a pretation of the final results (Blue & Khalil forthc In total, over 70 sites were documented, ranging from the Hellenistic period to the 7th century AD (A clear distinction was noted between the nature sites on the northern shores compared to those in th and on Mareotis Island. The north shore sites wer ly defined, but quite heavily eroded, tell sites. Th to the south appear to represent more dense urba centrations with associated agricultural and indus eas, particularly towards the east where the islan may have once been an extension of the souther and the ridge associated with the site of Marea. M the sites, particularly on the southern shore, were p buried under aeolian and alluvial sediments depos the eroding hillside and wind-blown material fr north.

North Shore Sites (Fig. 3)

A total of ten sites were identified on the northern They date from the Hellenistic to Late Roman perio a concentration of activity in the Roman period. Th primarily tell sites and their size ranged from c. 180,000 m². The ceramic assemblages at the sites i a mixture of amphorae, finewares, tablewares and wares. Many of the finewares and amphorae were i Many of the sites on the northern shore contain w cisterns as well as evidence for mortar-lined basins bly from bath complexes, which would suggest a d context. Limited evidence of irrigation exists in t of water wheels or *sakkias,* and *qadus* pots associa water wheels or *sakkias* were found at some Early a Roman sites. The evidence suggests that these sit largely domestic in nature and each site represents contained and distinct unit with a clear associati

1. The Lake Mareotis Research Project refers to this ridge, largely surrounded by water located in the south-eastern region of the survey area some distance from the southern shore of the lake, as Mareotis Island. However, its island status in antiquity has yet to be determined and it is also acknowledged that it is not, and was not in antiquity, the only island in the lake.

2. Preliminary investigations in the 2007 season were not as in as we had hoped, due to the fact that the fluxgate radiometer F had been using had limitations. Thus, the 2008 geophysical su conducted with a Bartington Instruments Grad 601-2 dual sens gate gradiometer. The dual sensors survey at twice the rate of a sensored instrument and with more refined results.

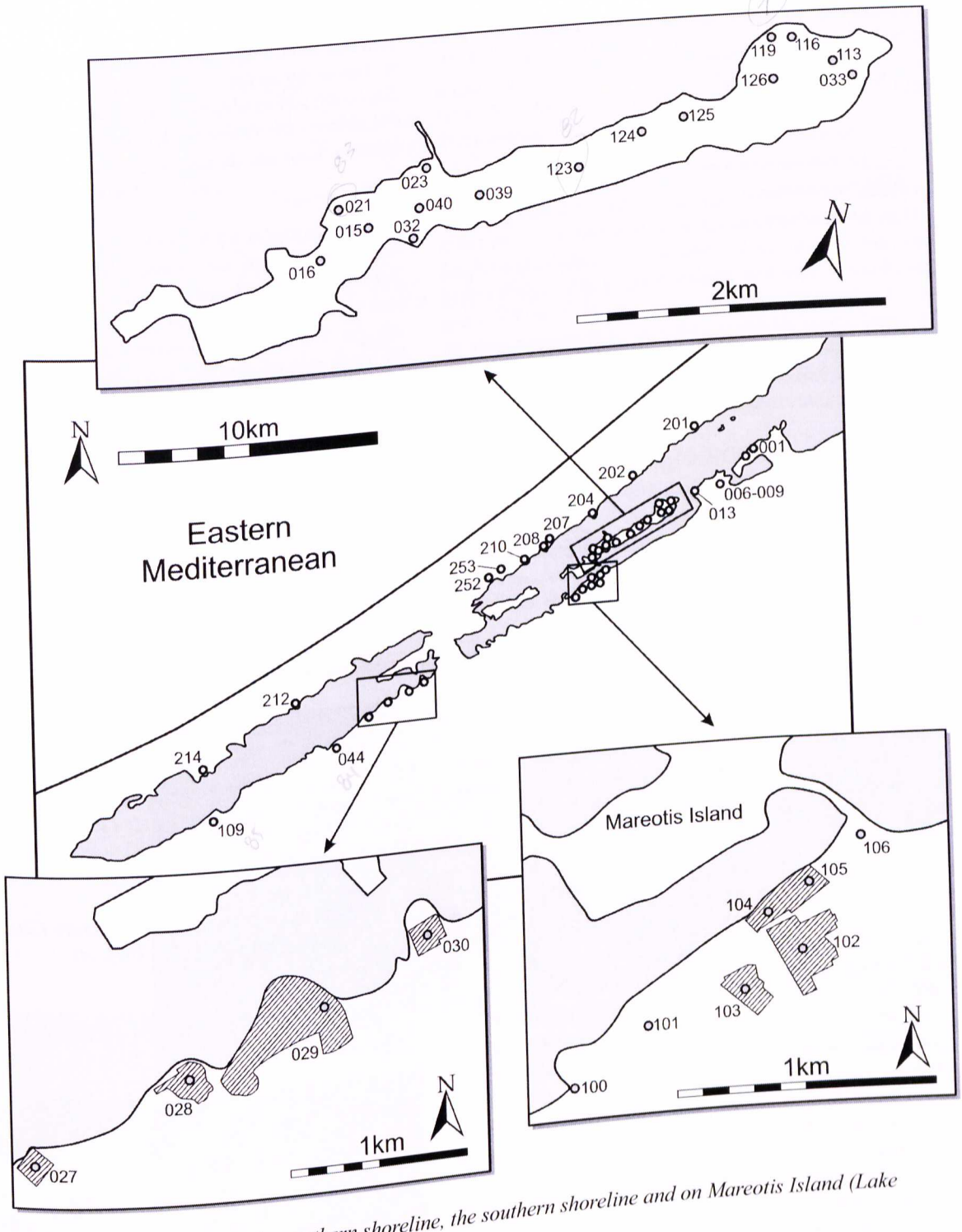

Fig. 3: Sites located along the northern shoreline, the southern shoreline and on Mareotis Island (Lake Mareotis Research Project).

the waterfront. A number of the settlements featured jetties extending into the lake on their southern shores.

The survey also revealed possible spatial and functional relationships between a number of sites on the northern shore and specific sites on the island and along the southern shore. For example, it was noticed that at least one of the largest sites on the northern shore of the lake (Al-Gamal, Site 204) is located immediately opposite a settlement located at the western end of the island (Site 23; see Hopkinson this volume). Quays and jetties from these sites extend across the lake towards each other. Thorough investigation of the ceramic samples collected from these sites will shed more light on their possible nature and relationship.

South Shore Sites (Fig. 3)

A total of 26 sites were identified on the southern shore. The sites ranged in date from the Hellenistic to the Late Roman periods, but generally exhibited limited activity in the Early Roman period. The earlier period displays some imports, largely amphorae from the Aegean region, but

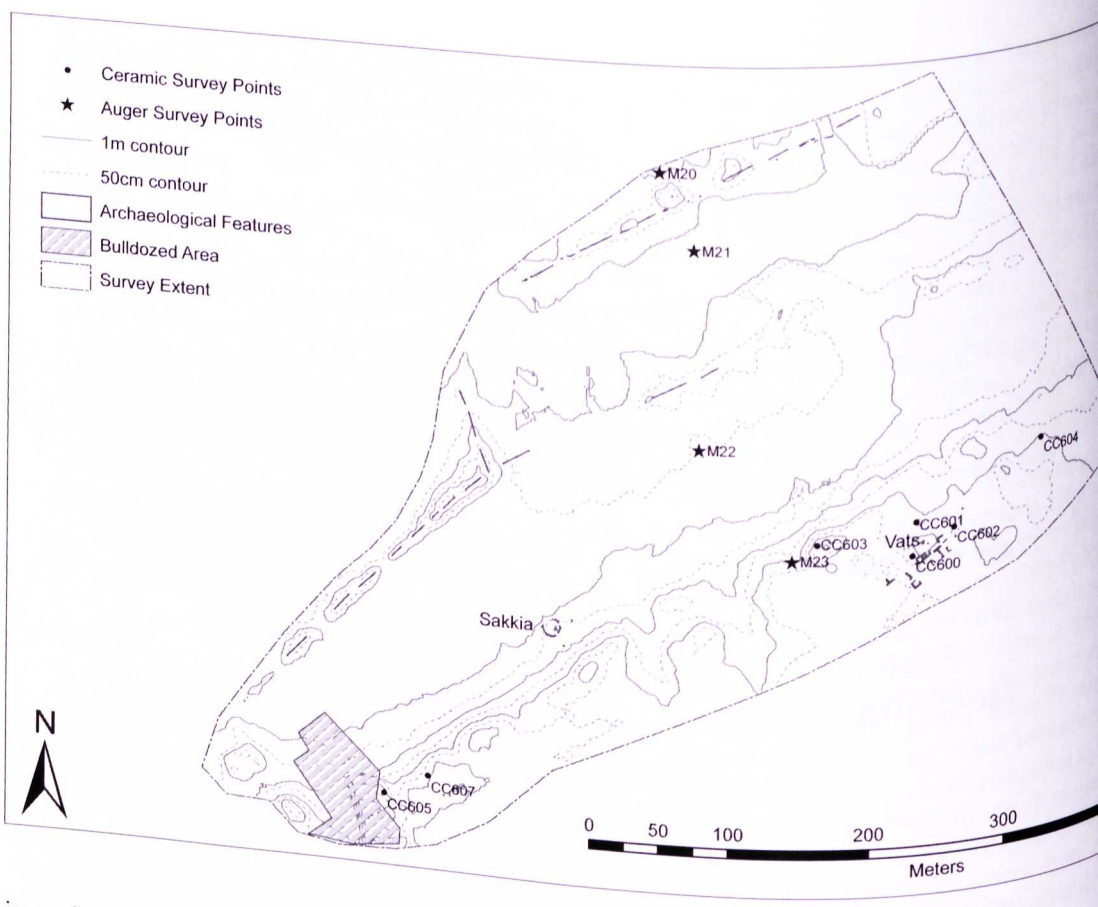

Fig. 4: Topographic, ceramic and auger
Site 44 on Mareotis Island (image Lake
Research Project).

is predominantly composed of locally produced material, while the Late Roman material reveals a greater amount of imported pottery from all over the eastern Mediterranean.

The sites towards the western extremity of the southern shores formed distinct and in some cases (Site 44 and Site 109) quite substantial units, and are spaced well apart. The archaeology at these sites was largely concentrated at the foot of the limestone ridge (Fig. 4). The sites extended north towards the shore of the lake where many exhibited a series of linear features that extend parallel to the shoreline down to the water's edge and were open to the E-NE. They appeared to support low-lying areas of marshy ground between the main occupation area and the shoreline ridge, or in many cases a boundary wall to the north. This type of linear feature, known as a 'lake wall,' essentially contained a body of water and could have been used for agricultural purposes, perhaps for feeding animals or harvesting reeds, as is still practiced in the region today. This was noticed at a number of sites and also towards the western end of the island (see below) (Fig. 5).

Fig. 5: An example of a 'lake wall' featu
(photo Lake Mareotis Research Project).

To the east, the sites were located on a limestone ridge that is effectively an extension of the ridge upon which both Mareotis Island and the site of Marea are situated. The nature of these sites appears to reflect similar dates and activities to that of the eastern end of the island. A number of sites have been identified that contained wine production facilities and/or *sakkias* designed to facilitate the shifting of water (for example Site 100, and Sites 01 and 106). Generally, however, these sites are less substantial than

those on the island or by comparison with Marea, and they tend to cluster opposite the western end of the island, or along the ridge that extends between Marea and the island. Further investigation is needed to identify the relationship between the eastern end of the island, the south-easterly sites and the western extent of Marea.

Two sites stand out as exceptions to the others noted along the southern shores; the Kibotos (the square-shaped harbour) (Site 09), and the 'complex building' (Site 13) (Figs. 6 & 7). The Kibotos (Site 09) is essentially a harbour area constructed of large limestone blocks (0.8 x 1 m), defined by a series of moles that enclose an area some 60 m long (N to S) and 36 m (E to W) wide (see Khalil this volume). A second site, known as the 'complex building' (Site 13), is located a short distance to the southwest of the Kibotos and is composed of a continuous wall constructed of huge blocks (1.3 x 1.1 m), with a smooth outer surface that slopes up and inwards from the foot of the building. It has been proposed that both these buildings date to the Pharaonic period (Haggag 1984: 277-280). No earlier Pharaonic material has yet been identified at any of the sites recorded in the survey area, with the exception of a few ceramics previously identified by El-Fakharani (El-Fakharani 1983: 176-178). Therefore, these buildings might contribute towards resolving the mystery of the so far elusive Pharaonic harbour of Marea (Fraser 1972: 146; El-Fakharani 1991: 28, 1983: 176).

Mareotis Island (Fig. 3)

Mareotis Island is a limestone ridge joined to the southern shore at its western end. It is possibly an adjunct of the southern shore that has extended out into the lake from the Marea Ridge. It is aligned roughly northeast – southwest and is 3.7 km in length and 680 m at its widest point. Some 40 sites were initially identified primarily concentrated at the eastern and western ends of the island, with a few sites in its central section that were largely industrial-scale Early Roman kiln sites (see Hopkinson this volume).

The majority of the material is Hellenistic in date, particularly towards the eastern end of the island, with a flurry of activity again in the Late Roman period, particularly towards the western end of the island. The ceramic assemblage indicates some imported material especially for the earlier Hellenistic period, but in general it is locally

Fig. 6: The Kibotos site (Site 09) (photo Lake Mareotis Research Project).

Fig. 7: The 'complex building' (Site 13) (photo Lake Mareotis Research Project).

produced, particularly the production of amphorae. The nature of the structures, with the exception of the centrally located industrial-scale amphorae production kiln sites, is essentially urban in character. The scale of the buildings, particularly those located on the ridge towards the east, is impressive, and many are associated with numerous waterfront structures located along the northern shore on the edge of the coastal plain. At the western end of the island, the settlement extends from the ridge to the north over a flat plain. Whereas the ridge supports further urban structures, the plain to the north appears to be more agriculturally orientated, with features including possible 'lake walls' and *sakkias* similar to those identified along the south-western shores of the lake (see above).

There is also evidence for quarrying on the island, as well as rock-cut tombs. Towards the eastern end of the island, a possible 'town wall' has been identified together with a series of jetties and platforms associated with the waterfront, possible warehouses and a small inlet embayment. All these are discussed in more detail in Hopkinson (this volume).

What is worthy of note is the fact that the majority of sites on the island are concentrated along the ridge and the northern shores, and that several were clearly built in a very specific relationship with sites on the lake's north shore (see above). The northern concentration of sites has also raised questions about the island's status. Does the fact that so few sites have been found along the island's southern shores suggest that it may have been linked to the southern shore of the lake in antiquity? Recent geomorphological work suggests that in fact the area to the south of the island has always been waterlogged to some degree, but that the waters were shallow and access by boat was problematic, and as such activities in this area were restricted.

Preliminary Conclusions

The Lake Mareotis Research Project has identified and systematically surveyed over 70 sites dating from the Hellenistic period through to the 7th century, in what still remains of the western arm of the once much larger Lake Mareotis. The sites vary extensively in nature, size and function, but demonstrate the importance this area had in relation to Alexandria and the mechanisms by which Mareotic products were produced and arrived at the city.

Local pottery production is indicated by the numerous kiln sites discovered in the region, particularly on the island. There is also considerable evidence for imported pottery from as early as the late 4th century BC and as late as the 7th century AD. The nature and size of the sites identified varied from rural small holdings to large urban settlements, with associated production sites, water storage facilities and agricultural and industrial complexes.

Different types of waterfront installations were recorded, including more than ten anchorage facilities, which form the majority of maritime installation along the shores of the lake's Mareotic Arm (see Khalil this volume). The frequency and abundance of these installations along the shores of the Mareotic Arm reflect the extent of maritime activity that was taking place in this region. Besides the jetties and quays which are positioned perpendicular to the shore, another type of maritime installation has also been identified, positioned parallel to the shore, and described as a 'lake wall.' The so-called 'lake walls' define the shores and protect them from the effects of silting and sedimentation. As many as five lake walls were discovered along the southern shore of the lake and the northern shore of Mareotis Island, areas which are more subject to silting as a result of the prevailing northwest wind. The lake walls could have been utilised as docking facilities for merchant vessels, but were more probably associated with agricultural activities, perhaps the cultivation of reeds as is still witnessed in the region today.

The Lake Mareotis Research Project has also recorded numerous archaeological sites of industrial and agricultural nature such as amphorae production sites, wineries and the remains of several water wheels (*sakkia*) which were used for lifting water for irrigation and for use in baths and other domestic purposes. With one exception, all the amphorae and wine production sites are located on the southern shore of the lake or on Mareotis Island. In antiquity, the southern shores of the lake were characterised by a fertile plain which supported and enabled agricultural activities to flourish. In addition, the abundance of calcareous clay, particularly suitable for amphorae production, resulted in a thriving large-scale amphorae industry. The study of the ceramic assemblages collected from the surveyed sites indicate that the amphorae production centres were active from the Ptolemaic to the Late Roman period.

Since no lake-side archaeological sites were recorded on the southern shore of the lake opposite Mareotis Island, questions have been raised about the nature of the island and whether or not it was indeed an island in antiquity. However, sedimentological analysis carried out during the final survey season revealed that Mareotis Island was probably an extension of a ridge that extended some 10 km to the west from the site of Marea. In addition, it was ascertained that the area between the island and the southern shore of the lake was either waterlogged or marshland in antiquity (Flaux forthcoming).

Previous research conducted in the Mareotic region has been largely limited to specific sites; however, the Lake Mareotis Research Project has systematically investigated all the archaeological remains along the shores of the lake's western arm. The project also assessed the results of previous archaeological work undertaken in the Western Deltaic region. Based on this, it is reasonable to suggest that the Mareotic Arm was in fact the most active area in Lake Mareotis in antiquity, and that most of the Mareotic products arriving in Alexandria were in fact coming from the western Mareotic Arm, rather than from settlements associated with the lake's main body (see Khalil this vol-

ume). Finally, the Lake Mareotis Research Project has outlined the true scale of activities in the Mareotic Arm with respect to industrial, agricultural and urban sites, being much more extensive than previously suggested, thus supporting the significant importance of the area and highlighting the role it played in the economy of Hellenistic and Roman Alexandria.

Acknowledgments

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Bibliography

El-Fakharani, F.A., 1983, Recent Excavation at Marea in Egypt. In G. Grimm, H. Heinen & E. Winter (eds.), *Aegyptiaca Trevernsia II, Das Römisch-Byzantinische Ägypten. Akten des internationalen Symposions 26.-30. September 1978 in Trier*: 175-186. Mainz.

El-Fakharani, F., 1991, The Kibotos of Alexandria. *Studi Miscellanei* 28: 21-28.

Blue, L., & Ramses, S., 2005, Lake Mareotis Research Project – Preliminary Report from Pilot Survey, August 2004. *Newsletter of the Archaeological Society of Alexandria 15 (February)*: 5-16.

Blue, L., & Khalil, E. (eds.), forthcoming, *A multidisciplinary approach to Alexandria's economic past: The Mareotis case study*. Oxford.

De Cosson, A., 1935, *Mareotis: Being a Short Account of the History and Ancient Monuments of the North-Western Desert of Egypt and Lake Mareotis*. London.

Empereur, J.-Y. (ed.), 1998, *Commerce et artisanat dans l'Alexandrie hellénistique et romaine. Actes du colloque d'Athènes, organisé par le CNRS, le Laboratoire de céramologie de Lyon et l'Ecole française d'Athènes, 11-12 décembre 1988*. Athens, Paris.

Empereur. J.-Y. (ed.), 2002, *Alexandrina 2*. Cairo.

Empereur, J.-Y., & Picon, M., 1998, Les ateliers d'amphores du Lac Mariout. In J.-Y. Empereur (ed.), *Commerce et artisanat dans l'Alexandrie hellénistique et romaine. Actes du colloque d'Athènes, organisé par le CNRS, le Laboratoire de céramologie de Lyon et l'Ecole française d'Athènes, 11-12 décembre 1988*: 75-88. Athens, Paris.

Flaux, C., forthcoming, Geomorphological survey of the south-west shores of Lake Mareotis. In L. Blue & E. Khalil (eds.), *A Multidisciplinary Approach to Alexandria's Economic Past: the Mareotis Case Study*. Oxford.

Fraser, P.M., 1972, *Ptolemaic Alexandria*, Vol. I. Oxford.

Frihy, O.E., 1996, Some Proposals for Coastal Management of the Nile Delta Coast. *Ocean & Coastal Management* 30.1: 43-59.

Goddio, F., Bernard, A., Bernard, E., Darwish, I., Kiss, Z., & Yoyotte, J., 1998, *Alexandria: The Submerged Royal Quarters*. Oxford.

Haas, C., 1997, *Alexandria in Late Antiquity: Topography and Social Conflict*. Baltimore.

Haggag, M., 1984, *Ports in Ancient Egypt till the Arab Conquest*. Unpub. MA diss., Alexandria University.

Hassan, F.A., 1997, The Dynamics of a Riverine Civilization: A Geoarchaeological Perspective on the Nile Valley, Egypt. *World Archaeology* 29.1: 51-74.

Rodziewicz, M.D., 1998, Fom Alexandria to the West by Land and by Waterways. In J.-Y. Empereur (ed.), *Commerce et artisanat dans l'Alexandrie hellénistique et romaine. Actes du colloque d'Athènes, organisé par le CNRS, le Laboratoire de céramologie de Lyon et l'Ecole française d'Athènes, 11-12 décembre 1988*: 93-103. Athens, Paris.

Said, R., 2002, Did Nile Flooding Sink Two Ancient Cities? *Nature* 415: 37-38

Strabo, *Geography*, H.L. Jones (transl.), 1949. London.

Warne, A.G., & Stanley, D.J., 1993, Late Quaternary Evolution of the Northwest Nile Delta and Adjacent Coast in the Alexandria Region, Egypt. *Journal of Coastal Research* 9.1: 26-64.