

## AZRAQ WETLANDS SURVEY 2000, PRELIMINARY REPORT

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### Introduction

The presence of prehistoric human activity in the eastern desert of Jordan has been well documented in earlier research by several people, including Betts (e.g. 1986), A. Garrard and his crew (e.g. Garrard *et al.* 1994), Copeland and Hours (1989), and Wilke and Quintero (1998), in addition to earlier, unsystematic investigations (e.g. Harding 1967; Field 1960).

New evidence of ancient human activity was brought to the surface in the middle 1990s by bulldozing work in the 'Ayn Sawdā/ Soda (عين سودا) and 'Ayn Qaṣīyah (عين قصية) pools of the al-Azraq Wetlands. These chipped stone tools and animal remains, which dated to the Late Pleistocene and Early Holocene epochs, led to two seasons of purposive survey, collections, and excavations in the western edge of the Azraq Wetlands (Rollefson *et al.* 1996; 1997). During excavations at 'Ayn Sawdā in 1997, a Neolithic hunting camp was discovered about 2.5km east of 'Ayn Sawdā in the dunes next to the former marsh in Azraq ash-Shishān/al-Junūbī (أزرق الشيشان/الأزرق الجنوبي),<sup>1</sup> and exploratory excavations were undertaken there in 1998 (cf. Rollefson *et al.* 1999).

Since much of the desert area around al-Azraq is of deep concern to the Royal Society for the Conservation of Nature (hereafter, RSCN), including direct responsibility for the management of the Azraq Wetlands Reserve in al-Azraq al-Junūbī and the Shawmari Game Preserve approximately 15km to the south, RSCN was interested in obtaining an inventory of cultural resources that existed on the lands that they administered. In 1999 an agreement was reached between the authors and the RSCN to undertake an intensive foot survey of the Wetlands Reserve in the year 2000 (Fig. 1). Fi-

nancial, logistical, and analytical support was generously provided for this work by RSCN, and additional assistance came from Dr. Fawwaz al-Khraysheh and the Department of Antiquities of Jordan.

### The South Azraq Landscape

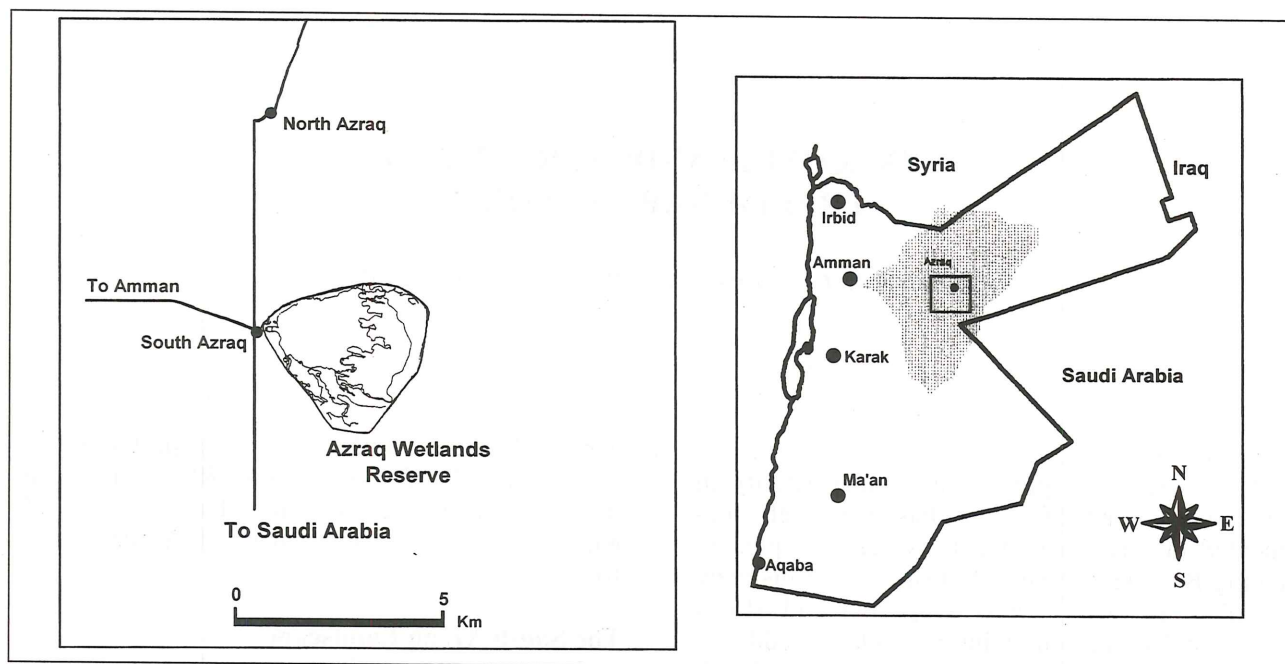
In this report we do not intend to provide detailed descriptions of the South Azraq area, since this kind of information is better described in other publications (e.g. el-Eisawi 1996; Nelson 1973). Very briefly, there are observable differences in the landscape and vegetation in the immediate vicinity of the Wetlands. Absolute altitude is noticeably variable within a small area, but generally the floor of the Wetlands region is relatively flat, ranging between ca. 912 -920m. A low range of hills occurs to the west of the marsh (at the Police Post, for example), where elevations reach as much as 558m, but only at the distant horizons to the north, west, and east can the eye see much to break the relief of the general elevational monotony.

The Wetlands themselves still have a well-defined set of microhabitats, although the distinctions between them were probably much more noticeable in terms of local moisture, vegetation, wildlife, and general color patterns in the past than today. The pumping of al-Azraq subsurface water to the population centers of 'Ammān, az-Zarqā', and al-Mafraq, which began in 1984, has had dramatic desiccation effects. In the subsequent 16 years, for example, the water table in South Azraq has fallen more than 5 meters [K. Kiwan, pers. comm., and personal observation over 20 years (GR)].

What remains to be seen today includes, broadly speaking, a series of interdigitated stretches with

1. Older maps and common usage until very recently used the ethnic identity of the majorities of the "two" Azraqs in their names. Thus northern Azraq was commonly called Azraq ad-Drūz, while the settlement some 9km to the south was called Azraq ash-Shishān (or Chechen in modern Russian

reference). More recent maps and population dynamics have resulted in a change in the references to the two communities: Azraq ad-Drūz is now officially "North Azraq/al-Azraq ash-Shamālī", while Azraq ash-Shishān is now "South Azraq/al-Azraq al-Junūbī".



1. Location of the Azraq Wetlands reserve in eastern Jordan (modified after the Royal Society for the Conservation of Nature).

notable sediment and vegetational differences. From the “outside” to the interior of the Wetlands, these zones can be summarized as:

1. Flat and sun-cracked mudflats along the north-eastern, eastern, and southeastern reaches of the area bounded by a fence. The sediments are very compact due, in former times, to the episodic standing water that allowed fine sediments to settle, followed by evaporation that resulted in sub-ceramic texture formation. Vegetation is very rare.
2. Proceeding towards the west and northwest of this *qā'* (or *playa*) section is a broad crescent of active silt dunes, whose activity has perhaps intensified in the past decade or so as local vegetation has begun to disappear. The silt dunes are generally stabilized by tamarisk trees and brush, as well as surviving roots of sedges and large colonies of the thorny, berry-bearing bush *Nitraria retusa*. The sediments in this area are very loose (under a salt-encrusted layer) and include a fine gritty loess material.
3. In the interior of these outlying zones are the “outer marsh lowlands”, a semi-circular or three-quarter-round region where standing water existed over long periods, perhaps even for many years at a time in recent history.<sup>2</sup> These areas are separated from the periphery by a distinct “bank zone”, where there is a descent

of about a meter from the higher exterior areas down a steep bank to the lower lying floor. This zone can be subdivided into:

- 3a. the floor of the “outer marsh lowlands” themselves. Very loose sediments were densely populated with recent tamarisk and sedge roots. The upper few centimeters are very powdery and generally dark colored due to high organic content.
- 3b. islands within this zone that rise suddenly to more than a meter above the surrounding marsh floor. Vegetation was rare on these islands, and where it existed it was principally sedge roots.
4. The “inner marsh lowlands”, which still today have standing water and dense, impenetrable stands of *Phragmites* sp. (and less often, *Typha* sp.) reeds. Recent stands of tamarisk trees (some perhaps well over 100 years old) and brush can be found at the western edge of the Wetlands in this zone.

The faunal aspects of the local landscape are very depleted due to the recent increase in local human population demands and the change in the local water table over the past decade and a half. Birds, which can still be found in all of the zones described above, are probably, sadly, an extremely impoverished sample of what once ranged the area just 20 years ago (cf. Nelson 1973: 170ff.). Cul-

2. This is probably the case for much of the Holocene period, at least, prior to the tragic demands of the subsurface water for the urban centers to the west of Azraq. In the Pleistocene it is probable that permanent lakes existed in the

area, although the extent of these bodies of water over time is a matter of debate (cf. Nelson 1973 vs. Garrard *et al.* 1986: 24).



turally induced ecological destruction through water depletion has necessarily changed the food chain in terms of other animals, from the lower range of insects up to mammals. Although it was not part of the survey design, occasional notice of jackals, Cape hare, and local hedgehog was noted in terms of personal observations of the animals themselves, tracks of different animals, warrens/burrows, and occasional skeletal remains; these animals were noted most frequently in the Zone 2 area described above. The dunes must still be relatively densely populated by microfauna, as the numerous tracks of snakes suggested; various lizard trails were also very frequent in the dune area.<sup>3</sup>

The modern marsh area, which is artificially maintained by pumping Pleistocene water up to the surface, supports a dense reed marsh that attracts a diverse bird species population, which has probably become very reduced compared to only 10 years ago. Water buffalo were introduced to the marsh about 100 years ago to control the extent of the reeds (Kiwan, pers. comm.).

### Survey Methodology

The area to be surveyed was limited, and in fact the territory was well defined by a barbed wire fence that encloses the Azraq Wetlands Preserve to protect the ecology and resources from damage and over exploitation.<sup>4</sup> The entire reserve covers about 12-13km<sup>2</sup>, although marshy areas and dense reed growth cover ca. 3-4km<sup>2</sup>. This left around 9-10km<sup>2</sup> to be investigated by foot patrols over exposed, dry land surfaces. The survey was conducted on foot by a team of four archaeologists who followed 100-meter wide N-S transects with 25-meter intervals between each crew member. The survey began on 1 July 2000 and continued until 27 July 2000.

We are not aware of a consensus on how a "site" should be defined (i.e., when a group of artifacts should be plotted on a survey map) on a pre-historic survey, and perhaps it is better to leave site definitions to individual survey parameters on a case-by-case basis. Across the Wetlands zones summarized above, the *qā'* expanse had a persistent "background noise" of scattered, mostly isolated pieces of debitage. Although some pieces were moderately sized flakes and blades (and occasionally cores), most of them were small and very light chips and fragments that appeared to have

been washed into the region during possible flash floods in Wādī Rājil (وادي راجل), which empties into the Wetlands in the eastern and southeastern edges of the Reserve. In other parts of the Reserve, artifacts were simply absent altogether (especially in Zone 3, but see below concerning the sub-zone 3b).

For the AWS survey, we arbitrarily recorded a collection of artifacts as a "site" if there were more than 10 pieces over an area of 2 x 2m (note that although this calculates to a density of around 2 artifacts per m<sup>2</sup>, both the minimum number and the density criteria had to be met before a set of artifacts was regarded as a site).<sup>5</sup> Isolated artifacts occurred very sporadically, and if these were tools they were mapped as "isolates" but not given a site number (see below).

### Survey Results

The survey was much more productive than we had anticipated (Table 1 and Figs. 2-3). Previous visits to the area in 1997 and 1998 suggested that the region was only sparsely populated with archaeological material, but in contrast to an expected total of 30 sites at the most, the survey encountered 145 distinct archaeological localities ranging in time from the Lower Paleolithic to modern historic times.<sup>6</sup> Site AWS 48 was an extensive "site complex" extended over approximately three hectares, and the 13 separate foci (48A - 48M) were counted as individual sites. Site AWS-29 was also very broadly distributed (2.25 hectares), but

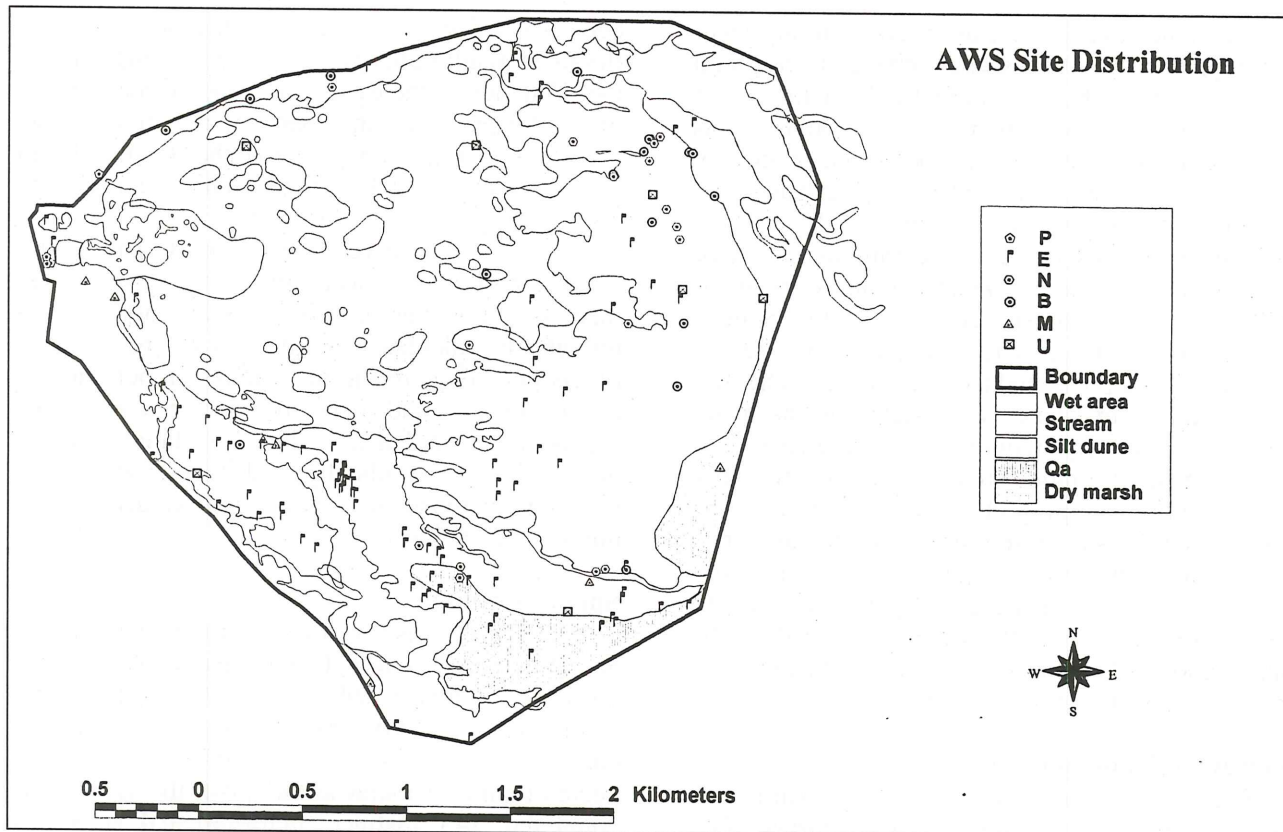
Table 1: Number of sites with artifacts from particular archaeological periods.

| Period                   | n  | % (N=145) |
|--------------------------|----|-----------|
| Paleolithic (general)    | 1  | 0.7       |
| Lower Paleolithic        | 3  | 2.1       |
| Lower/Middle Paleolithic | 2  | 1.4       |
| Middle Paleolithic       | 4  | 2.8       |
| Epipaleolithic (general) | 65 | 44.8      |
| Earlier Epipaleolithic   | 24 | 16.6      |
| Natufian                 | 9  | 6.2       |
| PPN (general)            | 9  | 6.2       |
| PPNB/C                   | 16 | 11.0      |
| Late Neolithic           | 4  | 2.8       |
| Late Prehistoric         | 22 | 15.2      |
| Islamic                  | 2  | 1.4       |
| Modern                   | 8  | 5.5       |
| Unknown                  | 9  | 6.2       |

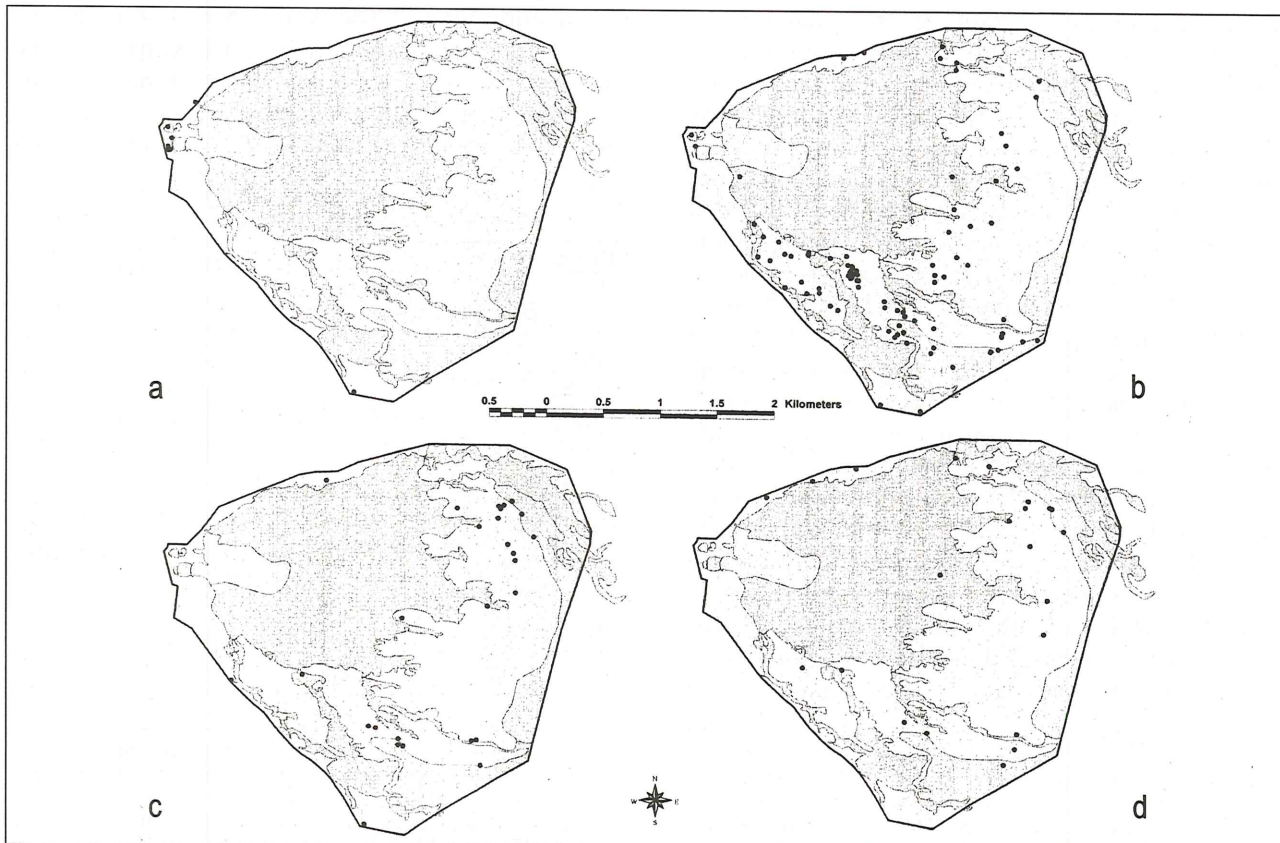
3. The clear tracks of animals in the dune area can be misleading in terms of population figures for the other regions. In the outlying *qī'ān*, for example, the consolidated nature of the sun-dried sediment made it unlikely that reptile, avian, and mammalian traffic would be recorded.
4. The barbed wire fence was originally erected in 1978 and

thoroughly repaired in 1993 (Kiwan, pers. comm.).

5. There was one exception to this set of site criteria. See discussion of Site AWS 121 below.
6. This total includes the four areas excavated at 'Ayn Sawdā in 1997 (sites AWS 128-131) and the site of Bawwāb al-Ghazāl tested in 1998 (AWS 79).



2. AWS 2000 site distribution in the Azraq Wetlands Reserve (all sites).



3. Distribution of archaeological sites by major period: a. Paleolithic; b. Epipaleolithic; c. Neolithic; d. Late Prehistoric.



no clear concentrations could be discerned; clearly the site represents multiple occupational episodes and should not be taken to represent only one or two visits. Site AWS 79 (Bawwāb al-Ghazāl بواب الغزال) also fits in this category, with many repeated seasonal stays over much of the Epipaleolithic and Neolithic periods.

The figures in **Table 1** require a comment. The total in the second column (n) is 178, and the percentage column exceeds 100%. This is a reflection that, while the majority (115, or 79.3%) of the lithic scatters appeared to date from a single archaeological phase, a considerable proportion of the find spots contained artifacts diagnostic of two (2, or 17.9%), three (3, or 2.1%), or even 4 (1, or 0.7 %) major periods.<sup>7</sup>

#### *Paleolithic Sites*

The number of Paleolithic sites in **Table 1** includes the three areas excavated at 'Ayn Sawdā in 1997 (cf. Rollefson *et al.* 1997), where layers of Lower Paleolithic and Middle Paleolithic artifacts and faunal remains were found; it is also possible that Upper Paleolithic material also occurs there, but this is not yet clear. The numbers in **Table 1** are undoubtedly under-representative, based on our experience at 'Ayn Sawdā, where artifacts from this temporally distant period were located from one to two meters below the modern land surface, depending on local topography.

Only one Paleolithic scatter was found outside the immediate area around 'Ayn Sawdā. This is AWS-9, found near the southern Wetlands border fence where it crosses the ancient "Roman Wall",<sup>8</sup> whose construction had evidently disturbed buried sediments. This collection contained debitage only, none of which was more diagnostic than the general "Paleolithic" category.

Site AWS-121 consists of a large backdirt pile that resulted from the excavation of a hole 5 x 5 x 5m in size.<sup>9</sup> The hole revealed a thick accumulation of grayish-green marly clay that is typical of the lake or pond sediments at 'Ayn Sawdā, which is 230m west and 325m south of the hole. Lying on the surface of the backdirt pile was a single Levallois point. In the absence of any other diagnostic evidence, this was assigned a "Lower/Middle Paleolithic" designation.

#### *Epipaleolithic*

The Epipaleolithic period in eastern Jordan has been divided into three principal phases (Byrd 1988; 1990): the Early, Middle, and Late (or Natufian) phases. They are distinguished by specific forms of retouched bladelets, and if these diagnostic pieces were not present in a collection, then the sites were assigned to a general "Epipaleolithic" category, which accounts for the most numerous assignments in **Table 1**. Lunate geometric microliths distinguished Natufian collections. Other geometric microliths such as trapezes and rectangles indicated earlier Epipaleolithic phases ("Earlier Epipaleolithic" in **Table 1**), although except for two cases, large enough samples were not available to distinguish between Early and Middle Epipaleolithic phases.

#### *Neolithic*

Almost a fifth of the sites contained evidence of some manifestation of the Neolithic period. An elongated El Khiam point, very similar to examples from Abū Maadi (cf. Gopher 1994: fig. 5.5:10, 12) was found in the backdirt piles from 'Ayn Sawdā (**Fig. 4.3**), which must date to the late PPNA or very early PPNB period.<sup>10</sup> Most of the remaining Neolithic collections had tanged arrowheads or naviform cores or blades that indicated assignment to the PPNB or PPNC. Site AWS-85 produced a bifacially tanged Byblos point (**Fig. 4.2**), a type that was the most common (18.7%) among the 251 classifiable arrowheads recovered from Bawwāb al-Ghazāl (Site AWS-79; Rollefson *et al.* n.d.). Two sites (AWS-85 and AWS-86) yielded "Badia points" (**Fig. 4.1**), which Betts has dated to the Late Neolithic of the mid- to late eighth millennium bp (1998: 42, fig. 4.14).

One of the PPNB/PPNC sites (AWS 109) included a rectilinear, stone-built U-shaped hearth with the closed end pointing towards the prevailing wind (NW). Similar hearths were noted at Bawwāb al-Ghazāl, and one that was excavated could be dated to the later PPNB (cf. Rollefson *et al.* 1999). The collection from AWS 109 included a bifacially retouched arrowhead tip, a sickle, four burins, three bifaces, and three chips of Dab'a/Dabba marble.<sup>11</sup>

Another site (AWS 102) yielded a Byblos point,

7. The 4-component site is Bawwāb al-Ghazāl.

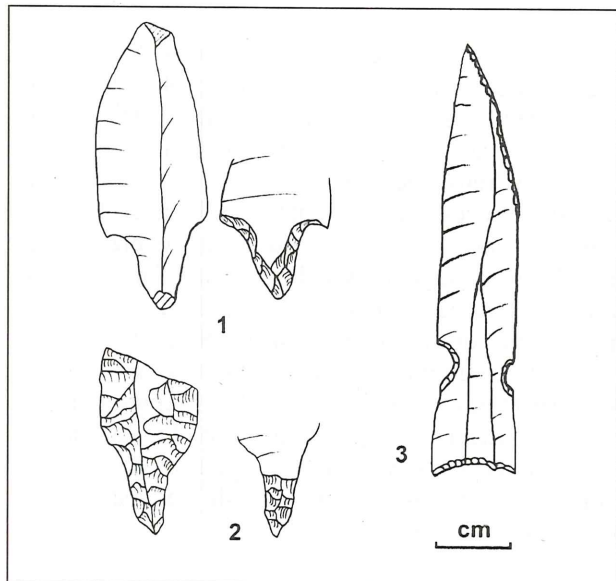
8. There is reason to believe this wall is Umayyad in date.

9. Who excavated this hole, and for what reason, is not known.

10. It is possible that this might be a variant of the Aswad point (e.g., Contenson 1995: fig. 93: 1-3, 7, Cauvin 2000: fig. 14: 1-3), although we feel the resemblance to the El Khiam type is stronger.

11. Dab'a marble is a limestone that outcrops in the Wetlands area and occurs in various shades of green. This material was used for bead production, and accounted for more than a third of the 235 beads found at Bawwāb al-Ghazāl in 1998 (cf. Rollefson *et al.* 1999). Dab'a marble beads were also found in LPPNB and PPNC layers at 'Ayn Ghazāl (cf. Rollefson *et al.* 1990: 103).





4. Arrowheads from the AWS 2000 Survey. 1. Badia point (Late Neolithic, AWS 85-1); 2. Bifacially tanged Byblos point (PPNC/Late Neolithic, AWS 85-3); 3. elongated El Khiam point (Late PPNA, AWS 129). (Drawing: G. Rollefson).

two truncation burins, two drills, 10 beads of the shells of land snails, one Dab'a marble bead, and a minimum of 15 chips of Dab'a marble. Briefly put, this site was a miniature version of Bawwāb al-Ghazāl (Site AWS-79), where evidence for an intensive bead industry was found. Two skeletons were also visible at Site AWS-102. One was an adult laid out in an extended position, and nearby the skull and ribcage of a small child or infant was eroding out of the silt dune. It is likely that these are PPNB in age, and we intend to recover them next season.

Finally, two sites (AWS-70 and AWS-71, possibly components of the same site) included Huweijir-type flint in addition to chips of Dab'a marble and PPNB/PPNC artifacts. While most of the raw material used throughout the Neolithic and earlier periods was a generally good quality gray to brown cherty flint, the Huweijir-type flint was purple-pink or brown with vivid red patches,<sup>12</sup> typical of material common in PPNB sites to the west (cf. Quintero 1996). Both sites also produced numerous chips of Dab'a marble, truncation burins, and drills.

#### "Late Prehistoric" Period

We include under the rubric of "Late Prehistoric" any lithic collection that does not appear to date from the Neolithic or earlier periods. We suspect that most of these sites are Chalcolithic or

Early Bronze Age (some collections include tabular scrapers), although later uses of flint are also quite possible. Pottery was found in loose association in many of the sites, but usually the sherds were not diagnostic.

Two features characterized the chipped stone artifacts from the Late Prehistoric periods. The first involved the heavy reliance on banded chert (colors range from dark gray through white), a raw material that is relatively granular, "dry", and of generally poor flaking qualities. Although banded gray flint occasionally occurred among the excavated artifacts and surface collections from Lower Paleolithic 'Ayn Sawdā, its exclusive presence in many of the Late Prehistoric sites is unique.

The second aspect that sets the Late Prehistoric samples apart deals with the character of primary production. Striking platforms are broad, thick, and steeply angled. Blades were not numerous, and when they occurred they usually were thick and wide; large flakes were usually the characteristic products of lithic manufacture.

#### Islamic Periods

Not counting the "Roman Wall", only two sites could be assigned to the earlier Islamic periods, although neither could be dated with any precision. A fragment of a colorful glass bracelet fragment was recovered at AWS-14, and some painted potsherds from a single pot break were found associated with a light, non-diagnostic flint scatter. However, two cowry shells, holed in a fashion similar to the decoration sometimes found on Bedouin weaving, were found as isolated artifacts and could possibly be several hundred years old.

#### Modern

By "modern" we mean the period of time since World War I. Four of the eight sites were bridges across or water control gates within the major channels of the wetlands. One site was a low mound of basalt blocks that is probably a Bedouin burial (and may, in fact, not be modern), and another burial was enclosed in a neat rectangle of well-dressed basalt blocks a single course high. The two remaining modern sites are the foundations of small houses, each about 25m<sup>2</sup> in size, at the southwestern edge of the marshlands.

#### Unknown

Nine of the sites located during the survey were small and diffuse scatters of non-diagnostic lithic

12. Betts remarked on the occurrence of small chalcidony nodules of a wide variety of colors in the eastern part of

Jordan (1998: 68), but this material apparently does not occur among the collections from the AWS 2000 survey.



debitage. One of the collections consisted of about 20 pieces of gray stone that resembles orthoquartzite. Orthoquartzite (of a tan color) was used as a raw material at LPPNB Baṣṭa and 'Ayn Jammām in southern Jordan, so perhaps this cluster of artifacts is Neolithic in age, but this certainly is not conclusive.

Another unassignable cluster ofdebitage was associated with a fragment of a sweet water clam shell, a marine mollusc that showed up with regularity at MPPNB 'Ayn Ghazāl, for instance. But again, it is not strong enough evidence to reassign the lithic assemblage to the PPNB period.

### Isolated Artifacts

Lost or abandoned tools were found infrequently in the survey area. Among those we mapped were a Lower/Middle Paleolithic Levallois point core, one PPNB Byblos point, three PPNB Jericho points, a bifacial, winged Yarmoukian point, three bifacial seam (or "tile") knives and a bifacial knife (all probably LPPNB to Late Neolithic), a fan scraper (probably Chalcolithic or Early Bronze Age), four well-made but undatable scrapers, and the two cowry shells mentioned above.

### "Small Finds"

Table 2 provides a list of the non-lithic material collected from sites located during the survey. Most of the entries require little comment with the exception of "gizzard stones".

We are all aware that birds have no teeth, yet the hard material (seeds, etc.) ingested by some birds nevertheless requires a means of being ground into small pieces. Many birds swallow small, stones that lodge in a sac (variously called a crop, craw, or less correctly the gizzard), in the throat to provide just such a grinding mechanism. At the death of the bird, whether the bones remain in the archaeological record or not, the gizzard stones remain behind, usually very smooth as a consequence of the long period of grinding against other stones in the crop. As a general rule, the larger the bird, the larger will be the gizzard stones. Some of those recovered during the AWS 2000 survey are of a size common to ostriches, for example.

### Discussion

Of all of the sites located during the survey, the most important remain the three areas already

**Table 2:** Non-lithic artifacts collected during the AWS 2000 survey. Site "IO" refers to "Isolated objects", and Material "DM" refers to Dab'a marble.

| Site | Material  | Object    | Phase        | Comments                         |
|------|-----------|-----------|--------------|----------------------------------|
| 14   | Glass     | Bracelet  | Islamic?     | Blue/green/red                   |
| 14   | Shell     | Cowries   | Unknown      | Five                             |
| 15   | Stone     | Bead      | Epipaleo     | White, tubular                   |
| 30   | Pottery   | Sherds    | Unknown      | 6 from 2 pots                    |
| 32   | Pottery   | Sherd     | Unknown      | One                              |
| 44   | Pottery   | Sherds    | Unknown      | Two; poss. Late Roman?           |
| 45   | Pottery   | Sherds    | Unknown      | 4 from same pot                  |
| 46   | DM        | Bead      | Epipaleo     | Large barrel                     |
| 46   | Stone     | Bead      | Epipaleo     |                                  |
| 48F  | Unknown   | Bead      | Epipaleo     |                                  |
| 48H  | Pottery   | Sherds    | Byzantine    | 8-9 pieces of ribbed ware        |
| 48J  | Shell     | Bead      | Epipaleo     | Dentalium                        |
| 64   | Stone     | "Gizzard" | Unknown      | Lemon-yellow quartz; 29x14x14 mm |
| 68   | Stone     | "Gizzard" | Unknown      | White quartzite; 19x16x9 mm      |
| 70   | DM        | Chips     | PPNB         |                                  |
| 71   | Pottery   | Sherds    | Unknown      | Three                            |
| 71   | DM        | Chips     | PPNB         |                                  |
| 74   | Stone     | "Gizzard" | Unknown      | Lemon-yellow quartz              |
| 74   | Pottery   | Sherds    | Unknown      |                                  |
| 76   | Shell     | Bead      | Natufian     | Dentalium                        |
| 77   | Pottery   | Sherds    | Unknown      |                                  |
| 85   | Shell     | Bead      | Late Prehist | Cowry                            |
| 85   | Pottery   | Sherds    | Unknown      | Four                             |
| 86   | Shell     | Bead      | Late Prehist | Cowry                            |
| 89   | DM        | Chips     | PPNB         | Two partly formed                |
| 98   | Pottery   | Sherds    | Unknown      | Two                              |
| 102  | DM        | Chips     | PPNB         | 15                               |
| 102  | DM        | Bead      | PPNB         | One                              |
| 102  | Shell     | Beads     | PPNB         | 10 "snail"                       |
| 107  | Pottery   | Sherds    | Unknown      | 20                               |
| 108  | Pottery   | Sherds    | Unknown      | Four                             |
| 109  | DM        | Chips     | PPNB         | Three                            |
| 113  | Pottery   | Sherds    | Unknown      | One                              |
| 115  | Stone     | "Gizzard" | Unknown      |                                  |
| 115  | Shell     | Pendant   | PPNB         | Sweet clam                       |
| 116  | Quartzite | Flakes    | Unknown      | 13, gray orthoquartzite          |
| 117  | Shell     | Bead      | Late Prehist | Enormous                         |
| 120  | Pottery   | Sherd     | Unknown      | One                              |
| 123  | Pottery   | Sherd     | Unknown      | One                              |
| 123  | Shell     | Pendant?  | Unknown      | Sweet clam                       |
| 123  | Stone     | "Gizzard" | Unknown      | White quartz                     |
| 124  | Stone     | "Gizzard" | Unknown      | White quartz                     |
| IO 7 | Shell     | Bead      | Unknown      | Cowry                            |
| IO 8 | Shell     | Bead      | Unknown      | Cowry                            |

known before the survey began: Lower Paleolithic and Epipaleolithic 'Ayn Sawdā (Sites AWS 128, 129, 130 and 131), Middle Paleolithic and Epipaleolithic 'Ayn Qaṣiyah (AWS 122), and Bawwāb al-Ghazāl (AWS 79). Nevertheless, other sites that should be investigated more thoroughly through test excavations and even more intensive campaigns include the large and dense sites of AWS 24<sup>13</sup> (Epipaleolithic), the AWS 48 complex (mostly Epipaleolithic), and AWS 102 (PPNB), which in addition to a bead-making industry, also produced two exposed burials.

Additional surface collections were made at 'Ayn Sawdā in order to expand the artifact sample collected in previous years. This year's efforts resulted in 176 more Late Acheulian bifaces, but there has not been time to sort the large number of Levallois elements and flake/blade tools.

Intensive collections were also made around 'Ayn Qaṣiyah (AWS-122), and vertical sections in the former pool (Locality II in the western end and Locality I in the eastern end) were cleaned to ob-

13. This site was first discovered by Garrard's team and termed AZ 17 (Garrard *et al.* 1977) and which has been

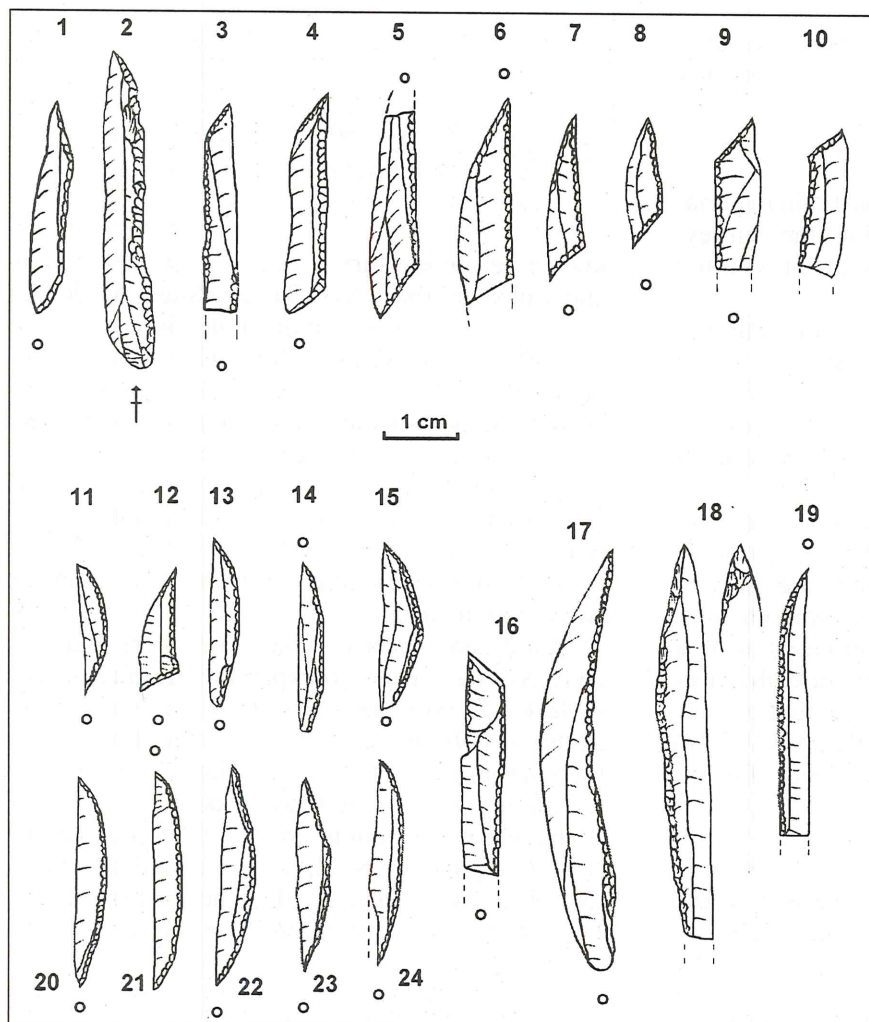
characterized as early Epipaleolithic or even late Upper Paleolithic (Garrard *et al.* 1987:18-19).

tain a clear stratigraphic sequence. This work produced considerable quantities of chipped stone material, but more importantly, it also demonstrated the very rich quantities of animal bone (including excellently preserved bird and microfaunal remains). The section cleaning indicated that there are at least three archaeological layers at the site:

1. In Locality II, at the bottom of the section resting on pond or lake marls, is a pavement of Levantine Mousterian artifacts, mostly Levallois flakes, points, and blades. Most of the artifacts bore a "polish" probably induced by very fine water-borne sand that buffed the surface of the upper-most artifacts; at the same time, most of the fine sediments of this archaeological layer were washed away, causing the artifacts to settle into a single lamina of cultural material. Notably, no faunal material was associated with the Levantine Mousterian layer.
2. A second "pavement" of artifacts and stones was noted in Locality II about 50cm above the Le-

vantine Mousterian layer. Large tools collected in this part of 'Ayn Qaṣiyah included burins, an endscraper, several sidescrapers, a notch, a knife, and several retouched flakes and blades. Microlithic tools consisted on Microgravette and La Mouillah points, many arch-backed pointed bladelets, two abruptly retouched lunates, and backed and truncated bladelets (Fig. 5). The constellation of microliths argues for a time range of around 22,000 to 19,000 bp.

3. Among the artifacts recovered during the section cleaning in Locality I, located about 50m to the east of Locality II, large tools included burins, endscrapers, sidescrapers, denticulates, wedges, and backed and retouched blades. Diagnostic microlithic tools included triangles, an abruptly retouched lunate, backed and truncated bladelets, and a single arch-backed pointed bladelet (Fig. 5). This combination of microliths suggests an age of ca. 19,000 to 16,000 bp. This layer also produced considerable quantities of burned bone, including



5. Upper row: artifacts from 'Ayn Qaṣiyah, Locality I: 1 - arch backed bladelet; 2. pointed backed bladelet; 3, 9-10. backed fragment with truncation; 4. double truncated and backed bladelet; 5-8. triangles. Bottom row: artifacts from 'Ayn Qaṣiyah, Locality II (Nos. 11-24) and 'Ayn Sawdā (No. 25). 11, 13-15, 20-24. arch backed bladelets; 12. triangle; 16. La Mouillah point; 17. partially backed bladelet; 18-19. Microgravettian points. (Drawing: G. Rollefson).



megafauna (gazelle, probable equids, probable bovids, etc.), avifauna, and microfauna; charcoal was also very abundant. 'Ayn Qaṣiyah promises to provide a lucid understanding of the Epipaleolithic exploitation of the al-Azraq marshlands.

All of the information collected this season concerning the archaeological resources in the Azraq Wetland Reserve will be analyzed over the coming several months in order for RSCN to determine how best to manage the cultural resources on the territory for which they are responsible. Maps showing the distribution of the sites are now being prepared, and GIS investigations might indicate how and why human exploitation of the area changed. RSCN has expressed an interest in developing some of the sites as assets to explain to tourists the vitality of the marshland to human development in eastern Jordan, and several alternatives will be developed that will involve the Paleolithic sites at 'Ayn Sawdā, the Epipaleolithic layers at 'Ayn Qaṣiyah, and the Natufian and Neolithic camps at Bawwāb al-Ghazāl. Such options will also be provided to the Department of Antiquities in order to coordinate policies and procedures in managing and developing the archaeological resources.

#### Site Location

*Zonation of site locations.* An examination of the maps in Figs. 2 and 3 shows that the great majority of the sites discovered during the survey are located in the second habitat zone – the dune area around the northern, eastern, and southern edges of the marsh zone. Sites located in the qā' zone are usually very sparse and normally "unknown" in terms of phase assignment, probably because many of them have been affected by flooding from Wādī Rājil; those that could be dated were "modern".

It is not surprising that there were no sites in Zone 3a, the floor of the seasonally – at times permanently – flooded marsh area to the east of today's pools. Although it would have been possible for activities to have taken place on this floor when water had evaporated, sediments would have accumulated relatively rapidly here, hiding such camps from view.

The case for the islands in Zone 3b is more surprising, on the other hand. The islands produced only two sites, despite their ideal location for hunting birds and small fauna (the two cases are represented by only one artifact each, rendering one of

the sites "unknown" and the other likely Late Prehistoric in view of the parameters of the blade's production and its raw material [banded flint]). But the situation is perhaps understandable because of recent use of the islands as resting places by modern water buffalo. These animals produced considerable quantities of manure that, mixed with blown tamarisk needles, has produced a thick and relatively stable covering layer across the entire surface of the islands. A program of random subsurface testing of several of the islands might determine if they functioned as hunting locales more frequently than the survey results indicate.

It has been already briefly mentioned that the area around the edges of the pools at 'Ayn Sawdā and 'Ayn Qaṣiyah revealed Lower and Middle Paleolithic habitation as well as Early and Middle Epipaleolithic exploitation. It is very likely that the shores of the former Pleistocene/Holocene lakes and pools were heavily visited throughout the Late Pleistocene (at least) as well as throughout the Early and Middle Holocene. The land outside of the fence of the Wetlands to the west of the pools probably once had considerable evidence of prehistoric use of the area. But most of this evidence has either been covered by a meter or more of sediment or is now covered by construction associated with the village of South Azraq itself.

*Temporal use of the Wetlands area.* The locations of the sites according to principal temporal phase are presented in Fig. 3 (we have not included the rare Islamic, Modern, or Unknown categories in the figure). As mentioned earlier, the Paleolithic distribution (Fig. 3a) is very misleading since the Paleolithic artifacts are normally buried a meter deep or more. The isolated Paleolithic site at the southern fence of the reserve indicates the point where the "Roman"/Umayyad Wall enters from the southwest.

The Epipaleolithic site distribution reflects both the numerical dominance and the widespread nature of the locations. Of particular note are the concentrations in the southern area (the cluster of dots represents the loci of AWS-48). Epipaleolithic sites generally parallel the edges of what today is the dry marsh.

In contrast, the Neolithic sites are perceptibly fewer, but in part this might be explained by noting that the Neolithic period is also considerably shorter in duration.<sup>14</sup> The Late Prehistoric sites are also

14. Considering the numbers in Table 1, the 29 components assigned to the Neolithic period represent only 30% of the 97 components dated to the Epipaleolithic. But the Neolithic sites were distributed over 4,000 years (or roughly 7

sites per millennium), while the Epipaleolithic sites appeared over 10,000 years (or ca. 10 sites per millennium). Thus the Neolithic "rate" is about 70% of the Epipaleolithic rate (cf. Rollefson 1987: 772-773).



more sparsely distributed across the area, generally mirroring the case for the Neolithic period. The contrast between the Epipaleolithic pattern, on the one hand, with the Neolithic/Late Prehistoric pattern might indicate that the southern edge of the marsh area was drier (or drier longer on a seasonal basis) in the former case. In no case, however, does it appear that there was a single, large, permanent lake in the area after the beginning of the Epipaleolithic period, although periodically there might have been extensive standing bodies of water that persisted over much of the yearly round.

#### Site Size

One of the characteristics recorded for each find spot was the area represented by the lithic scatter. In some cases this measure can provide a relatively clear idea of how popular a particular locality was for repeated visits by hunting (and later, pastoral) groups, as appears to be the case for Bawwāb al-Ghazāl (approximately one hectare). The very small lithic scatters might be analogous to "pot-breaks", in the sense that the handful of debitage represents no more than a brief stopover, lasting perhaps a couple of minutes.

But site area can also be misleading, particularly in areas where silt dunes are still active. It is probably true that the real site boundaries for any archaeological locality remain obscured by sediments, and in many cases this could mean that site areas are under-representative. On the other hand, there are other circumstances where estimating the site area could result in an inflation of habitational expanse: the 13 focal areas at Epipaleolithic AWS 48 are distributed over more than three hectares, and Epipaleolithic AWS 29 ranged over more than 2 hectares with no obvious foci.

#### Concluding Remarks

The information recovered from the AWS 2000 survey was surprising in several ways, but this indicates that we still have much to learn about the exploitation of this remarkable exception to the often hostile character of the surrounding landscape. Several of the sites beg for more intensive research in the future, especially AWS 122, AWS 102, AWS 48, and AWS 29. But the entire region needs more investigation if we are to reach an understanding of how and why human groups found the means of making a living in the countryside.

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