Amphibian research mission
Aammiq area, Central Bekaa valley, Lebanon
3-16 April 2004

Fig. 1. *Discoglossus nigriventer*, type, from life.

François TRON, A Rocha France
July 20th, 2004

Summary
From April 3rd to 16th an amphibian research mission was led in the Aammiq area in order to up-date the local list. Indeed a species of *Discoglossus* is expected to occur in the area since the observation of an individual of this genus was made in 2000.
4 species of amphibians have been identified during this mission : *Rana bedriagae, Hyla savignyi, Bufo viridis, Salamandra infraimmaculata* and an another unidentified *Rana (Pelophylax) sp* species is also documented. Eventually an unidentified frog call was heard several times at 3 distinct sites without being recorded nor seen. Though it is difficult to assess that this call does refer to a new species, several points tend to attribute this call to a *Discoglossus sp*.
Different observations and recommendations are produced, including possible options in order to develop a strategy for further research on the *Discoglossus*.

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Introduction

The Aammiq marsh, in the central Bekaa valley, East Lebanon, is a wetland of international importance, recorded under the Ramsar convention.
Since 1997, A Rocha Lebanon is doing scientific research and practical conservation with local stakeholders, especially major landowners. Through this work, the wildlife value and ecological processes of the area are much better known now, and scientific work is still running. However, no systematic work on Amphibians had been carried out in the area, and previous casual observations (El Hage, 1979, Herpetological list, A Rocha, undated) assessed the presence of 4 amphibian species : *Rana bedriagae, Hyla savignyi, Bufo viridis and Salamandra infraimmaculata*.

In April 2000, Colin Beale, scientific officer for A Rocha Lebanon, found a distinctive frog that he referred as a *Discoglossus*. However no *Discoglossus* had ever been reported from Lebanon, and the only one know from the Middle East, *D. nigriventer*, had been seen only twice and is considered as extinct since 1955 (IUCN Red List). In July 2003, this observation came back to the light and an amphibian research mission was set up in order to bring more elements.

From April 3rd to 16th, François Tron (Scientific officer for A Rocha France) and Rémi Duguet (French specialist of Amphibians) did an extensive survey of the amphibians of the Aammiq marsh, looking more especially for any *Discoglossus*.

Objectives

- Up-date the local Amphibians list
- Give all details for possible occurrence of any *Discoglossus*
- Make comments on current management of the marsh, in relation with Amphibians

Materiel and methods

Study area

The Aammiq marsh is a ca 300 ha marsh in the lowlands of the Bekaa valley which lies North-South, at an average altitude of 865 m. Two ranges of mountains (frequently reaching an altitude of up to 2200 m) on each side make the landscape very specific.
The bottom of the valley is covered by intensive crop fields, mainly wheat, but also some legumes. The agriculture history of the area includes long term drainage, with severe works in the 1960's and 70's. Springs and streams are totally embanked now, with little space for wildlife. Water is pumped in ditches, excavated pools or even bores for irrigating the crops. After severe floodings in February 2003 and in winter 2003-2004, some fields didn't support proper crop vegetation.
Herds of 3-500 sheeps and goats graze the lower slopes, and also the wet meadows by the marsh creating very open, short grass habitats. Oak forest covers large areas higher on the slopes, whilst the upper parts of the mountains (above 1700 m) are mostly barred. Herds have water at ponds near villages and springs.
As time was limited, this survey focused on the Aammiq marsh and surrounding water bodies. According to Mendelssohn's short note and Colin's observation, it was thought that the *Discoglossus* may be found in the lowland wetlands. However, western Mediterranean *Discoglossus* often live in active streams.

Identification of potential sites

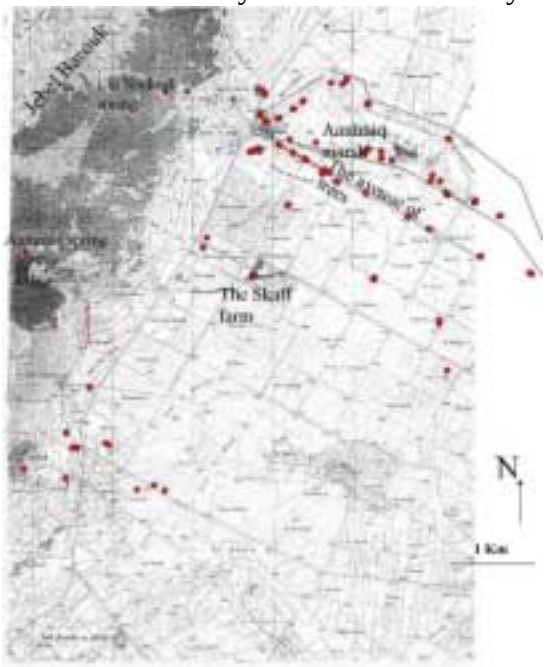
On Monday 5th and Tuesday 6th, Martin Bernhard and Simon Helou, from the A Rocha Lebanon team, showed us the area, some potential sites and access facilities. We also met one Skaff guard, local sheepherders, Es Saalouk Cheik and other people that can be helpful.

When going up on the side of the Jebel Barouk in the early morning, we also realized that water bodies reflected the raising sunshine, making them obvious in the landscape.

As we had the opportunity to use a vehicle from A Rocha Lebanon, we easily visited these sites by day and night. They are plotted on a reference map (IGN, 1962) at a 1/20 000 scale and on good elevated pictures of the marsh.

The map below shows the surveyed sites in the area of Aammiq ; we also visited by day 3 other sites : Wadi above Qob Elias, a pond South of Aana, the temporary lake near Mount Hermon.

At first sight, the marsh looked very uniform to us with large open water surfaces (with lots of fishes in) surrounded by huge reed beds. These habitats are not that suitable for Amphibians and we got a bit discouraged to find the frog at the marsh. However after a week we found some wet meadows, between crop fields and reed beds. These habitats are really attractive for Amphibians, but unfortunately we did not have time to survey all of them carefully enough.



Map 1 : Localization of surveyed amphibian sites in the Aammiq area – April 2004

Field work and data reporting system

For most of the surveyed sites, we did a day and a night visit, sometimes even several night visits.

Day visits aimed at finding clutches and tadpoles from which we can identify all species and evaluate the population size. Pond nets were used for this purpose (a small one was available at the center and Rémi brought is own large one.

Night visits (usually between 9 and 12 p.m.) aimed at identifying the species that are calling. Population size can also be estimated by the number of calling males. We also had a look at tadpoles by that time.

Any observation was reported under the GIS with the following table structure :
Identifying code
Date
Hour
Species
Numbers_of_adults
Numbers_of_tadpoles
Numbers_of_clutches
Population_size
Comments
Observators

For assessing the population size, we used this table, produced by ourselves, according to preliminary results. The indication of the population size figures on the specific maps see appendix).

Species	Population_size	Numbers_of_adults	Numbers_of_tadpoles
Bufo viridis	**1**	<5	<1000
Bufo viridis	**2**	5-20	1000-5000
Bufo viridis	**3**	>20	>5000
Hyla savignyi	**1**	<5	<500
Hyla savignyi	**2**	5-20	500-5000
Hyla savignyi	**3**	>20	>5000
Rana bedriagae	**1**	<20	
Rana bedriagae	**2**	20-100	
Rana bedriagae	**3**	>100	
Salamandra infraimmaculata	**1**		<10
Salamandra infraimmaculata	**2**		10-50
Salamandra infraimmaculata	**3**		>50
Unidentified calling frog	**1**	<5	
Unidentified calling frog	**2**	>5	

Local people input

It quickly became clear that several people of the area know amphibians rather well, including Faysal (one of the Skaff'guard), a frog fisherman and one of Martin's friend. Martin asked them any information on frogs and it was clear that they knew 4 species of frogs, which means one more than assessed so far.
A grant of 50 Dollars was offered for who will bring the right rare frog and we did get a regular *Rana bedriagae*…

Results and Discussion

Weather conditions

Since the end of February, it rained only once mid-March. February and March were also very cold.
On April 3rd, as we were just arriving, it rained 4 mm and on the 16th, it rained (+some hail) 17 mm.
During our time on site, temperatures increased from 15-20 to 35-40°C during the day and from 8-10 to 12-18°C during the night, except on the 16th, when T° dropped down to 9°C. 2004 is thus a relatively dry spring, but weather conditions were fairly good for our purpose.

Amphibian annotated list

Amphibians names below are the most recent ones. Many synonyms exists for some species and taxonomy may still change, especially for the Rana (Pelophylax) group (Marsh or Green frogs). In brackets we added an English name (that may not be exact at all) for easier understanding.

Rana bedriagae (Marsh frog)

Habitat :
Aquatic species.
Adults breed mainly in the marsh and the ditches of the valley. Smaller populations can be found in ponds near villages and springs.
Juveniles can be found everywhere, including near leaking water pipes.
This species is very dynamic and can afford better than other amphibians fish predation.

Population size
Very abundant - probably several thousands of adults.

Phenology
Adult start singing in early April.
Clutches probably by the end of April + May.
We found some tadpoles, which means that breeding may also occasionally occur in autumn.

Threats
Overfisheries ?

*Hyla savignyi (*Tree Frog)

Habitat :
Terrestrial species. Spend most of its life in bushes, trees, rocky areas and villages.
Adults come to breed at any water body, though being more abundant where fishes are absent. A big population is living on the side of Jebel Barouk and comes down the marsh to breed ; a possibly distinct population may live all year round in the marsh surroundings.

Population size
Abundant – probably several hundreds to a thousand of adults

Phenology
On April 3rd, we observed an intense migration towards the marsh and song activity increased during the first week of April but decreased in the second week. Mating observations in the second week.
Many tadpoles of different ages were recorded, showing that breeding started in late February/early March.
These 2 periods of breeding may refer to 2 distinct populations as referred above.

Threats
Road traffic
Fish introduction

Bufo viridis (Green Toad)

Habitat :
Terrestrial species. Spend most of its life in bushy areas.
Adults come to breed at temporary water bodies with few vegetation. This is a specialist of disturbed hydrosystems. Mostly live on the side of Jebel Barouk, but a small population also breed at the marsh.

Population size
Localized and uncommon – one or two hundreds of adults.

Phenology
Due to the small population size and the different stages recorded it is difficult to have a precise idea of the phenology of this species. However it seems that March is the preferred timing for reproduction at lower elevations.

Threats
Road traffic
Fish introduction

Salamandra infraimmaculata (Fire Salamander)

Habitat :
Terrestrial species. Spend most of its life in bushy areas.
Adults come to deposit larvae at springs and pools. Mostly live on the side of Jebel Barouk, but a population was found at the pond near the Skaff farm.

Population size
Very localized and uncommon – Less than a hundred of adults.

Phenology
Breeding occurs during winter time and early spring.
Tadpoles at the Skaff farm pond were going out of the water on the 13th of April.

Threats
Drying out of the ponds in the valley.
Fish introduction
Spring canalization

"Unidentified calling frog" (*Discoglossus sp* ???)

At 3 sites, we heard a distinctive amphibian call at a distance of 3-15 m ; the animals were singing under the water, at a depth of *ca* 20-50 cm. Turbidity and vegetation prevent any view of the ponds ground surface, so that the animals have never been seen, neither caught in the nets during our visits to the different localities.

At all localities, *Rana bedriagae* and *Hyla savignyi* were abundant.

The song has not been recorded but can be described as follow :
"Une série de 3-5 roucoulements graves, sourds et râpeux (qui font vaguement penser à ceux de *Streptotelia turtur*) ». This call is repeated every minute. Dave Bookless

who also heard the frog simply wrote : "It was fainter, softer, than Marsh Frog, with perhaps a more liquid sound".
This song can also be compared to the one of *Discoglossus sardus*, though being more melodious and slower. It is difficult to be sure that this call is not simply a specific call of *Rana bedriagae*, but its regularity, frequence and other things make us think that it should be referred to a distinct species.

Rana (Pelophylax) sp (Marsh frog sp)

On the April 12th, in the abandoned crop fields, north of the marsh, we found some frogs (including a female with eggs) closely related to *Rana bedriagae*, but looking different. They were smaller (when adult), with shorter leggs, uniform white belly, yellowish coloration below the backleggs, rufous dorsal and longer metatarsian tubercules.
Pictures have been taken and identification is under process.
We want to stress out that the systematic of this group is very complex and revision occurs regularly when more research is carried out. This data should then not be taken as a sign of a new species but only as a possibility for a more complex situation in the middle east systematic of Marsh frogs.

Other species

Two other amphibian species are known in Lebanon. *Triturus vittatus* and *Pelobates syriacus*. Despite specific attention to these rare species, we did not have any contact with them. Further research may however give new data, especially in the Mount Hermon area were many ponds can be found.

About possible occurrence of *Discoglossus sp* in the Bekaa

Colin Beale's description makes little doubt about the identification of a *Discoglossus*, even considering the wide range of coloration of the very abundant *Rana bedriagae* and *Discoglossus* themselves.
What we heard may also well be a *Discoglossus*, as being significantly different from the other local species calls and relatively close to the one of *D. sardus*. But comparison with *D. nigriventer* is impossible considering it has never been heard nor recorded by any scientist.

In the end, it is difficult for us to make any proper conclusion, apart relying on Colin's description.

Eventually it is worth to remind that *D. nigriventer* has been seen only twice in its original locality ! After its first record, on March 22nd 1940, annual surveys were carried out until 1947, without any result… Eventually, it is a local farmer who brought a specimen to the university in 1955 !!
Along with Colin Beale, we can say that this species must be rare and elusive. Finding this frog will probably require relatively important efforts.

Limiting factors for Amphibians in the Aammiq area

Various aspects of land-use in the Aammiq area cause problems to the amphibians. This includes :

- All springs and little streams are embanked if not piped. Very little space is left for wildlife around these water bodies (except in the upper part of the Ein Saalouk spring). Ditches are usually too narrow for aquatic vegetation spread.
- Good terrestrial habitats and migration corridors are not very common around the marsh (uncultivated and fairly bushy habitats).
- Fishes (big amphibian predators) seem to be in most of the water bodies.
- Road traffic kills hundreds of *Hyla savignyi* and tens of *Bufo viridis*, which is in both cases a significant portion of the population.
- Intensive agriculture may cause some fertilizers and pesticides run off, to which amphibians (and more especially *Hyla savignyi*) are very sensitive.

Comments on current management for the Aammiq marsh

A general comment is that Amphibian is not a diverse group in Aammiq, and so far no endangered species highlighted any particular herpetological interest for this site. However and remarkably, four species (if not 5 or 6) are present on that site and the two most common species have probably there one of their biggest population for Lebanon. One of them (*Rana bedriagae*) is even a local income resource.

So for all these reasons, we would recommend more research and monitoring on amphibians (Obj. 2). In the stakeholder analysis (Obj. 4) we would also recommend to include the frog fisheries in the scope of interest.

Obj. 1.1 : Optimising water level control.

We think that most objectives there are also in favor of amphibian conservation (especially obj. 1.1.1, 1.1.3, 1.1.8 & 1.1.9). Amphibian require water in their breeding sites until the tadpoles are fully developed. Timing depend on the species biology (see above), so no general recommendation can be made for the required time of flood for these breeding sites ; we assume that the different species know and have benefit the natural pattern of breeding sites flooding themselves.

Any pumping in the marsh would affect this pattern and the success of amphibian breeding. Damming would also have effects, but in the absence of data concerning duration of water in the breeding sites, it is difficult to assess the impact it would have on amphibians.

Obj 1.2 : Grazing as a management tool.

Grazing is very favorable to amphibians around the marsh as the animals remove the dense vegetation from the small water bodies that are so attractive for the amphibians to breed.

However the recommendation of a specific grazing pattern currently leads to an accumulation of organic matter in the south western part of the marsh, near the avenue of trees. This may have negative effects in the middle term as dense vegetation is covering these breeding sites, but on the other hand, it may provide good terrestrials habitats for different species (*Hyla savignyi, Bufo viridis, Salamandra infraimmaculata*…).

Grazing earlier in the year, or having higher instantaneous grazing pressure would probably increase the vegetation removal (if ever wished).

Opportunities for further work on amphibians

1 – *Discoglossus* search

To our thought there is a very high probability that some *Discoglossus* occur at Aammiq. So further research is required, with basically the same objectives we had in April 2004.

On the 9th of July, during A Rocha conference at Wycliffe, we (Chris Naylor, Chris Walley, Will Simonson, Simon Stuart and François Tron) have been discussing a possible strategy to keep on going with the *Discoglossus* research. Here is a brief summary of it :

- In September 2004, Chris Naylor will visit the major Lebanese herpetologist at Beirut university to present the possible occurrence of a *Discoglossus* sp at Aammiq and the work done by A Rocha so far. It is hoped that a joint project can emerge of this meeting.
- It is also hoped that another research trip can be set up to Lebanon next year. It may involve more people, for longer time and explore some areas that have not been surveyed yet. Francois Tron may lead the trip.
- Meanwhile it is recommended to keep on proposing the 50 dollars grant for anybody bringing that frog to A Rocha. Pictures of any strange frog or tadpole can be sent to Francois Tron for identification. The individuals must be kept in captivity as long no name is given to the animal.

2 – Identifying the "Unidentified Marsh Frog"

Considering the very complex systematics of the *Rana (Pelophylax)* group, important research would be needed to clarify the local situation, thus requiring important effort of specialists.

3 – Maintaining a database

Many data are available in people's mind, but no recording system is in use so far… At least, it would be good to record (and check once a year) breeding sites of *Salamandra infraimmaculata* and *Bufo viridis*. All our data are available at the office and saved within a GIS. This can be used for saving new data, as long they come from the Aammiq area.

4 – Assessing conservation status of Amphibians in the wider Bekaa

Our preliminary survey showed that there are a number of small wetlands through the valley but many of them have not been surveyed and a number of unrecorded and threatened amphibian species may occur in the area, but very few data is available. For these reasons, a wider survey of the area could point out hotspots and processes. This could form the base of a wider wetland monitoring scheme and practical conservation project.

5 – Fundamental ecology of Amphibians

Aammiq marshes have really big Amphibian populations (especially *Hyla savignyi*, but also *Salamandra infraimmaculata* on the hills), and it seems that very few research have been carried out on the ecology of Amphibians in the Middle East. A Rocha Lebanon could offer a very good base for any research on population dynamics, migrations, habitats use, relation with human activities (impact of road traffic, pesticide use and fisheries, ditches and "sheep pond" capacity for amphibians…).

6 - Conservation opportunities

Along with the limiting factors analysis, we wish to give a general insight to what kind of specific conservation measures would be relevant for amphibians :

- Increase fallow/grazed land + wooded area near the water bodies. This would create very suitable terrestrial habitats for *Hyla savignyi, Bufo viridis, Salamandra infraimmaculata*…
- Fill any unused ditch, whatever its size. This has already been done for major ditches at the northern part of the marsh. Doing that for secondary ditches, may reduce fish presence and then increase amphibian (along with any invertebrate) breeding success.
- Create ponds at used ditches extremities. Aquatic vegetation that would develop there would help for water depollution.
- Adjust pipes under the roads from the streams running down the hills to make proper amphibians migration ways. Basically, building concrete walls 50 m apart these pipes would block them in the ditch along the road and lead them to the pipes (this is however not relevant for *Hyla savignyi*). Efficiency of this would be reinforced with saving a "wildlife" corridor along each stream line.
- Create concrete (or clay ?) ponds near springs and along water pipes running down the springs. This would be much appreciated by *Salamandra infraimmaculata* and possibly *Bufo viridis.* There is a high potential for collaboration with sheepherders there as these ponds would also be of the herds benefit.

Conclusion

This amphibian research mission produced 150 data on more than 50 sites in and around the Aammiq marshes. 4 species have been identified and first data are available on their local phenology, range, population size and conservation status. Recommandations are produced for further research and conservation.

A possible new species of *Rana (Pelophylax) sp* has been also discovered but remained unidentified so far.

No *Discoglossus* has been seen but at 3 different sites, a distinctive frog call has been heard, possibly related to this genus.

Though we did not prove the presence of any *Discoglossus* in the Aammiq area, we are rather confident that a species of this genus does live in the area. Following a meeting on July 10th between major stakeholders within A Rocha, a possible strategy for further research on that species is presented.

Aknowledgments
We are very thankfull to :
A Rocha Lebanon team, especially Chris Naylor, Martin and Lodi Bernhard, Simon Helou, Richard Storey for their hospitality and guided tours in the area and also for funding most of this mission.
Simon Stuart, Will Simonson, Peter Harris and Alain & Karin Boisclair-Joly for advice.
A Rocha for putting people together and facilitating exchange
Georges for its precious introduction to Lebanon.
Faysal for its good field work.
The Skaff family for allowing this work on their property and for their will to preserve the marsh.

Appendix
Distribution and abundance maps for :
Rana bedriagae
Hyla savignyi
Bufo viridis
Salamandra infraimmaculata
Unidentified calling frog
Rana (Pelophylax) sp
Colin's observation

A list of the herpetofauna of the Aammiq area – April 2004

Colin Beale frog description

Identification key

Literature

http://elib.cs.berkeley.edu/cgi-bin/amphib_query?where-genus=Discoglossus&where-species=nigriventer#365

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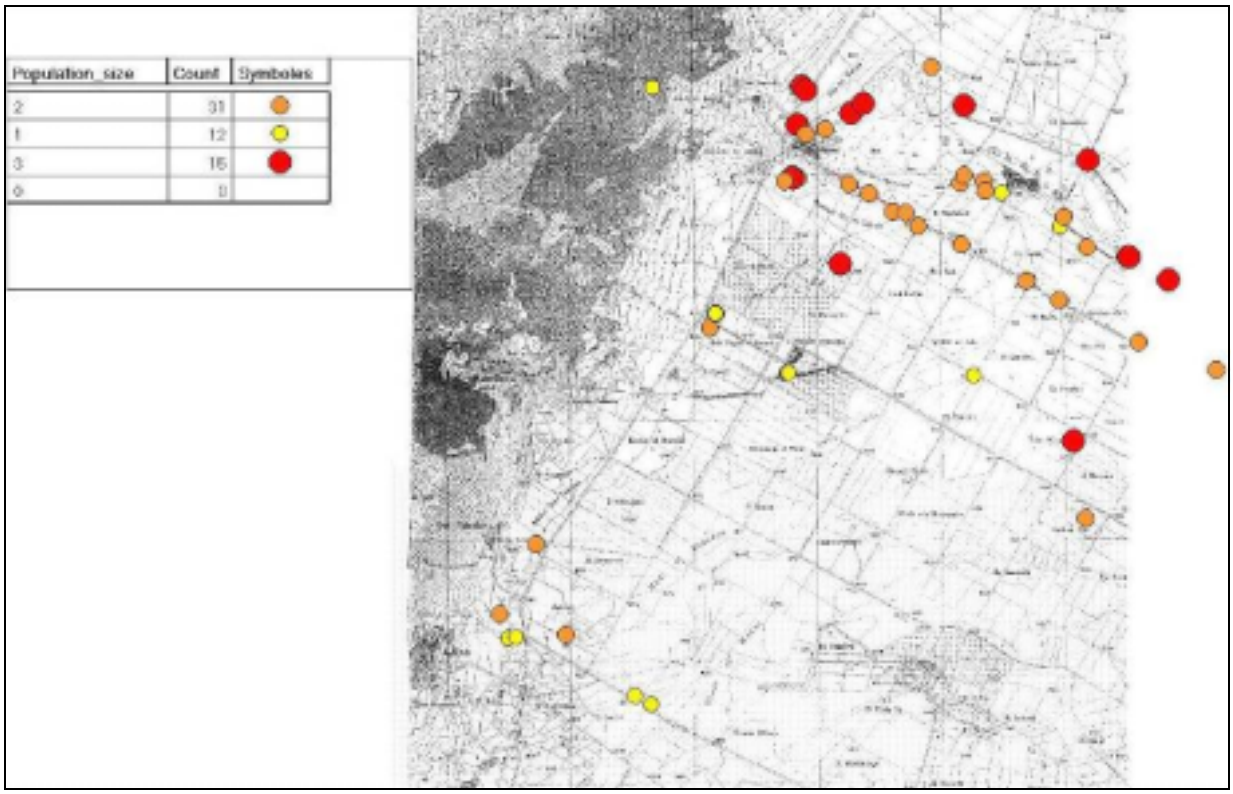
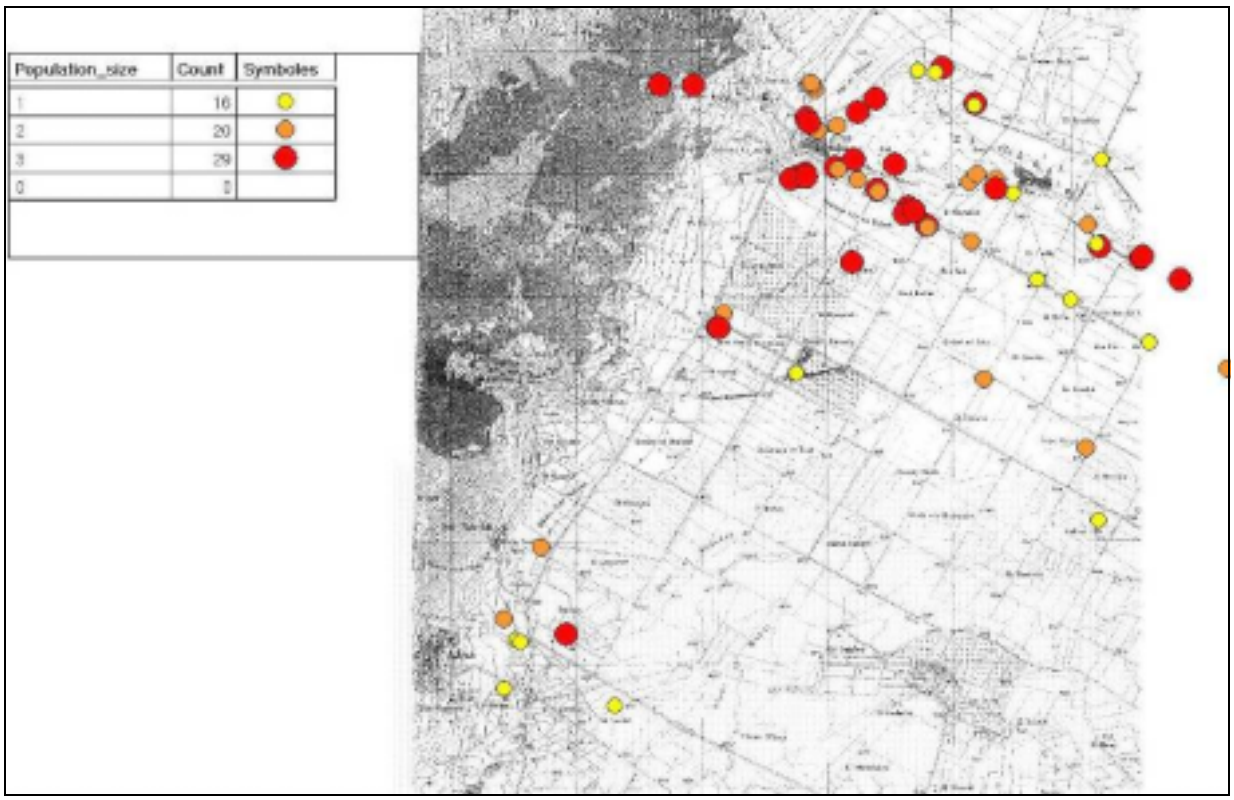
STOREY R. No date. Assessing groundwater and surface water flows through Aammiq wetland. 10 p.

Appendix 1

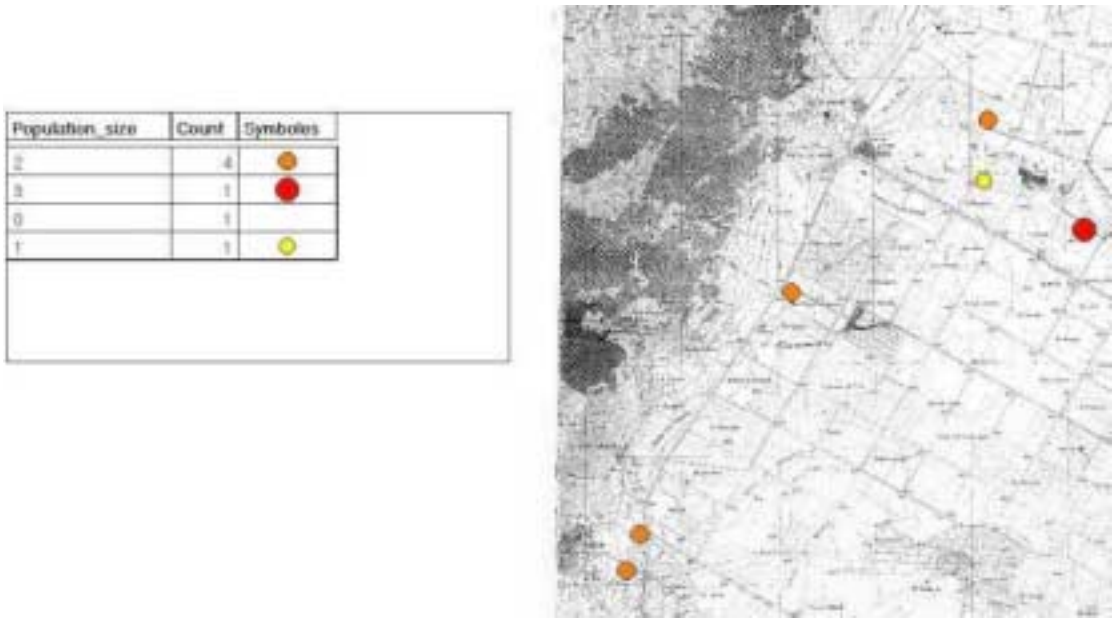
Maps of distribution and abundance of all amphibian species in the Aammiq area – April 2004



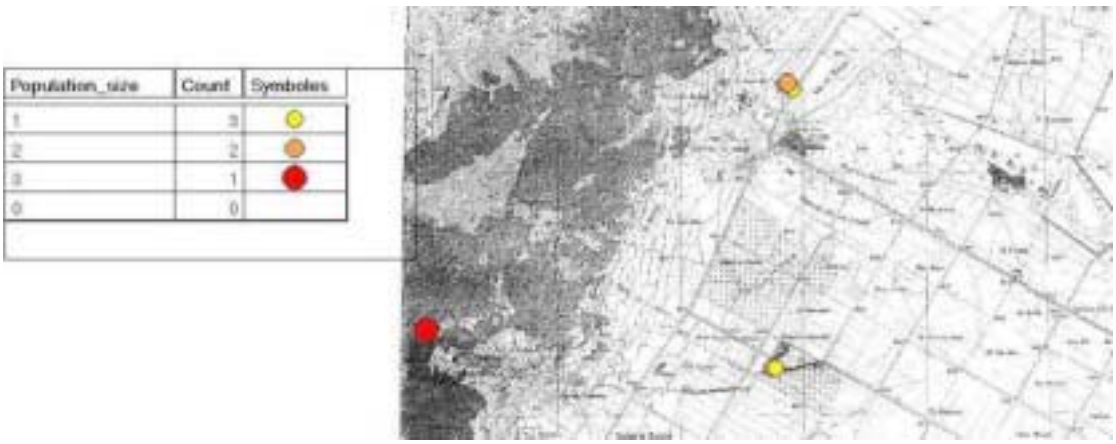
Map of distribution and abundance of *Rana bedriagae* in the Aammiq area – April 2004



Map of distribution and abundance of *Hyla savignyi* in the Aammiq area – April 2004

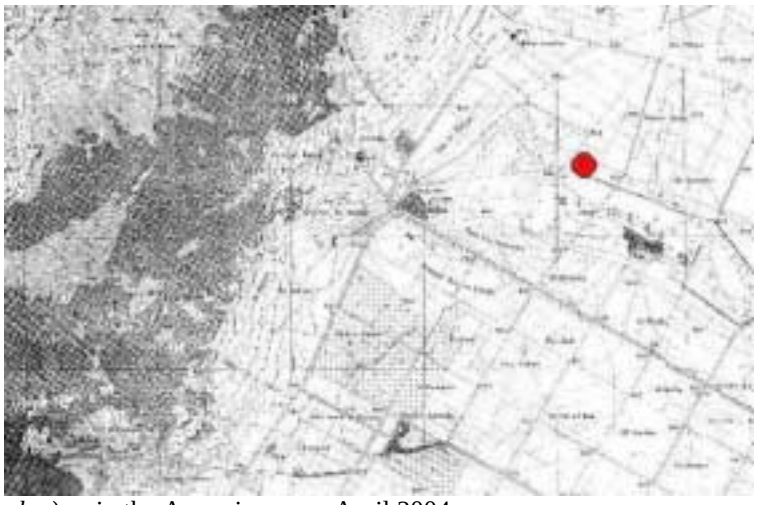


Map of distribution and abundance of *Bufo viridis* in the Aammiq area – April 2004



Map of distribution and abundance of *Salamandra infraimmaculata* in the Aammiq area – April 2004

Map of distribution and abundance of the *"unidentified calling frog"* in the Aammiq area – April 2004



Map of distribution *Rana (Pelophylax) sp* in the Aammiq area – April 2004

Map of the location of Colin Beale observation of a Discoglossus sp in the Aammiq area – April 2000

Appendix 2 :

A list of the herpetofauna of the Aammiq area – April 2004

Species	Abundance	Habitats
Rana bedriagae	Very abundant	Marsh
Hyla savignyi	Abundant	Marsh
Bufo viridis	Localized, uncommon	Temporary ponds
Salamandra infraimmaculata	Very Localized, rare	Springs and ponds
Lacerta laevis	Common	Bushes, lower elevations
Lacerta ?? (the only endemic one)	Localized, common	Clear forest, higher elevations
Mabuya vittata	Common	Everywhere
Ophisops elegans	Very common	Everywhere
Natrix tesselata	Common	Any wetland
Coluber jugularis	?	Small swamp, NW of Aammiq springs, on the other side of the road
Elaphe quadrilineata	?	1 dead on the road going up to El Shouf
Malpolon monspessulanus	?	Forest
Mauremis caspica	Common	Any water body. Ditches are particularly attractive.
Testuda graeca	Common	Bushes and forests

Other species also occur in the area of Aammiq as shown in some lists at A Rocha's office.

Appendix 3 :

Probable observation of a *Discoglossus sp* at Aammiq Lebanon, April/May 2000

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The story takes place some time in mid April, mid-morning on a sunny day at the Aammiq wetlands, South-east Lebanon. I was carrying out a butterfly survey along the avenue of trees with a visitor to the project, when a frog sitting in shallow water (half in/half out) in the ditch nearby caught our attention. (At this point the ditch had iris growing in it and overhanging *Rhamnus* sp.) We both had a very good view of the frog through binoculars and in good light at a distance of approximately 3m. Having some experience of frogs of the genus Discoglossus from Portugal (where we occasionally found them on the marshes near Cruzinha at night, or on the Monchique hills) I was confident that the individual we were watching was a member of this genera. Unfortunately neither of us were aware of the significance of such a record at the time and made no attempts to handle it, or take special notes of the circumstances. That said, however, I do remember it quite well, as it was the first (and subsequently seems to be only!) time I'd seen one at Aammiq and it stuck in my mind at the time.

I remember the individual as being slightly larger than the average Marsh Frog and quite well marked; the feature that first drew my attention to it - a nice blotchy pattern on the back. Relative to the Portuguese species, my opinion at the time was that this individual was basically very similar, but probably rather better marked (the contrast between the dark spots and olive/grey ground colour stronger, and clearly delineated with a fine pale yellow/green boarder perhaps more distinct than Portuguese ones). The key feature, of course, being the pupil shape (somewhat like a rounded triangle in shape) which is obvious given a clear look in good sunshine, and it was this that led me to make the identification.

Although I looked twice at this individual because it was clearly better marked than most amphibians I'd seen in the area (excluding green toads, of course!), I considered it could just be a well marked individual of a variable species that caught my eye. The difference between this individual and what I was familiar with from Portugal was not beyond the individual variation I considered possible knowing that species. It looked rather like the illustration 1a of plate 6 of the Collin's Field Guide to Reptiles and Amphibians of Britain and Europe by Arnold *et al*., though I did know that the taxonomy was very complex so just assumed someone would identify it to species level from its range. Little did I know that the range would be of considerable interest!

Being only a casual observation and not part of a systematic survey of the amphibians, it is hard to guess at the status of Discoglossus in the Aammiq wetlands. However, as I looked at an awful lot of frogs in the marsh whilst I was there and only once saw this species I can only conclude that either it is very secretive (quite possibly true), or very rare

Appendix 4 :

List of all amphibian observations
Herpetological research mission - April 2004

ID	Date	Hour	Species	Numbers_of_adults	Numbers_of_tadpoles	Numbers_of_clutches	Population_size	Comments
1	04/03/2004	22	Hyla savignii	100	0	0	0	mainly dead on road
2	04/03/2004	22	Hyla savignii	100	0	0	0	mainly dead on road
3	04/03/2004	22	Hyla savignii	100	0	0	0	mainly dead on road
4	04/03/2004	22	Hyla savignii	10	0	0	0	mainly dead on road
5	04/03/2004	22	Bufo viridis	13	0	0	0	mainly dead on road
6	04/03/2004	22	Bufo viridis	4	0	0	0	mainly dead on road
7	04/03/2004	22	Bufo viridis	3	0	0	0	mainly dead on road
8	04/03/2004	22	Rana bedriagae	3	0	0	0	mainly dead on road
9	04/03/2004	22	Rana bedriagae	2	0	0	0	mainly dead on road
10	04/03/2004	22	Rana bedriagae	1	0	0	0	mainly dead on road
11	04/03/2004	22	Rana bedriagae	20	0	0	2	
12	04/03/2004	22	Hyla savignii	12	0	0	2	
13	04/03/2004	23	Rana bedriagae	10	0	0	1	
14	04/03/2004	23	Hyla savignii	7	0	0	2	
15	04/05/2004	11	Bufo viridis	0	2000	0	2	
16	04/05/2004	11	Hyla savignii	4	0	0	1	
17	04/05/2004	14	Rana bedriagae	10	0	0	2	
18	04/05/2004	14	Hyla savignii	50	0	0	2	
19	04/11/2004	20	Hyla savignii	20	0	0	3	
20	04/11/2004	20	Hyla savignii	20	0	0	3	
21	04/11/2004	20	Hyla savignii	20	0	0	3	
22	04/11/2004	20	Hyla savignii	20	0	0	3	
23	04/11/2004	21	Hyla savignii	20	300	0	3	
24	04/11/2004	21	Hyla savignii	50	300	0	3	
25	04/10/2004	21	Hyla savignii	20	0	0	2	
26	04/10/2004	21	Rana bedriagae	50	0	0	3	
27	04/10/2004	21	Hyla savignii	10	0	0	3	
28	04/10/2004	21	Rana bedriagae	30	0	0	3	
29	04/10/2004	22	Bufo viridis	25	0	20	0	
30	04/10/2004	21	Hyla savignii	20	0	0	3	

31	04/10/2004	21	Rana bedriagae	50	0	0	3	
32	04/04/2004	17	Rana bedriagae	10	0	0	0	In the small stream
33	04/04/2004	17	Rana bedriagae	10	0	0	0	In the small stream
34	04/04/2004	17	Hyla savignii	5	0	0	0	
35	04/05/2003	22	Salamandra infraimmaculata	0	5	0	0	
36	04/05/2004	22	Rana bedriagae	50	0	0	0	
37	04/05/2004	22	Hyla savignii	10	0	0	0	
38	04/05/2004	22	Salamandra infraimmaculata	15	15	0	0	
39	04/05/2004	22	Hyla savignii	15	0	0	0	
40	04/05/2004	22	Rana bedriagae	100	0	0	0	
41	04/05/2004	23	Hyla savignii	20	0	0	0	
42	04/05/2004	23	Rana bedriagae	100	0	0	0	
43	04/05/2004	23	Hyla savignii	20	0	0	0	
44	04/05/2004	23	Rana bedriagae	100	0	0	0	
45	04/06/2004	11	Hyla savignii	20	20	0	0	
46	04/06/2004	21	Hyla savignii	150	2000	0	0	
47	04/06/2004	21	Rana bedriagae	100	0	0	0	
48	04/06/2004	22	Hyla savignii	7	0	0	0	
49	04/06/2004	22	Rana bedriagae	100	0	0	0	
50	04/06/2004	22	Hyla savignii	20	0	0	0	
51	04/06/2004	22	Rana bedriagae	50	0	0	0	
52	04/06/2004	23	Hyla savignii	20	0	0	0	
53	04/06/2004	23	Rana bedriagae	100	0	0	0	
54	04/07/2004	21	Salamandra infraimmaculata	0	50	0	0	
55	04/07/2004	21	Hyla savignii	3	150	0	0	
56	04/07/2004	21	Rana bedriagae	20	0	0	0	
57	04/07/2004	21	Rana bedriagae	10	0	0	0	
58	04/07/2004	21	Salamandra infraimmaculata	0	3	0	0	
59	04/07/2004	22	Rana bedriagae	15	0	0	0	
60	04/07/2004	22	Rana bedriagae	50	0	0	0	
61	04/07/2004	22	Hyla savignii	10	500	0	0	
62	04/07/2004	22	Hyla savignii	5	0	0	0	
63	04/07/2004	23	Rana bedriagae	20	0	0	0	
64	04/07/2004	23	Hyla savignii	10	0	0	0	
65	04/07/2004	23	Rana bedriagae	100	0	0	0	
66	04/07/2004	23	Hyla savignii	10	0	0	0	
67	04/08/2004	21	Hyla savignii	20	0	0	0	
68	04/08/2004	21	Rana bedriagae	30	0	0	0	
69	04/08/2004	22	Hyla savignii	4	50	0	0	
70	04/08/2004	22	Rana bedriagae	10	0	0	0	
71	04/08/2004	22	Hyla savignii	3	0	0	0	
72	04/08/2004	22	Bufo viridis	0	1500	0	0	
73	04/08/2004	22	Rana bedriagae	5	0	0	0	
74	04/09/2004	22	Hyla savignii	20	300	0	0	
75	04/09/2004	22	Rana bedriagae	100	0	0	0	
76	04/09/2004	22	Hyla savignii	20	500	0	0	
77	04/09/2004	22	Rana bedriagae	100	0	0	0	
78	04/09/2004	23	Rana bedriagae	150	0	0	0	

79	04/10/2004	17	Salamandra infraimmaculata	0	2	0	0	Just out of the water, under stones
80	04/10/2004	21	Bufo viridis	6	0	0	0	
81	04/10/2004	21	Hyla savignii	20	0	0	0	
82	04/10/2004	21	Rana bedriagae	50	0	0	0	
83	04/10/2004	22	Rana bedriagae	30	0	0	0	
84	04/10/2004	22	Rana bedriagae	10	0	0	0	
85	04/12/2004	17	Rana bedriagae	50	0	0	0	
86	04/12/2004	17	Hyla savignii	20	1000	0	0	
87	04/12/2004	18	Bufo viridis	0	1000	0	0	
88	04/12/2004	18	Hyla savignii	10	5000	0	0	
89	04/12/2004	18	Rana bedriagae	100	100	0	0	
90	04/12/2004	21	Bufo viridis	1	0	0	0	male
91	04/12/2004	22	Hyla savignii	30	2000	0	0	
92	04/12/2004	22	Rana bedriagae	50	0	0	0	
93	04/12/2004	22	Rana bedriagae	50	0	0	0	
94	04/12/2004	22	Hyla savignii	20	3000	0	0	
95	04/12/2004	22	Unidentified calling frog	2	0	0	0	
96	04/12/2004	22	Hyla savignii	10	0	0	0	
97	04/12/2004	22	Rana bedriagae	30	0	0	0	
98	04/12/2004	22	Rana bedriagae	30	0	0	0	
99	04/12/2004	22	Hyla savignii	10	0	0	0	
100	04/12/2004	22	Hyla savignii	20	0	0	0	
101	04/12/2004	22	Rana bedriagae	50	0	0	0	
102	04/12/2004	22	Rana bedriagae	50	0	0	0	
103	04/12/2004	22	Hyla savignii	10	0	0	0	
104	04/12/2004	23	Hyla savignii	10	0	0	0	
105	04/12/2004	23	Rana bedriagae	50	0	0	0	
106	04/12/2004	23	Hyla savignii	5	0	0	0	
107	04/12/2004	23	Rana bedriagae	30	0	0	0	
108	04/12/2004	23	Hyla savignii	5	0	0	0	
109	04/12/2004	23	Rana bedriagae	30	0	0	0	
110	04/12/2004	23	Hyla savignii	5	0	0	0	
111	04/12/2004	23	Rana bedriagae	30	0	0	0	
112	04/12/2004	23	Hyla savignii	10	0	0	0	
113	04/12/2004	23	Rana bedriagae	50	0	0	0	
114	04/12/2004	24	Hyla savignii	20	0	0	0	
115	04/12/2004	24	Rana bedriagae	100	0	0	0	
116	04/12/2004	24	Hyla savignii	30	5000	0	0	
117	04/12/2004	24	Rana bedriagae	200	0	0	0	
118	04/12/2004	24	Unidentified calling frog	10	0	0	0	
119	13/4/2004	17	Rana bedriagae	100	0	0	0	
120	13/4/2004	17	Hyla savignii	5	0	0	0	
121	13/4/2004	22	Hyla savignii	5	0	0	0	
122	13/4/2004	22	Hyla savignii	5	0	0	0	
123	13/4/2004	23	Hyla savignii	5	0	0	0	
124	13/4/2004	23	Unidentified Green Frog	5	0	0	0	capture of a pregant female + pictures
125	13/4/2004	24	Unidentified calling frog	5	0	0	0	
126	14/4/2004	17	Bufo viridis	0	500	0	0	
127	14/4/2004	17	Hyla savignii	5	3000	0	0	

128	14/4/2004	17	Rana bedriagae	30	0	0	0	
129	14/4/2004	17	Rana bedriagae	30	0	0	0	
130	14/4/2004	17	Hyla savignii	10	1000	0	0	
131	14/4/2004	17	Hyla savignii	5	1000	0	0	
132	14/4/2004	17	Rana bedriagae	30	0	0	0	
133	14/4/2004	18	Hyla savignii	2	200	0	0	
134	14/4/2004	18	Rana bedriagae	10	0	0	0	
135	14/4/2004	19	Rana bedriagae	50	0	0	0	
136	14/4/2004	18	Hyla savignii	5	5000	0	0	
137	14/4/2004	22	Hyla savignii	10	5000	0	0	
138	14/4/2004	22	Rana bedriagae	100	0	0	0	
139	14/4/2004	22	Unidentified calling frog	4	0	0	0	
140	04/11/2004	9	Hyla savignii	30	0	0	0	Near water tap for the garden
141	04/08/2004	17	Rana bedriagae	100	0	0	0	Along running water from irrigation pipe
142	04/08/2004	17	Hyla savignii	50	0	0	0	Along running water from irrigation pipe
143	04/08/2004	16	Salamandra infraimmaculata	0	100	0	0	2 generations
144	04/04/2004	10	Rana bedriagae	50	0	0	0	
145	04/04/2004	10	Hyla savignii	10	0	0	0	

Appendix 5 :

List of all wildlife species seen
Herpetological research mission - April 2004

Birds :

code	latin	francais	english
TACRUF	Tachybaptus ruficollis	Grèbe castagneux	Little Grebe
IXOMIN	Ixobrychus minutus	Blongios nain	Little Bittern
ARDRAL	Ardeola ralloides	Crabier chevelu	Squacco Heron
EGRGAR	Egretta garzetta	Aigrette garzette	Little Egret
EGRALB	Egretta alba	Grande Aigrette	Great Egret
ARDCIN	Ardea cinerea	Héron cendré	Grey Heron
ARDPUR	Ardea purpurea	Héron pourpré	Purple Heron
CICNIG	Ciconia nigra	Cigogne noire	Black Stork
CICCIC	Ciconia ciconia	Cigogne blanche	White Stork
PLEFAL	Plegadis falcinellus	Ibis falcinelle	Glossy Ibis
ANAPLA	Anas platyrhynchos	Canard colvert	Mallard
ANAQUE	Anas querquedula	Sarcelle d'été	Garganey
MILMIG	Milvus migrans	Milan noir	Black Kite
CIRGAL	Circaetus gallicus	Circaète Jean-le-blanc	Short-toed Eagle
CIRAER	Circus aeruginosus	Busard des roseaux	Marsh Harrier
CIRPYG	Circus pygargus	Busard cendré	Montagu's Harrier
ACCNIS	Accipiter nisus	Epervier d'Europe	Sparrowhawk
ACCBRE	Accipiter brevipes	Epervier à pieds courts	Levant Sparrowhawk
BUTVUL	Buteo buteo vulpinus	Buse des steppes	Steppe Buzzard
BUTRUF	Buteo rufinus	Buse féroce	Long-legged Buzzard
AQUPOM	Aquila pomarina	Aigle pomarin	Lesser Spotted Eagle
AQUCLA	Aquila clanga	Aigle criard	Spotted Eagle
HIEPEN	Hieraaetus pennatus	Aigle botté	Booted Eagle
FALTIN	Falco tinnunculus	Faucon crécerelle	Common Kestrel
ALECHU	Alectoris chukar	Perdrix chukar	Chukar
COTCOT	Coturnix coturnix	Caille des blés	Quail
RALAQU	Rallus aquaticus	Râle d'eau	Water Rail
PORPAR	Porzana parva	Marouette poussin	Little Crake
PORPUS	Porzana pusilla	Marouette de Baillon	Baillon's Crake
GALCHL	Gallinula chloropus	Gallinule poule-d'eau	Moorhen
FULATR	Fulica atra	Foulque macroule	Coot
HOPSPI	Hoplopterus spinosus	Vanneau éperonné	Spur-wined Plover
PHIPUG	Philomachus pugnax	Combattant varié	Ruff
LYMMIN	Lymnocryptes minimus	Bécassine sourde	Jack Snipe
GALGAL	Gallinago gallinago	Bécassine des marais	Common Snipe
GALMED	Gallinago media	Bécassine double	Great Snipe
TRIOCH	Tringa ochropus	Chevalier culblanc	Green Sandpiper
COLDOM	Columba livia dom.	Pigeon domestique	Feral Pigeon
CUCCAN	Cuculus canorus	Coucou gris	Cuckoo
TYTALB	Tyto alba	Effraie des clochers	Barn Owl
OTUSCO	Otus scops	Petit-duc scops	Scop's Owl
BUBBUB	Bubo bubo ascalaphus	Grand-duc ascalaphe	Eagle Owl
STRALU	Strix aluco	Chouette hulotte	Tawny Owl
ASIOTU	Asio otus	Hibou moyen-duc	Long-eared Owl
APUAPU	Apus apus	Martinet noir	Common Swift
APUMEL	Apus melba	Martinet à ventre blanc	Alpine Swift
ALCATT	Alcedo atthis	Martin-pêcheur d'Europe	Kingfisher
MERAPI	Merops apiaster	Guêpier d'Europe	European Bee-eater

JYNTOR	Jynx torquilla	Torcol fourmilier	Wryneck
DENSYR	Dendrocopos syriacus	Pic syriaque	Syrian Woodpecker
MELCAL	Melanocorypha calandra	Alouette calandre	Calandra Lark
CALBRA	Calandrella brachydactyla	Alouette calandrelle	Short-toed Lark
GALCRI	Galerida cristata	Cochevis huppé	Crested Lark
LULARB	Lullula arborea	Alouette lulu	Woodlark
EREALP	Eremophila alpestris	Alouette haussecol	Shorelark
RIPRIP	Riparia riparia	Hirondelle de rivage	Sand Martin
HIRRUP	Hirundo rupestris	Hirondelle des rochers	Crag Martin
HIRRUS	Hirundo rustica	Hirondelle rustique	Barn Swallow
HIRDAU	Hirundo daurica	Hirondelle rousseline	Red-rumped Swallow
DELURB	Delichon urbica	Hirondelle de fenêtre	House Martin
ANTTRI	Anthus trivialis	Pipit des arbres	Tree Pipit
ANTCER	Anthus cervinus	Pipit à gorge rousse	Red-throated Pipit
MOTFLA	Motacilla flava	Bergeronnette printanière	Yellow Wagtail
MOTALB	Motacilla alba	Bergeronnette grise	White Wagtail
TROTRO	Troglodytes troglodytes	Troglodyte mignon	Wren
LUSMEG	Luscinia megarhynchos	Rossignol philomèle	Nightingale
LUSLUS	Luscinia luscinia	Rossignol progné	Thrush Nightingale
IRAGUT	Irania guttularis	Iranie à gorge blanche	White thoated Robin
PHOOCH	Phoenicurus ochruros	Rougequeue noir	Black Redstart
PHOPHO	Phoenicurus phoenicurus	Rougequeue à front blanc	Common Redstart
SAXTOR	Saxicola torquata	Tarier pâtre	Stonechat
OENISA	Oenanthe isabellina	Traquet isabelle	Isabelline Wheatear
OENOEN	Oenanthe oenanthe	Traquet motteux	Northern Wheatear
OENHIS	Oenanthe hispanica	Traquet oreillard	Black-eared Wheatear
MONSOL	Monticola solitarius	Monticole bleu	Blue Rock Thrush
TURMER	Turdus merula	Merle noir	Blackbird
TURPHI	Turdus philomelos	Grive musicienne	Song Thrush
CETCET	Cettia cetti	Bouscarle de Cetti	Cetti's Warbler
CISJUN	Cisticola juncidis	Cisticole des joncs	Zitting Cisticola
PRIGRA	Prinia gracilis	Prinia gracile	Graceful Prinia
LOCNAE	Locustella naevia	Locustelle tachetée	Grasshopper Warbler
LOCLUS	Locustella luscinioides	Locustelle luscinioide	Savi's Warbler
ACRMEL	Acrocephalus melanopogon	Lusciniole à moustaches	Moustached Warbler
ACRSCH	Acrocephalus schoenobaenus	Phragmite des joncs	Sedge Warbler
ACRSCI	Acrocephalus scirpaceus	Rousserolle effarvatte	Reed Warbler
ACRARU	Acrocephalus arundinaceus	Rousserolle turdoïde	Great Reed Warbler
SYLMEL	Sylvia melanocephala	Fauvette mélanocéphale	Sardinian Warbler
SYLHOR	Sylvia hortensis	Fauvette orphée	Orphean Warbler
SYLNIS	Sylvia nisoria	Fauvette épervière	Barred Warbler
SYLCUR	Sylvia curruca	Fauvette babillarde	Lesser Whitethroat
SYLCOM	Sylvia communis	Fauvette grisette	Whitethroat
SYLATR	Sylvia atricapilla	Fauvette à tête noire	Blackcap
PHYORI	Phylloscopus orientalis	Pouillot oriental	Eastern Bonelli's Warbler
PHYSIB	Phylloscopus sibilatrix	Pouillot siffleur	Wood Warbler
PHYCOL	Phylloscopus collybita	Pouillot véloce	Chiffchaff
PHYTRO	Phylloscopus trochilus	Pouillot fitis	Willow Warbler
MUSSTR	Muscicapa striata	Gobemouche gris	Spotted Flycatcher
PARMAJ	Parus major	Mésange charbonnière	Great Tit
SITNEU	Sitta neumayer	Sitelle de Neumayer	Rock Nuthatch
REMPEN	Remiz pendulinus	Rémiz penduline	Penduline Tit
LANCOL	Lanius collurio	Pie-grièche écorcheur	Red-backed Shrike

LANSEN	Lanius s. senator	Pie-grièche à tête rousse	Woodchat Shrike
LANNUB	Lanius nubicus	Pie-grièche masquée	Masked Shrike
GARGLA	Garrulus glandarius	Geai des chênes	Jay
CORNIX	Corvus corone cornix	Corneille mantelée	Hooded Crow
PASDOM	Passer domesticus	Moineau domestique	House Sparrow
PASHIS	Passer hispanoliensis	Moineau espagnol	Spanish Sparrow
PETPET	Petronia petronia	Moineau soulcie	Rock Sparrow
FRICOE	Fringilla coelebs	Pinson des arbres	Chaffinch
SERSYR	Serinus syriacus	Serin syriaque	Syrian Serin
CARCHL	Carduelis chloris	Verdier d'Europe	Greenfinch
CARCAR	Carduelis carduelis	Chardonneret élégant	Goldfinch
CARCAN	Carduelis cannabina	Linotte mélodieuse	Linnet
EMBHOR	Emberiza hortulana	Bruant ortolan	Ortolan Bunting
EMBCAE	Emberiza caesia	Bruant cendrillard	Crezchmart Bunting
MILCAL	Miliaria calandra	Bruant proyer	Corn Bunting

Mammals :

Name	Observations
Chacal	2 in a field 300 NE of the Skaff farm, 9/4/4 -- Footprints, Uncultivated fields, north of Aammiq marshes, 12/4/4
Wolf ?	Donk, Jebel Barouk, 1300 m, 9/4/4 (pictures) -- Footprint, Uncultivated fields, north of Aammiq marshes, 12/4/4 (pictures)
Swamp cat	1 seen at night, wet meadows SE Aammiq marsh, 9/4/4 -- Footprints, Uncultivated fields, north of Aammiq marshes, 12/4/4 (pictures)
Otter	4 Donks on a pale square big stone (Thierry Lodé, Prof. at the Angers' university, France, found reliefs of bird, fish scales (probably a Percidae) and Coleoptera (probably this very large swimming black one)) , Avenue of Trees near the spring, 13/4/4 (pictures) -- Footprints at sluice gate, E of the marsh, 14/4/4 (pictures)
Bat	Surpisingly very few…
Porcupine	1 thorn, Jebel Barouk, 1300 m, 9/4/4

Reptiles & Amphibians :

Species	**Abundance**	**Habitats**
Rana bedriagae	Very abundant	Marsh
Hyla savignyi	Abundant	Marsh
Bufo viridis	Localized, uncommon	Temporary ponds
Salamandra infraimmaculata	Very Localized, rare	Springs and ponds
Lacerta laevis	Common	Bushes, lower elevations
Lacerta ?? (the only endemic one)	Localized, common	Clear forest, higher elevations
Mabuya vittata	Common	Everywhere
Ophisops elegans	Very common	Everywhere
Natrix tesselata	Common	Any wetland
Coluber jugularis	?	Small swamp, NW of Aammiq springs, on the other side of the road
Elaphe quadrilineata	?	1 dead on the road going up to El Shouf
Malpolon monspessulanus	?	Forest
Testuda graeca	Common	Bushes and forests
Mauremis caspica	Common	Any water body. Ditches are particularly attractive.