Bird ringing programme in Bahrain 2005-2010

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Introduction

Individually marking birds is a scientific technique used throughout Europe and North America since the earliest years of the last century. In the earlier years of ringing in Great Britain, recording movements of Woodcock *Scolopax rusticola*, on the Duke of Cumberland's estate at Alnwick was begun when individual birds were caught alive and fitted with a metal ring in 1891. The inscription on the ring was the letter N and the year of ringing (Greenwood, 2009, *et cit*). Over one hundred years later we now have hundreds of ringing schemes covering all the continents and today, the data gathered are still providing valuable information on movements, longevity, mortality and morphology of countless numbers of bird species globally.

In the beginning the primary role of ringing birds was to try to find out where birds such as swallows *Hirunda rustica*, went to in winter. Earlier folklore suggested that they overwintered in mud on the banks of rivers and lakes (much like hibernating frogs, *Rana temporaria*), emerging in spring each year. News of ringed birds reported from South Africa in winter, surprised and delighted the new generation of scientists of the time, (Coiffait and Clark 2009).
The analytical techniques surrounding bird ringing have also developed in complexity over the past century. In addition to monitoring movements (distance, direction and duration), modern methods of analysis are used to elucidate patterns of distribution and abundance, dispersal and mortality factors which in turn are helping to build models of population dynamics for bird species. Being able to identify individual birds has also contributed greatly to our understanding of multi-scale habitat studies using sophisticated mark-recapture approaches (e.g. Calladine, 2006) and most recently demographic data from ringed birds are being used to examine the impact of global warming on birds and their habitats (Moeller, 2008).

While much is known of the migration patterns of birds though western Europe and Africa thanks to ringing data (Wernham *et al*, 2002), little is known of the breeding and wintering areas of species moving through the Middle East and the Arabian Gulf in particular. Despite there being many data on the arrival and departure dates of migrants based on observations in the GCC countries accumulated over the past 2-3 decades (Hirschfeld 1995 in Bahrain, Eriksen *et al* 2003 in Oman, Gregory 2005 in Kuwait, Richardson 2003 in United Arab Emirates), we still have little direct knowledge of the specifics of the populations utilizing the region.

Ringing activity in the GCC has been sporadic. While a number of projects have been initiated within the region, there has been a lack of consistency of effort. Ringing schemes have been registered in Iraq, Iran, Saudi Arabia, United Arab Emirates and Bahrain in the past (EURING 2010). However, with the exception of the Kingdom of Saudi Arabia, all schemes are now non operational. While many of the recoveries of ringed birds have been recorded in the Atlas of Breeding Birds of Arabia (ABBA) (Jennings, 2010), most of the original data is either held personally by the ringers or has been lost.

In 2004, the author, who is a trained ringer and trainer, under the British Trust for Ornithology (BTO) joint British and Irish ringing scheme, undertook to develop and operate a ringing programme in the Kingdom of Bahrain. The permission to use BTO rings was obtained in 2005 and the programme has been implemented without respite to date (2010). This paper outlines the aims and objectives, results and future direction of this ringing effort.

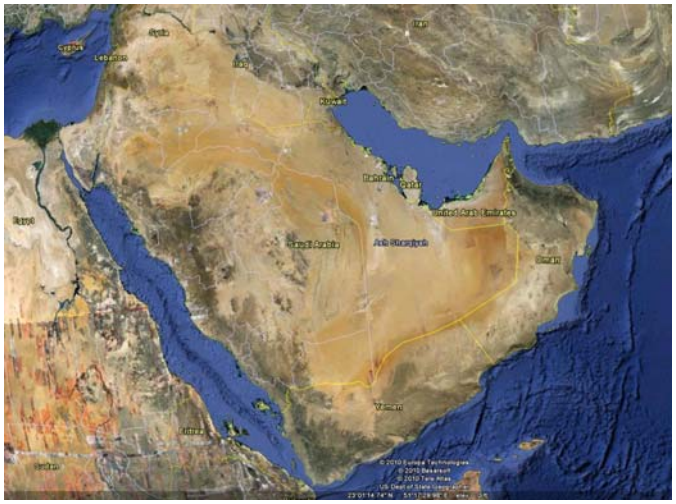


Fig1 Arabian Gulf

Study area

The Kingdom of Bahrain is in the south western section of the Arabian Gulf between Qatar and Saudi Arabia, in a shallow section known as the Gulf of Salwa, Figure 1. It is an archipelago consisting of over 30 islands, the largest being known as Bahrain, which contains the capital city, Manama. It is joined to the Kingdom of Saudi Arabia by a causeway and is proposed to join to Qatar within the next decade. The highest point in Bahrain is 165 meters above sea level (asl) while much of the land area is less than 3 meters asl. The vast majority of the inhabitants of the kingdom live in the upper one third of the main island, including the Sitra and Muharraq islands which are now joined with Manama.

The northern part of the Bahrain island has a higher rainfall than the southern section, the latter being composed of

natural sandy desert and Sebhka. The middle section of the island is known as the central depression which is surrounded by a 'rimrock' escarpment. The jebel Al Durkhan on the western side of the rimrock is the highest point in Bahrain.

The northern section of the main island is richly supplied with sweet water from natural wells, treated sewage and desalination plants. Palm groves are common and locally produced fruit and vegetables are grown primarily in the north and west of this area. While there are some communal areas associated with the villages, most of the land is in private ownership and inaccessible to the author for ringing purposes. Consistant access to suitable ringing sites has been problematical.

Materials and Methods

As there is no national ringing scheme currently operating in the Kingdom, all ringing activity has been conducted under the auspices of the Bahrain Natural History Society, a non-Governmental Society which has been supporting the conservation of the natural heritage of Bahrain since 1976. The rings used in the project are issued through the British Trust for Ornithology Ringing Scheme, to whom all data is returned for storage and archiving.

Mist netting has been conducted at a variety of ringing sites from desert scrub, palm groves, grasslands, reed beds, dry wadis, drainage channels and ponds inland to coastal sites with marine vegetation, mangroves and open beaches. Traps have been used in all habitats and pulli were ringed in Mangrove and on sandy islands offshore.

Birds are caught using mist nets and traps. Two shelf and four shelf nets ranging in size from 6 meters to 18 meters are erected depending on terrain and habitat. Early morning and evening sessions have been operated at all times of the year depending on target species. Tape lures are used on occasion to support catching effort particularly of hirundines in autumn and pipits in winter. Tern pulli are ringed while still flightless.

Having a live bird in the hand presents a great opportunity to gather morphological data. The following measurements have been taken routinely on all individuals post-fledging; Maximum Wing Length (of the closed wing), Tail Length, Bill Skull Length, Bill Depth (at the nares), Tarsus Length, Fat Score and Muscle Score, according to Svensson (1992). Age and Sex are recorded where know and and moult scores and moult pattern when it occurs. In some passerines a full wing formula is recorded to confirm species or races of species based on data from Svensson (1992). During the breeding season the presence and extent of a brood patch is recorded in all females caught.

Results

Ringing commenced in Bahrain in October 2005. A total of 7000 birds were ringed between 2005 and July 2010. Figure 2 shows the total number of rings used per year from 2006 to 2009 inclusive. 125 bird species have been ringed to date. Appendix 1 lists the total number of each species for reference.

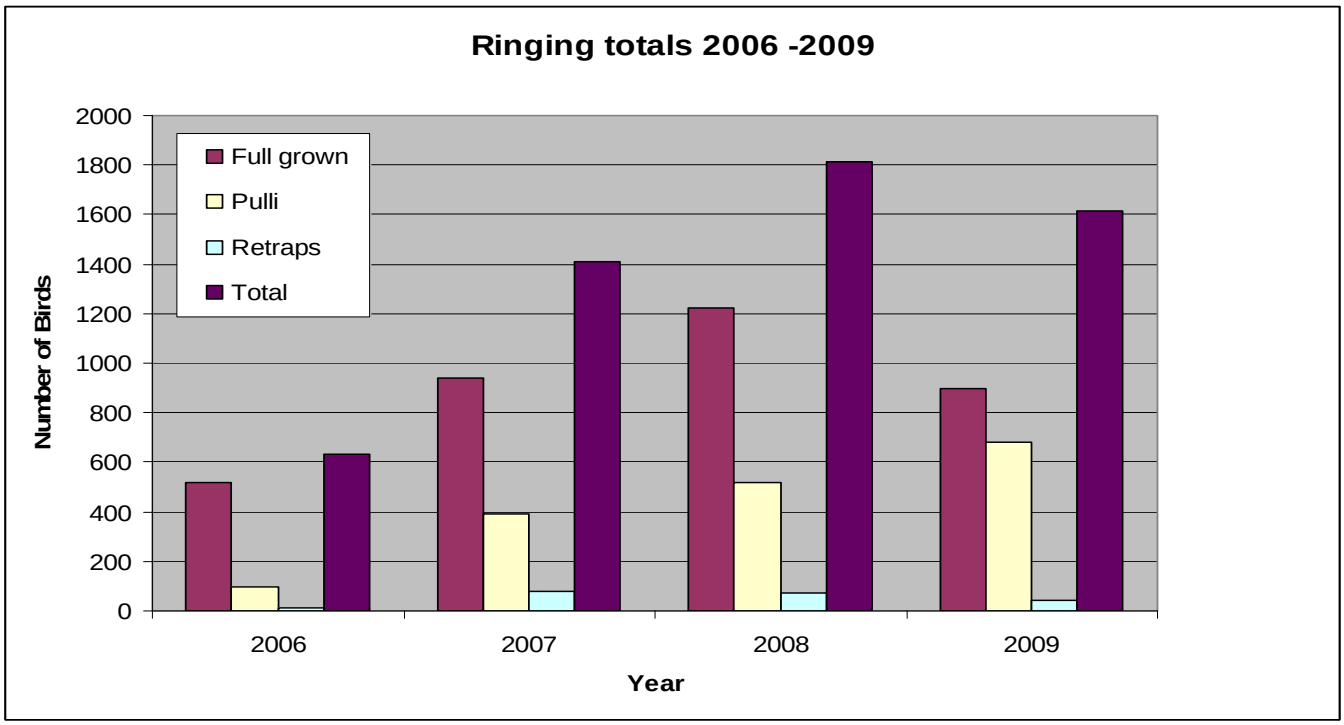


Figure 2: Annual ringing totals for birds ringed in Bahrain from 2006 – 2009. Birds subdivided in to Full grown, Pulli and birds re-caught on more than one occasion.

Given the paucity of morphological data on the avifauna of the region, the project aims to publish statistical analysis (mean, standard deviation and sample size) of the measured variables (see materials and methods)once 50 individuals of the species have been processed. Table 1 lists the species which have reached or exceeded this figure.

Common name	*Scientific name*	*Full grown*	*Retraps/ Recoveries*	*Total*
Indian Silverbill	*Euodice malabarica*	**133**	**1**	**134**
Pale Rockfinch	*Carpospiza brachydactyla*	**93**	**4**	**97**
Crested Lark	*Galerida cristata*	**102**	**6**	**114**
Sand Martin	*Riparia riparia*	**90**	**0**	**90**
Swallow	*Hirundo rustica*	**534**	**0**	**534**
Water Pipit	*Anthus spinoletta*	**118**	**0**	**118**
White-cheeked Bulbul	*Pycnonotus leucogenys*	**201**	**18**	**219**
Grey Hypocolius	*Hypocolius ampelinus*	**64**	**4**	**68**
Rufous Bush Chat	*Cercotrichas galactotes*	**127**	**18**	**145**
Redstart	*Phoenicurus phoenicurus*	**50**	**6**	**56**
Isabelline Wheatear	*Oenanthe isabellina*	**176**	**1**	**177**
Wheatear	*Oenanthe oenanthe*	**34**	**0**	**34**
Pied Wheatear	*Oenanthe pleschanka*	**119**	**2**	**121**
Desert Wheatear	*Oenanthe deserti*	**90**	**0**	**90**
Graceful Prinia	*Prinia gracilis*	**53**	**10**	**63**
Reed Warbler	*Acrocephalus scirpaceus*	**71**	**1**	**72**
Eastern Olivaceous Warbler	*Hippolais pallida*	**61**	**38**	**99**
Lesser Whitethroat	*Sylvia curruca*	**51**	**5**	**56**
Whitethroat	*Sylvia communis*	**58**	**2**	**60**
Chiffchaff	*Phylloscopus collybita*	**141**	**9**	**150**
Willow Warbler	*Phylloscopus trochilus*	**418**	**22**	**440**
Isabelline Shrike	*Lanius isabellinus*	**115**	**10**	**125**
House Sparrow	*Passer domesticus*	**106**	**3**	**109**
Spanish Sparrow	*Passer hispaniolensis*	**58**	**0**	**58**
Ortolan Bunting	*Emberiza hortulana*	**172**	**5**	**177**

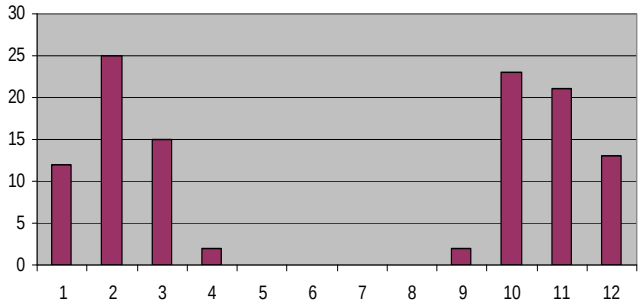
Table 1: List of species for which more than 50 free flying individuals have been ringed in Bahrain 2005 – 2010.

Aspects of the breeding phenology of Rufous bushchats *Cercotrichas galactotes* and Olivaceous warblers *Hippolais pallid*, have been elucidated using ringing and retrap data from Badaan farm between 2006 and 2008, Table 2. While both species tend to arrive at the same time, Rufous Bushchats appear to stay later and accumulate fat for migration in the latter half of September as opposed to late August as observed in Olivaceaous warblers.

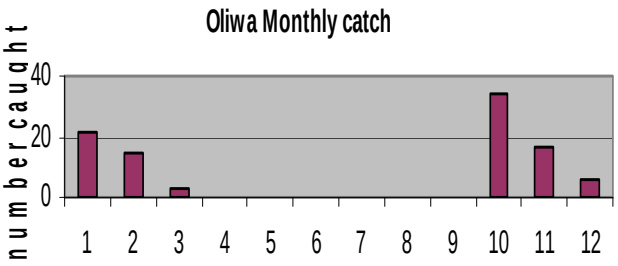
A number of offshore islands were visited between June and August 2006 and 2010 to ring tern pulli. Table 3 lists the species involved and the numbers ringed to date. Terns come to the gulf to breed and spend the winter in the Indian Ocean. Three recoveries have been received to date, Figure 3, two of these from the Mumbai coast in India. Movement of birds between breeding colonies in the Gulf has also been recorded.

The Grey Hypocolius *Hypocolius ampelinus*, is an endemic bird species to the Middle East. Birds winter in Bahrain annually. Table 4 lists the numbers of each age and sex ringed in Bahrain from 2007 – 2010. Four retraps have occurred confirming that birds are faithful to their wintering sites from year to year and within the same winter. Morphological and moult data of this species is currently being prepared for publication.

Breeding phenology	Olivaceous Warbler	Rufous Bush chat
Date of first ringing	6th April	6th April
Ringing of first juvenile of the year	24th June	1st June
Second Broods first appear	no	30th July
Site fidelity	No evidence	Several birds retrapped in same garden in subsequent years
Timing of fat accumulation in preparation for migration	Late August	Mid September
Sex identification data	Yes	Yes



Monthly catch of Rufous Bush Chats ringed in Bahrain, (1 = July, 2 = August, etc.)



Monthly catch of Olivaceous warblers ringed in Bahrain. (1 = July, 2 = August, etc.)

Table 2: Aspects of the breeding phenology of Rufous bushchat *Cercotrichas galactotes* and Olivaceous warbler *Hippolais pallid*, in Bahrain based on ringing and recovery data between 2006-2009.

Discussion

Bird ringing (banding in North America) has been an important tool in scientific research for over 100 years. Today it is used to monitor distribution and abundance (e.g. Robinson *et* al 2007), in the investigation of large-scale variation in population dynamics (e.g. Royle and Dorazio 2008), in the study of mechanisms of migration (e.g. Bairlein and Schaub 2009) and in bird conservation generally (see brief review by Anderson and Green 2009). Identification of subtle patterns of change rely on large data sets gained through countless ringers from many ringing schemes across international borders. In Europe many of these data are shared between schemes or centralized through the European Union for Bird Ringing (EURING, 2010). No such collaboration exists in the gulf region which has implication for the value of data gathered here.

Common name	*Scientific name*	*2006*	*2007*	*2008*	*2009*	*2010*	*TOTAL*
Lesser Crested Tern	*Sterna bengalensis*	40	170	350	443	514	1517
White-cheeked Tern	*Sterna repressa*	50	129	14	62	65	320
Bridled Tern	*Sterna anaethetus*	0	69	140	131	226	566

Table 3: The annual numbers of three tern species ringed in Bahrain 2006 – 2010.

Ring recovery data from the project are very limited to date. Only two rings from 7,000 rings fitted have been recovered. This is a 0.0003% recovery rate for the project as a whole or 0.001% for Lesser-crested terns and 0.003% for Bridled terns respectively. Recovery rates from similar sized terns in Europe are in the range 0.8 – 2.9% (Coiffait *et al* 2009), while species such as blackcaps *Sylvia atricapilla* and whitethroats *S. communis* have a recovery rate of about 1 bird per thousand ringed (Robinson *et al* 2009). If one excludes the terns ringed in Bahrain then the ringing of over 7,000 birds of 125 species has resulted in no recoveries to date.

Based on these facts it would seem that the results gathered from recovery data are a poor return for effort. However two aspects of the project are contributing significantly to our understanding and knowledge of the avifauna in the Middle East region; 1) retrap data (catching a bird more than once), which gives specific information on site fidelity, duration of stay and migration strategies, Table 2) unique morphological and moult data on the birds once in the hand. This is particularly relevant in the case of the grey hypocolius which is an elusive and little known species outside the Middle East, Table 4.

Age and Sex	*Number of birds*
Juvenile Female	14
Adult female	22
Juvenile Male	10
Adult Male	18
Retrapped birds	4
Total Caught	**68**

Table 4: The number of age and sex of the Grey Hypocolius ringed in Bahrain 2007 – 2010.

The increase in the annual total of birds ringed (Figure 2) is primarily due to the training of a local ringer over this period, which has enabled additional independent ringing activity to take place. With one local ringer now fully qualified, this training is seen as an important development of the ringing project which will ensure the continuation of the project in the future.

The disparate nature of avian ringing studies in the Gulf region (Hirschfeld *et* al 1982 in Bahrain, M. Jennings in Saudi Arabia, T. Hallam in Bahrain, a German student in Oman, Mike McGrady on sooty falcons *Falco concolor* in the UAE, pers. comm.) and the lack of centralization of these data have resulted in much knowledge being lost. The publication of the Arabian Breeding Bird Atlas (ABBA) in 2010 (Jennings 2010), has captured some of the findings from these studies however a more centralized approach to the collation, collection and storage of ringing data in the gulf region is needed. The establishment of a single, centralized ringing scheme would be a major step forward for ornithological research in the region into the future.

Figure 3: Movement data of terns ringed on Al Jarrim islands, Bahrain. One bridled tern and 1 lesser-crested tern recovered in Mumbai, India and One Lesser-crested tern photographed breeding in a colony off Kuwait.

Acknowledgements

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