

THE ṬAFĪLA-BUŞAYRA ARCHAEOLOGICAL SURVEY: PHASE 1 (1999)

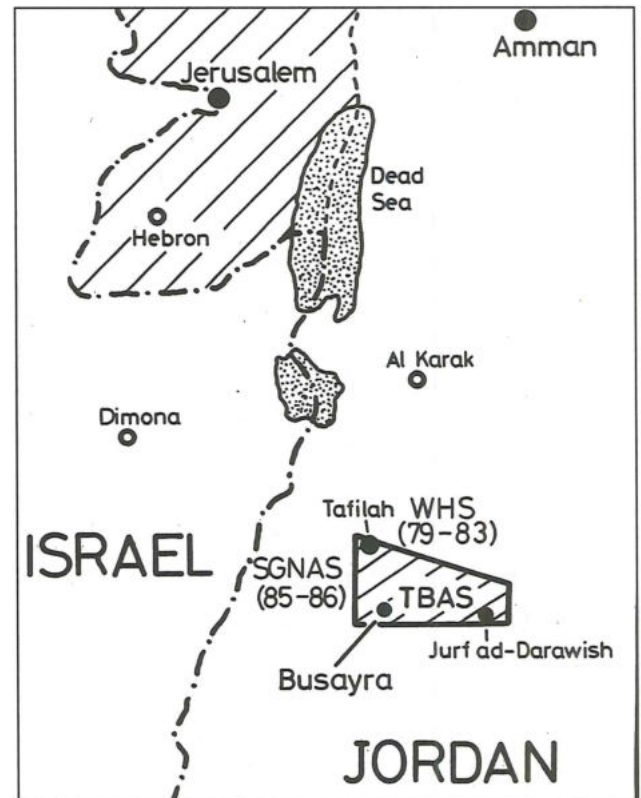
by

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Introduction

The Ṭafila-Buṣayra Archaeological Survey (TBAS) is a three-year project (1999-2002).¹ It attempts to connect geographically with the territory of Wādī al-Ḥasa Archaeological Survey (WHS) (1979-1983) (MacDonald *et al.* 1988) and the Southern Ghawrs and Northeast 'Arabah Archaeological Survey (SGNAS) (1985-1986) (MacDonald *et al.* 1992). It will survey an area of ca. 480 km² in the region from just west of at-Ṭafila and Buṣayra towards Jurf ad-Darāwīsh in the east. This area represents the territory immediately to the south and east respectively of that which the WHS and the SGNAS covered (Fig. 1).

Both Glueck and Hart carried out archaeological survey work in the area previous to the work of the TBAS. The former conducted explorations in the area in 1933 (Glueck 1934: 77-81), 1934 (Glueck 1935: 95-100), and 1936 (Glueck 1939: 19, 25-32, 53) and the latter in 1984 (Hart 1986; Hart and Falkner 1985). These surveys, however, only scratched the surface of the archaeological riches of the area. In addition, Parker (1986: 91-93) visited two sites, namely, Jurf ad-Darāwīsh *castellum* and



1. The TBAS Territory.

Qaṣr al-Bint, in his survey of the southern sector of the Roman limes. Finally, Fiema (1993; 1997) carried out work at at-Tuwana along the *Via Nova Traiana* in the central segment of the TBAS survey area in 1992 while Waheeb (1993) conducted a survey of

1. Team members for the 1999, eight-week season (May-June) included Burton MacDonald (St. Francis Xavier University, Antigonish, Nova Scotia), director; Andrew Bradshaw (St. Francis Xavier University), aerial photographs, colour slides, B/W photos, and pottery registration; Larry Herr (Canadian University College, College Heights, Alberta), pottery specialist; Michael Neeley (Montana State University), lithic specialist; and Scott Quaintance (Kansas State University, Manhattan), Global Positioning System (GPS), digital cameras, and mapping. Additionally, Piotr Bienkowski (Liverpool Museum, U.K.), Brett Hill (Arizona State University, Tempe), Khaled Moumani (Natural Resources Authority, Mapping Division, Am-

man), and Jane Peterson (Marquette University, Milwaukee, WI) joined the survey for short periods of time. Imad Drous served as representative of the Department of Antiquities while Abu Yousef was project cook.

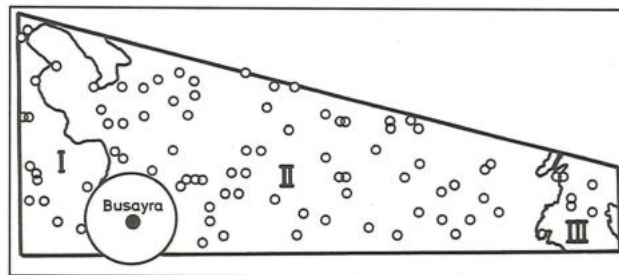
The TBAS is a licensed project of the Department of Antiquities of Jordan (Excavation Permit No. 12/99 to Burton MacDonald on April 27, 1999). Moreover, the Committee on Archaeological Policy (CAP) of the American Schools of Oriental Research has affiliated the project while the Social Sciences and Humanities Research Council of Canada has provided funding (File No. 410-99-0541). Larry Herr and Mike Neeley produced the ceramic and lithic plates respectively for this publication.

the at-Tafile-Ghawr Feifeh road alignment in the northwest segment of the territory in the same year. With the exception of Bennett's work at the Buṣayra Citadel (Bennett 1973; 1974; 1975; 1977; 1983; Bienkowski 1997), no full-scale excavations have been carried out in the TBAS survey area.²

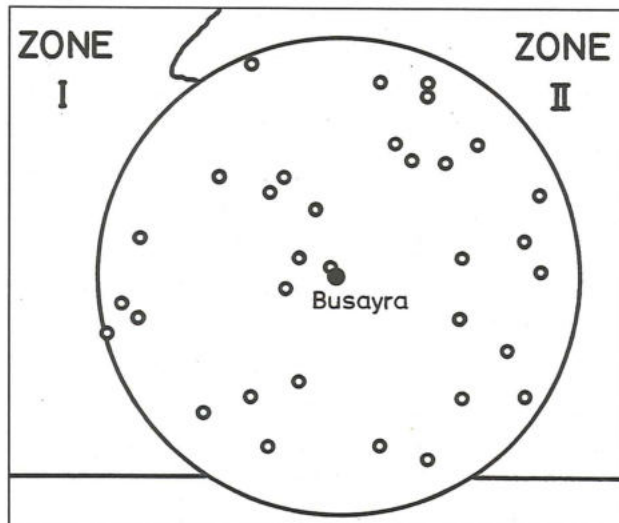
Objectives

The objectives of the project are fourfold:

- 1) To provide a statistically, valid sample of artifacts and archaeological sites in the various topographical zones of the survey area. Towards this end, the survey territory is divided into three topographical zones based on the 1:50,000 scale maps:
 - a) Zone 1: the gorges, that is, the area of steep wadis that generally flow in a north-westerly direction towards the Southern Ghawrs and Northeast 'Arabah (11 random plots, each measuring 500 x 500 m);
 - b) Zone 2: the area of the so-called Edomite Plateau, or part of the Transjordanian Plateau, from just west of at-Tafile and Buṣayra towards Jurf ad-Darāwīsh in the east (70 random plots, each measuring 500 x 500 m); and
 - c) Zone 3: the desert region in the area of Jurf ad-Darāwīsh (six random plots, each measuring 500 x 500 m) (Fig. 2).
- 2) To serve as a "hinterlands" survey of the Buṣayra Citadel, part of the Edomite capital. Towards this end, the TBAS project designated a 3-km radius around the citadel as Zone Buṣayra (Fig. 3). This zone incorporates topographical characteristics of both Zones 1 and 2.
- 3) To "ground-proof" several aerial photographs of the survey territory.
- 4) To investigate the archaeological materials, specifically lithics, associated with



2. GIS Randomly Chosen Plots.



3. Zone Buṣayra.

Wādī Juhayra Lake, a Pleistocene lake in the Jurf ad-Darāwīsh region (Moumani 1996; 1997).³

Methodologies

The methodologies that the TBAS team members employed varied according to the project's objectives. For example, when working on the random squares of Zones 1, 2, and Buṣayra, a corner of the random square was first located using a Global Positioning System (GPS). Once a corner was located, survey team members positioned themselves, usually a distance of 25-50 m apart, along one of the lines of the square. Then, with the help of compasses to keep a straight line, team members transected the plot, picking up lithics and sherds in par-

2. Bienkowski, with financial assistance from the Leon Levy-Shelby White Foundation, is presently working on a final report of Bennett's excavations at the Buṣayra Citadel.

3. In fact, Moumani writes, relative to this matter, "Shallow lake(s) up to 4 km² existed in the Jurf

Ed Darawish area during late Pleistocene ..." (1997: 5), and "Shallow lake(s) up to 4 km² formed in the Jurf Ed Darawish area during late Pleistocene ..." (1997 : 37). This matter will be pursued further in the chapter on the geology of the area in the final report on the project.

ticular. Depending upon the number of team members (from four to six) on any given day, one transect was often sufficient to cover the 200 x 200 m squares of Zone Buşayra. However, for the 500 x 500 m², two transects were generally required to cover the area. TBAS team members also used pedestrian transects to cover the shores of Wādī Juhayra Lake in their search for sites. Here, as for other lithic scatters, two collection strategies were utilized in the field. On diffuse density scatters, a random selection of lithic material was collected with an emphasis on locating diagnostic elements. Sites with more concentrated artifact distributions were collected by placing a 1-m radius circle on the site and collecting all material within the circle. This provided a standardized measure of artifact densities. Relative to the aerial photos, team members studied these and decided how best to get in, by means of a 4-wheel drive vehicle, to the area the photos depicted. Once in the area, team members then located themselves topographically on the basis of the photos and drove or walked to the area of the potential site. A judgment was then made as whether or not to give the indicated feature a TBAS site number. If the feature was judged to be a site then it was surveyed as such. Finally, a purposive, survey methodology was used extensively throughout at-Ṭafila-Buşayra-Jurf ad-Darāwīsh region. This involved sur-

veying all sites noted either within or adjacent to the random squares, interviewing Department of Antiquities personnel relative to the location of sites, and also talking with the farmers, shepherds, and Bedouin who live in the region about the whereabouts of sites. Once a site was located and surveyed, TBAS team members made every effort to insure that the name of the site was ascertained.

Accomplishments

As noted above, the first objective of the project is to provide a statistically valid sample of artifacts and archaeological sites in the survey area. To this end, the TBAS team members have, relative to Zone 1, attempted to visit and sample 11 random squares, which, as are all TBAS random squares, have been chosen on the basis of a Geographic Information System (GIS) database design and cartographic composition by Peter S. Johnson, Center for Applied Spatial Analysis, The University of Arizona, Tucson (coordinates in meters, UTM projection, Zone 36) (see Fig. 2). This zone, as mentioned previously, is the region of the gorges or steep wadis. It is very difficult terrain in which to carry out pedestrian transects. As a result, the TBAS team members were able to access only six of the 11 plots (Table 1). The remaining five plots are in areas where the gorges are very precipitous

Table 1. Random Squares (RS) (500 x 500 m) of Zone 1, the Gorges.

RS No.	Sample No(s).	Periods Represented
6	38 (Ceramics)/39 (Lithics)	Ceramic period lithics; Byz; LIsl
18	Inaccessible	-
19	Inaccessible	-
39	Inaccessible	-
42	Inaccessible	-
47	Inaccessible	-
56	147 (Ceramics)/148 (Lithics)	Ceramic period lithics; Iron II; Rom; Byz; EIsl; LIsl
64	123 (Ceramics)/124 (Lithics)	PL; Ceramic period lithics; Iron II; ERom; Rom; Byz; LIsl
65	119 (Ceramics)/120 (Lithics)	PL; Ceramic period lithics; Iron II; ERom; Byz; LIsl
75	112 (Ceramics)/113 (Lithics)	MPL; Ceramic period lithics; Per/Hell; Byz
80	105 (Ceramics)/106 (Lithics)	Ceramic period lithics; Iron Age; ERom; Byz; LIsl

and dangerous. Technical, mountain-climbing expertise and equipment are required to survey these plots. Generally, these plots are so extensively eroded that there is little opportunity of finding any *in situ* archaeological materials. Nevertheless, working on these 11 plots forced the TBAS team members into all accessible areas of the northwesterly flowing, wadi system. As a result, based on preliminary analysis, team members have surveyed and documented archaeological sites ranging from at least the Middle Paleolithic to the Late Islamic period in Zone 1. The periods specifically represented are Middle Paleolithic, Iron II, Persian/Hellenistic, Early Roman, Roman, Byzantine, Early Islamic, and Late Islamic (see Table 1). Moreover, 11 sites within or near Zone 1 represent Lower/Middle Paleolithic, possible Middle Paleolithic, Iron I, Iron II, Early Roman (Nabataean), Roman, Byzantine, and possible Late Islamic (Table 2). We feel confident of our understanding of the chronological prehistory and history of this zone. In addition, relative to Zone 1, TBAS team members investigated 19 sites along a dirt road that leads from the Buşayra region to the Northeast 'Arabah at Wādī ad-Daḥal (Table 3). This road would have

joined, in antiquity, a route going from the Southern Ghawrs in the north to Faynān and southward to the Gulf of al-'Aqaba on the Red Sea. The purposive survey of this route served as a means by which the TBAS territory is connected geographically with that of the region of the SGNAS in the area of Wādī ad-Daḥal (MacDonald et al. 1992, Fig. 3). Lithic and ceramic readings from the sites surveyed along this route represent the Middle Paleolithic, Late Chalcolithic, Chalcolithic/Early Bronze, Late Iron I, Iron II (Fig. 4), Iron Age, Early Roman (Nabataean), Late Roman, Byzantine, Byzantine/Early Islamic, Middle Islamic, and Late Islamic periods (Table 3).⁴ TBAS Site 61, Rujm al-Musaykaneh, is a good example of a watchtower that overlooks this route (Fig. 5).

TBAS team members transected seven of the 70 random squares of Zone 2, that is, a segment of the Edomite or Transjordanian Plateau from just west of aṭ-Ṭafīla-Buşayra towards Jurf ad-Darāwish in the east, during the 1999 season (Table 4). We identified four sites within or near the transected squares of Zone 2 (Table 5). The investigation of the remaining 63 squares of the zone is one of the main objectives of the 2000 infield season.

Table 2. Sites within or near Random Squares of Zone 1, the Gorges.

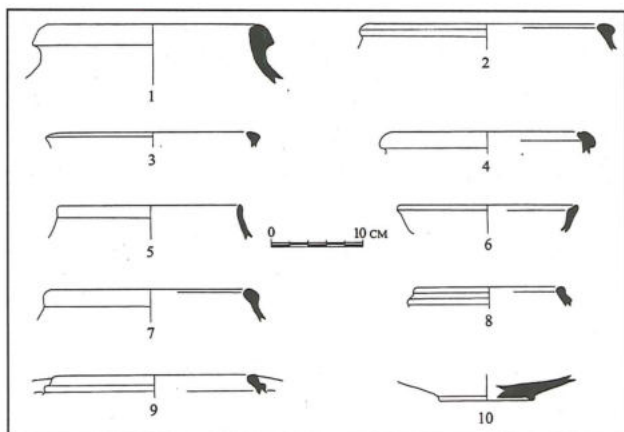
Site No.	Within RS No.	Near RS No.	Periods Represented
20	-	6	LPL/MPL; Ceramic period lithics
21	6	-	Iron II; Byz/EIsl
36	-	56	Rom; Byz; poss LIsl
37	56	-	Ceramic period lithics; Iron I; Iron II; Rom-Byz
58	64	-	Poss MPL; Ceramic period lithics; Byz
59	65	-	Ceramic period lithics; poss Iron Age; Byz
60	65	-	Post-NL ceramic lithics
61	-	65	Iron II; ERom
53	75	-	Ud
54	-	75	Ceramic period lithics; Rom-Byz; poss LIsl
55	-	75	Ceramic period lithics; ERom (Nab)

4. A newly-built, asphalt road goes from the area just south of aṭ-Ṭafīla along Wādī Umruq to the region of Feifeh in the Southern Ghawrs (Waheeb 1993). There are, thus, two roads that one can take from a aṭ-Ṭafīla-Buşayra region to the Southern Ghawrs

and Northeast 'Arabah. The TBAS members intend to investigate next season the possibility of a pedestrian track that may go from the area of An-Namata on the plateau to Wādī al-Khanāzīr in the Southern Ghawrs.

Table 3. Sites along dirt road to Wādī ad-Daḥāl in the Northeast ‘Arabah.

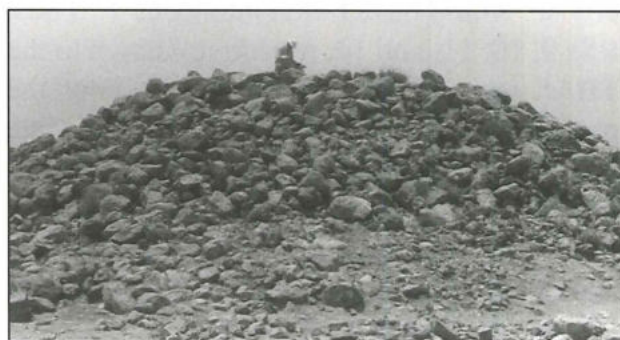
Site No.	Site Name	Site Description	Periods Represented
61	Rujm al-Musaykaneh	Watchtower	Ceramic period lithics; Iron II; ERom (Nab)
62	Qasr Karayim bin ‘Ali	Rectilinear Structure/Tomb	Iron II; prob Byz
63	-	Circular Structure	Iron Age; LRom; Byz
64	-	Cave and/or Cistern	Poss PL; Iron II; LRom; Byz
65	-	Rectilinear Structure/Tomb	MPL; Byz; LIsl
66	-	Circular Structure	Rom; Byz; LIsl
67	-	Tomb	Nab; Byz/EIsl; MIsl
68	-	Circular Structure	MPL; Iron II; ERom; Byz
69	-	Rectilinear Structure	Ceramic period lithics; Byz
70	-	Rectilinear Structure/Wall	Iron Age; ERom; LRom; Byz
72	Kh. al-Qa‘ayr	Rectilinear Structure/Tomb	Ceramic period lithics; Late Iron I; Iron II; Byz; Ud
73	-	Rectilinear Structure/Wall	Ceramic period lithics; Iron Age; Rom; Byz
74	-	Circular Structure	Ceramic period lithics; EIsl; LIsl
75	-	Stone Pile/Wall	Poss PL; Ceramic period lithics; Byz; Ud Isl
76	-	Rectilinear Structure	Early ceramic period lithics; LChal; Iron Age; Byz; LIsl
77	-	Rectilinear Structure	Ceramic period lithics; Post-classical sherds
78	-	Rectilinear Structure	Ceramic period lithics; Chal/EB; prob Iron Age
79	-	Circular Structure	Ceramic period lithics; Iron Age; Rom; LIsl
80	-	Circular Structure	Ceramic period lithics; Byz; MIsl-LIsl



4. TBAS Site 72 (Kh. al-Qa‘ayr), Early-Late Iron II: 1. Pithos (poss. Late Iron I); 2. Krater; 3-6. Bowls; 7-9. Cooking Pots (7 may be 10th-9th century; 8-9 are typical Late Edomite; 10. Ring base.

As Tables 4 and 5 indicate, the periods represented in Zone 2 are generally consistent with those of Zone 1.

TBAS team members did not transect any of the six random squares in Zone 3



5. TBAS Site 61, Rujm al-Musaykaneh.

(Jurf ad-Darāwish area) during the 1999 season. The transecting of these squares will be another of the main priorities of the 2000 infield season.

Relative to the second objective, namely, to carry out a “hinterlands” survey of Buṣayra Citadel (see Fig. 3), TBAS team members accomplished this by attempting to walk transects of the 33 randomly chosen plots (200 x 200 m) within a 3-km radius of

Table 4. Random Squares (500 x 500 m) of Zone 2, the Plateau.

Plot No.	Sample No(s).	Periods Represented
1	29 (Ceramics)/30 (Lithics)	Ceramic period lithics; Rom/Byz
2	34 (Ceramics)/33 (Lithics)	Ceramic period lithics; Chal/EB (?) lithics; Byz
3	27 (Ceramics)/28 (Lithics)	MPL; Ceramic period lithics; Rom; Byz; EIsl; LIsl
7	288 (Ceramics)/289 (Lithics)	Ceramic period lithics; Prob Iron Age; Rom (Nab); Byz; LIsl
9	275 (Ceramics)/276 (Lithics)	Ceramic period lithics; LChal/EB; Iron Age; Byz
10	44 (Ceramics)/43 (Lithics)	Ceramic period lithics; Iron II; Rom; Byz; EIsl
11	286 (Ceramics)/287 (Lithics)	Ceramic period lithics; Rom-Byz

Table 5. Sites within or near Random Squares of Zone 2, the Plateau.

Site No.	Within RS No.	Near RS No.	Periods Represented
17	2	-	Ceramic period lithics
18	2	-	Ceramic period lithics
13	9	-	Ceramic period lithics; EIsl
14	-	9	Ceramic period lithics

the site.⁵ Moreover, we attempted to identify all archaeological sites within this area regardless of whether or not they fell within the squares. We were able, during the 1999 in-field season, to access 29 of the plots as well as territory adjacent to them. Four of the 33 plots were not accessed. This is due to the fact that the “hinterlands” survey includes segments of the “gorges” terrain that, otherwise, would have fallen into Zone 1. Thus, RSs 9, 10, 11, and 14, remain unknown to the TBAS team members. On the basis of the plots accessed in this zone, we can now state that periods represented include possible Paleolithic, Iron Age, Iron II, Early Roman, Late Roman, Roman (Nabataean), Byzantine, Early Islamic, Middle Islamic, Late Islamic, and Modern (Table 6).

As a result of the “hinterlands” survey of Zone Buşayra, work in Zones 1 and 2, and through purposive survey of sites adjacent to these zones, the TBAS team members

identified many major architectural sites. Previous to the beginning of this project, only a half-dozen of these sites had been reported. Well-known sites include the Buşayra Citadel along with several sites, for example, Umm Dayifa, Khirbat al-Hārith, Khirbat al-Janīn, and Khirbat ‘Ayn al-Bayḍa, along the so-called King’s Highway (Num 20:17; 21:22). As a result of the TBAS’ first in-field season, many more sites can now be made known to the interested public.

Tall Buşayra, TBAS Site 132, serves as an excellent example of one particular, and as yet relatively unknown, site within Zone Buşayra. It is located 900 m down the slope from the modern gate that gives access to the Buşayra Citadel, TBAS Site 135. It appears to be a tall and is cut by roads on the west, south, and east. Several wall lines are clearly visible in these road cuts. One particular wall, uncovered four years ago during bulldozing associated with the construction of two modern, four-story buildings, still stands 6.25 m above the present street level and it is more than 1-m thick (Fig. 6). It runs in a north-south direction, extending radially from the Buşayra Citadel, and is exposed for a distance of 25 meters. The land-

5. The original intention was to carry out a “hinterlands” survey of the Buşayra Citadel that included territory within a 5 km radius. However, A. Walmsley, University of Western Australia, Perth, who is presently excavating Gharandal (1997, 1988) immediately to the south of Buşayra, wanted to carry out his own “hinterlands” survey of his site. Thus, in a cooperative move, the TBAS team

members, restricted their survey to a 3 km radius of Buşayra. In fact, the TBAS team’s work in Zone Buşayra along with that in Zones 1 and 2 actually means that the “hinterlands” survey of the Buşayra Citadel is much more than the 3 km radius. The only exception to this is in the area immediately south of Zone Buşayra.

Table 6. Random Squares (200 x 200 m) of Zone Buşayra.

RS No.	Sample No(s).	Periods Represented
1	102	Iron Age; Rom; Byz; prob LIsl
2	179	Rom (Nab); Byz; MIsl-LIsl; Mod
3	180	Byz; LIsl
4	181	Iron II; LRom; Byz
5	171	LRom; Byz; MIsl/LIsl
6	175 (Ceramics)/176 (Lithics)	Ceramic period lithics; Iron I/Iron II; Iron II; LPer-Hell; Byz/EIsl
7	172	Prob Iron Age; ERom; LRom; Rom (Nab); Byz; LIsl
8	173 (Ceramics)/174 (Lithics)	Ceramic period lithics; Iron II; Rom
9	Inaccessible	-
10	Inaccessible	-
11	Inaccessible	-
12	186	Iron II; Rom; LRom; Ud
13	64	LRom; LOtt (?)
14	Inaccessible	-
15	184 (Ceramics)/185 (Lithics)	PL (?); Ceramic period lithics; Iron II; LRom; Byz; EIsl
16	46 (Ceramics)/47 (Lithics)	Ceramic period lithics; Rom (Nab); LRom; Byz
17	187 (Ceramics)/188 (Lithics)	Poss PL; Ceramic period lithics; ERom; LRom; Byz; LIsl; Ud
18	45	Iron Age; LRom-Byz
19	182 (Ceramics)/183 (Lithics)	Ceramic period lithics; Iron II; Rom; Byz
20	49	Iron II; ERom; LRom; Byz/EIsl
21	91 (Ceramics)/92 (Lithics)	Ceramic period lithics; Iron II; ERom; Byz
22	89 (Ceramics)/90 (Lithics)	Ceramic period lithics; Iron II; Rom
23	189 (Ceramics)/190 (Lithics)	Ceramic period lithics; Iron II; ERom; LRom; Byz
24	95 (Ceramics)/96 (Lithics)	EPL; Poss PL/ceramic period lithics; Iron Age; Byz
25	191	Iron Age; Rom; Byz
26	76	Iron II; Rom; LIsl
27	79 (Ceramics)/78 (Lithics)	Ceramic period lithics; Iron Age; ERom dom-few Nab
28	192 (Ceramics)/193 (Lithics)	Ceramic period lithics; Iron II; LRom; Byz
29	194	Iron II; ERom; LRom; Byz
30	85 (Ceramics)/86 (Lithics)	Iron II; Byz
31	83 (Ceramics)/84 (Lithics)	Ceramic period lithics; Iron Age; ERom; Byz
32	177	Iron Age; LRom; Byz; Mod
33	178	Iron Age; Rom; Byz dom; EIsl; MIsl/LIsl; Mod; Ud

owners left it in place to serve as a retaining wall for their buildings. Periods represented by the sherds that the TBAS team members collected in the vicinity of the road cuts are Early Iron II, Iron II, Roman, Nabataean, Byzantine, Early Islamic, Late Islamic, and Modern.

If Tall Buşayra and the Buşayra Citadel are contemporaneous, then the town was a very large one during the Iron II period.

With respect to the Byzantine period, one limestone block features a partial Greek in-

scription and an associated Christian cross, TBAS Site 133. The block is located in an arch of a roofless and presently abandoned Ottoman house on the east side of modern Buşayra. The inscription is upside down and is clearly a reused stone from an ecclesiastical structure. It appears to be based on Psalm 121.8, "The Lord keep your going out and your coming in...." (T. Gagos, personal communication). TBAS team members think that this gives definitive indication of the existence of a church that



6. TBAS Site 132, 6.25 m high wall at Tall Buşayra.

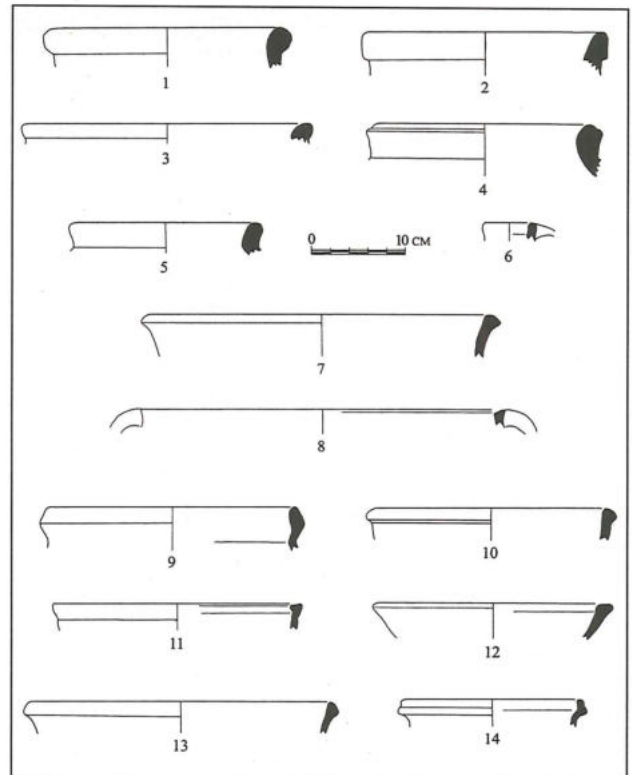
Glueck (1934: 78) and others (Saller and Bagatti 1949: 231) mention as having existed in Buşayra.

With respect to the project's third objective, namely, the "ground-proofing" of aerial photographs of the area taken in 1953 (see Kennedy 1998a and b), Kennedy, University of Western Australia, Perth, has looked at aerial photos, at a scale of 1:25,000, of certain segments of the TBAS territory and identified features that may be sites and should be investigated. Kennedy provided team members with a printed list of the identified sites by numbers and an accompanying description, along with an indication, by means of no stars to one-to-three stars, of how significant he views each potential site.

The TBAS team members investigated 63 of these Kennedy-identified, potential sites on nine aerial photos during the 1999 season. Preliminary results indicate that

about 14 percent of these sites have been lost, due mainly to development, such as agricultural field clearance, residential and road construction, and reforestation. In addition, 41% are archaeological sites that the TBAS team members documented. The remainder, that is, 45%, are field clearance in the form of stone lines and stone piles, exposed bedrock, and animal pens and/or corals. Although there are generally some ceramics and lithics in the area where these features are located, the TBAS team has not judged them to be archaeological sites.

The use of aerial photographs caused the TBAS team members to investigate in an area to the east of Jabal al-Hala (Zone 2). The survey team's progress on the plots of Zone 2 does not currently include this area. However, it is now known that this small area contains a large number of architectural sites (Fig. 7). We will revisit this area next season when we examine more of the random squares in Zone 2.



7. TBAS Site 146, Iron I (maybe some Early Iron II): 1-4. Pithoi (collared?); 5. Jar; 6. Juglet; 7-8. Kraters; 9-13. Bowls (9 and 13 are not Cooking Pots); 14. Cooking Pot.

Because of the examination of random squares that gets survey team members into all areas of the survey territory to be surveyed and the method of purposive survey that the present project employs, the TBAS team members are of the opinion that all the major sites that Kennedy identifies on his aerial photos would also be found without the use of the photos. However, if one is interested in locating architectural sites exclusively through the use of aerial photographs, then Kennedy's identification of major sites (given two or three stars) ought to be of great help.

A final objective of the project is to investigate the archaeological materials, especially lithics, associated with Wādī Juhayra Lake, a Pleistocene lake in the Jurf ad-Darāwīsh region that Moumani has identified and mapped (1996, 1997).

Moumani joined the TBAS team on June 2, 1999, and showed us the outlines of the lake that measures ca. 13 km (N-S) and is ca. 4 km² in area. He guided us through areas of the lake close to the village of Jurf ad-Darāwīsh where he indicated the locations from which he took core samples that he has dated by means of Optical Stimulating Luminescence (OSL) to 182 + 65 ka, 166 + 13 ka, and 82 + 6 ka (1996: 126). He has concluded that some of the Paleolithic artifacts that he found embedded in the sediments from which he took his core samples are either the same age as the sediments or they may be older (Moumani 1996: 134).

Following the above-described introduction to Wādī Juhayra Lake, TBAS team

members, over a five-day period, surveyed the "shores" of about half the lake and recorded 26 sites. The sites range in date from the Lower Paleolithic to the Late Islamic period (Table 7).

The TBAS team members intend to continue their survey of Wādī Juhayra Lake in the upcoming, infield season.⁶

Lithic Materials

The 1999 TBAS field season yielded surface collections of lithic artifacts from 82 sites and 27 random squares producing a total of 4,178 lithic artifacts from 121 samples. This resulted in an average of 34 artifacts per collection. The dominant morphological form was the flake, constituting 64.8% of the entire survey material (Table 8). Morphological forms that were less common in these collections included blades (14.7%), bladelets (3.7%), and cores (3.9%).

Analytical Methods

Analysis of the 121 surface collections resulted in the identification of 148 separate cultural-temporal units. These range from the Lower Paleolithic through later ceramic periods. Assignments of age were based on the presence/absence of temporally sensitive retouched pieces, core and debitage morphology as an indicator of technology, the degree of patination, and the quality of the lithic raw material. Diagnostic retouched pieces are most commonly used to assign cultural-temporal affinity as some of these have more-or-less restricted distributions in

6. In conjunction with their work in the area of Wādī Juhayra Lake, TBAS team members investigated a quarry that Moumani discovered in Wādī al-Muqla'a, 3 km northwest of Al-Hussayniyya al-Janubiyya, during his study of the geology of the Jurf ad-Darāwīsh area (Moumani 1997: 52). Moumani is of the opinion that "this site was probably quarried during the building of ad-Da'ajaneh Castle 7.5 km south of this locality" (1997: 52; see Parker 1986: 93-94 on the ad-Da'ajaneh Castle). He further states that, "the

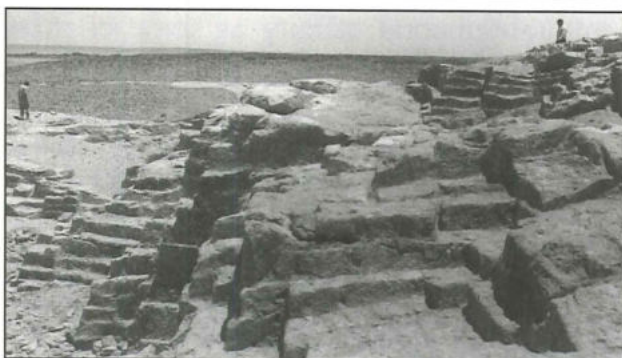
limestone of this quarry was probably used in building the main enclosure wall and the arched gates to the castle" (1997: 52). The TBAS team members' collection of Late Roman/Byzantine sherds from a circular enclosure immediately south of the quarry provides evidence supporting Moumani's opinions. The area of the quarry is outside the TBAS territory. However, because of Moumani's interest in the site, we sherded it and included it as TBAS Site 90 (Fig. 8).

Table 7. TBAS Wādi Juhayra Lake Sites (1999).

TBAS Site No.	Type of Site	Periods Represented
91	Lithic Scatter/Production Centre	MPL/UPL
92	Lithic Scatter/Production Centre	MPL/UPL
93	Lithic Scatter/Production Centre	MPL/UPL
94	Lithic Scatter/Production Centre	Early EPL
95	Lithic Scatter/Production Centre	MPL/UPL
96	Lithic Scatter/Production Centre	MPL
97	Lithic Scatter/Production Centre	UPL
98	Lithic Scatter/Production Centre	MPL
99	Lithic Scatter/Production Centre	MPL
100	Lithic Scatter/Production Centre	MPL
101	Lithic and Sherd Scatter/Rectilinear Structure	MPL/EPL; Late EPL; NL-Chal
102	Lithic Scatter	Late EPL
103	Lithic and Sherd Scatter/Rectilinear Structure	PL; NL/Chal; Byz (1 vessel ?)
104	Lithic and Sherd Scatter	Late EPL; Pre-classical bods; Rom-Byz
105	Sherd Scatter/Potbust	Byz
106	Lithic and Sherd Scatter/Tomb (?)	Late EPL; Ceramic period lithics; NL-Chal; prob LIsl
107	Lithic and Sherd Scatter/Circular Structure	NL/Chal; NL-Chal; EB bods; Byz
108	Lithic and Sherd Scatter/Rectilinear Structure	PL/Chal; EB, poss; Rom; Byz; poss LIsl
109	Lithic and Sherd Scatter/Rectilinear Structure	PL; NL/Chal lithics; NL-Chal; Byz
110	Lithic and Sherd Scatter/Stone Pile	NL-Chal
111	Sherd Scatter/Rectilinear Structure	Ceramic period lithics; Late Isl
112	Lithic Scatter/Production Centre	LPL-UPL
113	Lithic Scatter/Tomb/Stone Pile	PL/UPL/EPL
114	Lithic Scatter/Production Centre	MPL
115	Lithic Scatter/Production Centre	LPL/MPL
139	Sherd Scatter	NL/Chal/EB lithics; NL-Chal

Table 8. Frequencies and Percentages of Debitage and Cores (1999).

Blades	Flakes	Bladelets	Cores	Shatter	Total
614 (14.7)	2706 (64.8)	157 (3.7)	163 (3.9)	538 (12.9)	4178



8. TBAS Site 90, quarry.

time and space. Unfortunately, retouched pieces usually constitute a small portion of

any assemblage and many retouched forms are not particularly sensitive markers of time. The morphology ofdebitage and cores also provided some temporal information as many particular lithic technologies have somewhat restricted temporal dimensions. This is generally the case with blade/bladelet industries (Upper Paleolithic, Epipaleolithic, Neolithic) as well as Levallois industries (Lower Paleolithic, Middle Paleolithic). A third method used to determine age involved the relative degree of patina-

tion. All things being equal, older artifacts should be more heavily weathered and discolored. This method of assigning temporal affinity is potentially problematic as patination between sites of the same age can be quite variable. With this in mind, patination was only used to compare material within a surface collection and resulted in very coarse-grained age designations (e.g., Paleolithic vs. ceramic period). Finally, it was observed that there were patterned differences in raw material selection between Paleolithic and ceramic period collections. Paleolithic materials tended to be homogenous and higher quality while the ceramic period raw materials were less homogeneous and often contained internal flaws. The pattern of differential selection of material was strengthened by the regular association of ceramics with the lower grade raw materials.

The examination of the lithic collections indicated that ceramic period components were by far the most common, outnumbering Paleolithic components by almost a 2:1 margin (Table 9). Of the 52 Paleolithic components from 36 sites and survey plots, only five are assigned to the Lower Paleolithic. These Lower Paleolithic components are represented at three sites (91, 112, 115) that are all located in the eastern portion of the survey area along the shores of the Pleistocene Jurf-Burma Lake (Moumani 1996). The frequency of handaxes was low in the survey area and included two from Site 112 - one that was a large Micoquian handaxe suggesting a Late

Table 9. Frequency and Percentage of Lithic Temporal Components Represented (1999).

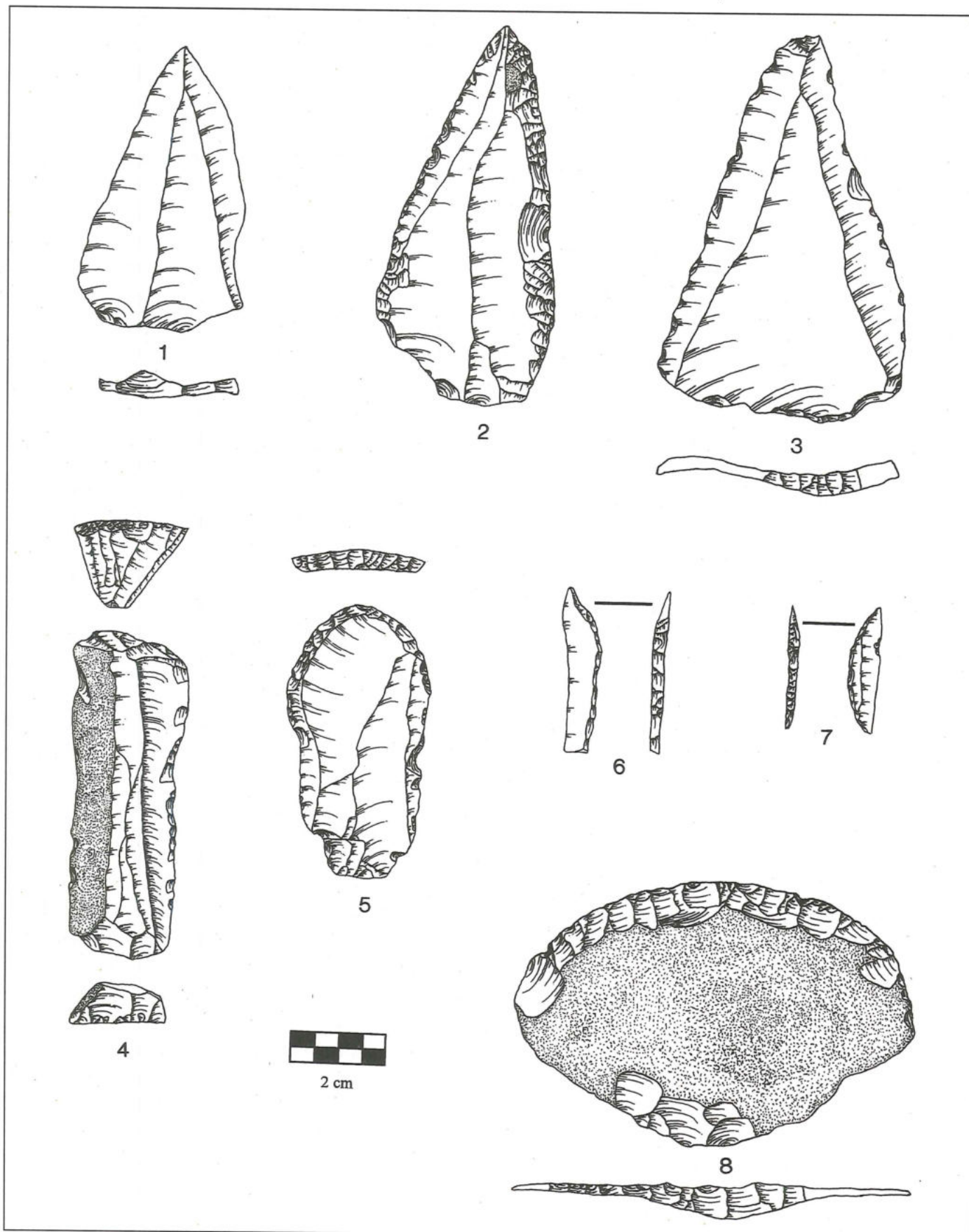
Cultural-Temporal Unit	Frequency and Percentage	
Lower Paleolithic	5	(3.4)
Lower/Middle Paleolithic	1	(0.7)
Middle Paleolithic	17	(11.5)
Middle/Upper Paleolithic	1	(0.7)
Upper Paleolithic	5	(3.4)
Upper/Epipaleolithic	1	(0.7)
Epipaleolithic	6	(4.0)
Paleolithic (undifferentiated)	16	(10.8)
Late Neolithic/Chalcolithic/Early Bronze	8	(5.4)
Ceramic Period (undifferentiated)	88	(59.4)
Total	148	(100.0)

Acheulian age (Copeland 1998). *In situ* deposits were not identified. However, Lower Paleolithic material from Site 112 was scattered along an erosional channel. This material was differentially patinated from nearby surface remains suggesting a different depositional environment. More intensive geological work is necessary to evaluate the possibility of subsurface remains.

The best represented of the Paleolithic cultural-temporal units was the Middle Paleolithic, accounting for 11.5% of all components. Seventeen components are represented from 14 sites and two random squares. Levallois flakes and points, indicative of the Middle Paleolithic, are found throughout the survey area but the greatest concentration of these artifacts occurs along the shore of the lake (Fig. 9: 1-3). Twelve sites along the ancient lakeshore contain Middle Paleolithic components and an additional Middle Paleolithic component was identified from the western edge of the Jabal Umm Rijam that overlooks the lake. Many of the Middle Paleolithic sites in the area of the lake are found eroding out of marl deposits and suggest the potential for intact subsurface deposits. Furthermore, *in situ* artifacts were observed in profile along various portions of the Wādī Jurf.

Upper Paleolithic components were identified at five sites, all located on the shores of the Pleistocene lake. The largest of these Upper Paleolithic occurrences is Site 97 with a density of 185 artifacts in a 1 m radius (Fig. 9:4). Unlike other Upper Paleolithic locations in the area, this material is much more heavily patinated and its context of deposition is not in the marl sediments but consists of a deflated surface on a terrace overlooking the Wādī Jurf.

Five of the six sites containing Epipaleolithic components were recorded in the eastern end of the survey area. A single early Epipaleolithic occupation (Site 94) was found along the lake at the edge of the modern town of Jurf ad-Darāwīsh. Among the



9. Lithic artifacts: 1. Site 93, Levallois point; 2. Site 114, retouched Levallois point; 3. Site 68, Levallois point; 4. Site 97, double endscraper; 5. Site 104, endscraper; 6. Site 94, La Mouillah point; 7. Site 102, lunate; and 8. Site 107, tabular scraper.

artifacts collected were microburins, backed bladelets, and La Mouillah points (Fig. 9:6). Geometric forms were absent suggesting an early Epipaleolithic age. Sites of a similar age and techno-typological character have been found in Wādī al-Ḥasa to the north (Neeley et al. 1998; Olszewski 1997). Four late Epipaleolithic sites were identified along the margins of Wādī Juhayra Lake. Techno-typological characteristics of these sites (101, 102, 104, 106) include microburins, lunates, bladelet production, and very small bladelet cores (Fig. 9:7). These assemblages are characterized by the use of a lustrous, gray chert that is not found at any of the other Paleolithic sites in the eastern survey area. Evidence for an Epipaleolithic occupation in the western survey area was limited and consisted of bladelet cores from Buṣayra Plot 24. Blades and bladelets were absent from the sample.

Pre-Pottery Neolithic components were not identified at any of the sites in the 1999 survey. The time periods subsequent to the Pre-Pottery Neolithic, namely, the Late Neolithic, Chalcolithic, and Early Bronze, were lumped into a single analytical unit based on the lithic materials alone. This collapsing of these units is due to the fact that many of the retouched tool classes (e.g., fan scrapers, sickles, borers/drills) occur in each of these periods and can be difficult to assign to any one particular period (Fig. 9:8). In some cases, a more secure temporal assignment can be obtained from the associated ceramic materials. In the survey area, eight Neolithic/Chalcolithic/Bronze Age components were identified from five sites and one survey plot. In the eastern end, these components were only found around Wādī Juhayra Lake. Their distribution in the west was more widespread, and included components along the track leading down into the northeast 'Arabah. Artifact densities at these sites were much lower than those sites associated with the various Paleolithic periods.

The largest group of lithic collections represented sites assigned to the category of undifferentiated ceramic period (Table 9). These collections do not contain any sort of reliable temporal diagnostics among the chipped stone materials. Any assessment of their cultural affinity should rely upon the association of ceramic materials. In many cases, the lithic materials were too few in number to hazard a more precise estimate of the age. Also, nearly all of these collections are characterized by the use of low quality stone and a simple, flake-based technology that is highly expedient in nature. While found over the entire 1999 survey area, the majority of these ceramic period assemblages are found in the more intensively surveyed western portion of the project area.

Summary and Discussion

The first TBAS season resulted in the identification of 148 lithic components from 121 sites. The time periods represented appear to cover a large span of time from the Lower Paleolithic through the more recent ceramic periods. However, there is clearly a pattern of more intensive Paleolithic occupation in the eastern portion of the survey region associated with the lake system. This pattern is in contrast to the limited evidence for Paleolithic settlement in the western part of the survey region. Initially, this might indicate that Paleolithic foragers avoided part of the landscape, however, it is important to take into account the potential changes in the landscape over the past 10,000 years. The western portion of the survey region is characterized by deeply incised wadis on the edge of the plateau and millennia of agropastoral activities. This combination of human and natural processes has likely altered the landscape more drastically than in the east where physical relief is less marked and Holocene erosion and human occupation have been less intensive. As a result of these factors, evidence of Paleolithic land-use in the west is largely absent and rarely

in situ. Such a pattern is evident from the scatter of isolated Paleolithic materials in the 500 x 500-m random squares and the absence of high concentrations of Paleolithic materials comparable to those in the east. It is likely that areas attractive to Paleolithic foragers were also attractive to later Holocene agriculturalists and have been exploited for millennia. In contrast, the lake environment that was so attractive for Paleolithic foraging societies around Jurf ad-Darāwīsh probably disappeared by the late Pleistocene and all subsequent settlement was less intensive and less extensive. This has resulted in the preservation of Paleolithic sites with the potential for sealed subsurface deposits.

Conclusions

During the 1999 infield season, TBAS team members investigated 42 random squares in Zones 1, 2, and Buṣayra. In addition, we surveyed a total of 151 sites. As a result, we have been successful in identifying numerous concentrations of sites that are located: 1) southwest of Buṣayra on the northeast facing slopes of Jabal al-Kula; 2) along the main north-south road between aṭ-Ṭafīla and Buṣayra; 3) along the dirt road that leads from the Transjordanian Plateau in the vicinity of Buṣayra to Wādī ad-Dahal in the Northeast 'Arabah; 4) in the region of Jabal al-Hala; and 5) along the shores of

Wādī Juhayra Lake. The most commonly represented periods include the Middle Paleolithic, Epipaleolithic, Neolithic-Chalcolithic, Iron II, Roman, Byzantine, and all Islamic periods. Periods poorly represented or not represented at all include the Early Bronze, Middle Bronze, Late Bronze, Persian, and Hellenistic.

Preliminary analyses indicate that the oldest materials from Wādī Juhayra Lake come from the northern and central segments of the lake. Middle Paleolithic and late Epipaleolithic periods are particularly well represented in this region. This dating is not at variance with the OSL dating mentioned above. In these areas, TBAS team members did not notice any ceramic materials. However, in the southern segments of Wādī Juhayra Lake, survey team members collected Neolithic-Chalcolithic, Early Bronze, Roman-Byzantine, Byzantine, and probable or possible Late Islamic ceramic materials. This appears to indicate that the southern segments of the lake continued in existence and/or they contained water, at least seasonally, long after the northern segments had dried up.

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