
Water Quality and Artemia Monitoring at Al Wathba



11th October 2003

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Project Ref: **03-31-0001**

Project Title: **Abu Dhabi Baseline Survey**

Status: **Final**

Document Ref. No: **03-31-0001/WSM/ER001**

FINAL



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Water Quality and Artemia Survey Monitoring at Al Wathba

ISSUE SHEET

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Issue Status	Final		
Purpose of Issue	Internal report		
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Ref.	03-31-0001/WSM/TP004
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REVISION SHEET

Revision No.	Date	Affected Pages	Date Change Made	By (initials)

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Summary

Brine shrimp (*Artemia* sp.) is the major natural food resource for flamingos at Al Wathba wetland reserve. Following the natural cyclical decline in the brine shrimp population during the summer of 2002, the population never recovered and by October 2002, when the brine shrimp population should have increased, none were recorded at the site. Because of this population crash, an algal bloom occurred (algae are the main food resource of brine shrimps), which has remained until the present day. As a further consequence, the flamingo population recorded at the lake during the 2002 – 2003 period was significantly lower than during previous years.

The Artemia recovery strategy, decided upon by the Al Wathba technical working group and based on the guidelines developed from the Artemia research project, was to allow water levels at Al Wathba lake to fall to the lowest levels possible over the summer (2003). There were two major reasons for this. The first reason was that as the water body reduced; the temperature and salinity would increase, thereby preventing further algal blooms. The second and most important reason was that, by allowing the lake to dry out, we would have the option of inputting a vast quantity of fresh water at the end of the summer. Once this was done, the low salinity, coupled with lower temperatures would trigger the hatching of Artemia from cysts that had remained dormant for the last two years.

In accordance with the strategy, the lake was flooded with fresh water during mid-September and Artemia hatching subsequently took place around two of the three water input locations. At these two locations the water quality remains ideal for continued Artemia breeding. At the time of the survey the Artemia present were at the metanaupliar stage of their life-cycle, which involves moulting through a total of 17 larval stages. Depending on food availability and environmental conditions, the time period from hatching to being able to reproduce can take from 17 – 30 days.

Much of the lake body remains hyper-saline, despite the large quantities of fresh water input and such conditions are at the limits of the breeding tolerance of *Artemia*. The option of pumping some of the hyper-saline water off the site through the discharge sluice combined with the

continued input of fresh-water should be considered as a means of reducing overall salt load within the lake and returning the lake to conditions closer to those that are optimal for *Artemia* growth and reproduction.

Introduction

An *Artemia* research programme was developed by the Terrestrial Environment Research Center of ERWDA at the end of 2001 with the purpose of developing an understanding of the population dynamics, ecology and habitat requirements of the brine shrimps (*Artemia* sp.) living at Al Wathba lake. The brine shrimps at Al Wathba, which are thought by taxonomists at Ghent University, Belgium to be a hybrid species, are the major food resource for flamingos (*Phoenicopterus ruber*) at the site. Following the conclusion of the *Artemia* research project in March 2003, guidelines on the management of the water body to facilitate maximal brine shrimp production were produced and distributed. A project report is being produced as a thesis submission - forming part of an MSc by Ms Shaikha Al Dhaheri and is expected to be available by the end of the year.

The recommendations within the guidelines were put into force in April of 2003 following a meeting of the Al Wathba technical working group. The key feature of the guidelines was the need for management of the water levels in summer - dropping the water level (simulating the process that occurs within natural temporal salt lakes) arrests the breeding of *Artemia* and forces them to lay cysts, which remain dormant as the lake dries out. At the end of summer, flooding the lake with fresh water (again, simulating the process that happens in natural temporal salt lakes) triggers hatching of *Artemia* cysts, which, after a month or so will be able to reproduce.

In order to monitor the success of the management plan, an *Artemia* monitoring programme is underway, with the first samples being collected during September 2003. Monitoring will be carried out on a monthly basis with results being made available at the end of each month.

Results

Water quality samples were taken from 10 sites at Al Wathba (fig 1). At sampling site 4, one sample was taken from the surface of the lake and a second sample was collected from the bottom of the lake at a depth of 2m.

Site ID	Collection Date	pH	Conductivity (mS/cm)	Salinity (PPT)	Phosphate (mg/L)	Calcium (mg/L)	Magnesium (mg/L)
ST01	28/9/03	9.40	104.6	76	0.51	1214	1784
ST02	28/9/03	9.28	114.0	86	0.54	1362	2001
ST03	28/9/03	9.26	98.3	69	0.55	1124	1583
ST04	28/9/03	8.78	131.0	102	0.82	1451	2448
ST04 2m	28/9/03	6.94	236.0	262	0.5	3356	7105
ST05	28/9/03	8.72	116.0	86	0.93	1374	2149
ST06	28/9/03	8.75	136.7	107	0.9	1551	2560
ST07	28/9/03	9.32	127.0	98	0.64	1705	1992
ST08	28/9/03	9.68	34.4	21.6	0.18	550	508
ST08	4/10/03	9.90	22.1	13.1	NA	NA	NA
ST09	4/10/03	8.40	9.92	5.6	NA	NA	NA
ST10	4/10/03	9.90	47.6	30.6	NA	NA	NA

Table 1 pH and chemical analysis of water samples

Site ID		Nitrite (mg/L)	Nitrate (mg/L)	Ammonia (mg/L)	Larval Artemia (n/l)	Adult Artemia (n/l)
ST01	28/9/03	0.19	5.69	0.2	0	0
ST02	28/9/03	0.22	5.56	0.22	0	0
ST03	28/9/03	0.19	5.42	0.16	0	0
ST04	28/9/03	0.27	4.41	0.66	0	0
ST04 2m	28/9/03	0.25	0.07	6.96	0	0
ST05	28/9/03	0.28	3.5	0.72	0	0
ST06	28/9/03	0.34	4.07	0.56	0	0
ST07	28/9/03	0.18	3.73	0.23	0	0
ST08	28/9/03	0.8	5.75	0.36	270	0
ST08	4/10/03	NA	NA	NA	1000	0
ST09	4/10/03	NA	NA	NA	0	0
ST10	4/10/03	NA	NA	NA	200	0

Table 2 Nutrient analysis and Artemia counts for the 10 survey sites



Figure 1 Artemia and water quality sampling locations at Al Wathba Lake