

**SURVEYS OF BREEDING GOLDEN EAGLES  
*AQUILA CHRYSAETOS*  
SULTANATE OF OMAN  
2010 and 2014**

**MICK GREEN & IAN HARRISON**



# **SURVEY OF BREEDING GOLDEN EAGLES *AQUILA CHRYSAETOS***

## **SULTANATE OF OMAN**

**10 - 23 FEBRUARY 2010 and 4 – 9 FEBRUARY 2014**

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### **INTRODUCTION**

Proof of breeding of Golden Eagle *Aquila chrysaetos* in the Sultanate of Oman was first obtained and reported by Gallagher and Brown (1982). In addition to the two sites described by Gallagher and Brown at Zawliyah and Qarn Nihada, a further eighteen sites have been found since 1980/1981. However, comprehensive surveys of the breeding population have not been carried out regularly and not all sites have been visited every breeding season. This is due to a number of factors:

- a) the inaccessibility of some of the sites
- b) the time required to visit all the sites
- c) the small number of active birdwatchers in Oman
- d) the desire not to cause too much disturbance particularly in the crucial months of November and December when eggs are laid and incubation occurs.

Golden Eagles are sporadic breeders and may also move to a new site within their territory if the old site proves unsatisfactory – this may mean that the new nest site is not necessarily found, given the size and difficulty of the eagle territory to cover and the lack of manpower or time available. It may well be the case, therefore, that although some nest sites are no longer occupied, breeding may well still be occurring elsewhere in the eagle's territory which may be anything from 44 to 325 square kilometres - Cramp and Simmons (1980) and Gallagher and Brown (*ibid.*).

Ian Harrison conducted a survey of all accessible sites in the 1999-2000 breeding season – from the end of January to mid-March 2000. Using both the results he obtained and the data from previous years by different observers, he determined that there were no more than eight active sites from 1990 to 2000, compared with twelve active sites in the period 1985-1990. He also visited a few key sites in 2005-2006 and confirmed breeding in two of these. Jens and Hanne Eriksen also checked some of the sites between 2000 and 2005 and confirmed breeding at one site in both 2004 and 2005. Data were also obtained for some years from the White Oryx reserve at Yalooni. Since 2000, therefore, the exact status of breeding Golden Eagles in Oman has not been fully documented.

Moreover, since breeding of Golden Eagles in Oman was first proved, the country, including the central desert area where breeding of the Golden Eagle occurs, has developed and changed immeasurably in many ways.

For the reasons given above therefore, it was considered that an update of the breeding status of Golden Eagle in Oman was required. The aims of the first study were thus to determine which of the known Golden Eagle sites in the Omani central desert had a breeding pair in the 2009-2010 season and to explore other potential areas where breeding might conceivably occur. In 2014 a repeat survey of those sites identified as showing signs of recent occupancy or with high potential was undertaken.

The period of study was determined by the breeding cycle of Golden Eagles in Oman which is as follows:

Late September – early November	Courtship and nest-building
Mid-November – early December	First egg laid and incubation starts
Late December – late January	First chick hatches
Early – late March	Chicks fledge

It was therefore planned to survey in February in order to minimise potential predation particularly by Brown-necked Raven *Corvus ruficollis*.

## METHODOLOGY

Prior to the visit in 2010 we drew up an approximate itinerary based on the locations of the known Golden Eagle breeding sites. In 2014 we selected all those site where signs of eagles had been found in 2010 along with territories thought still able to hold eagles.

Only two of the known Golden Eagle breeding sites in Oman were known to be on cliffs, the rest were known to be in trees - *Prosopis cineraria* (Arabic *Ghaf*) except for one in the Empty Quarter which was described as being in a *Calligonum crinitum* bush. Most of the sites were known to Ian Harrison so the basic method adopted was to drive towards the nest site scanning for any adult birds in the area. We approached within a few hundred metres of the nest site and then walked the remaining distance to get an idea of whether or not the nest was occupied. Our aim was to minimise disturbance to nesting birds but also to avoid any unnecessary vehicle tracks leading to the nest site since we were aware that egg collectors are still a threat to nesting raptors and that local bedu will follow vehicle tracks to suitable shade trees. If the nest could be accessed fairly easily by either climbing the tree or cliff directly or by using the ladder we had carried with us, then this was the favoured procedure. Otherwise the vehicle was brought closer and the ladder erected on top of the roof rack so that we had a view of the nest.

We explored the surrounding area of any nest site (whether occupied or not) as much as possible in order to determine whether or not any alternative site was being used or could potentially be used in the future. In the case of the cliff site, this was done on foot while elsewhere we scanned the surrounding area for suitable trees and then checked these by driving and then approaching more closely on foot.

We noted the GPS coordinates for all nests, including old nests and ones that had collapsed. We also noted nests of Brown-necked Raven *Corvus ruficollis*. In addition we made a brief description of the surrounding area if we felt that this would help future researchers. Where found and identified, prey items were noted. We have not included the eagle site coordinates in this report since in addition to threats due to habitat degradation and consequent reduction in the number of prey species and also potential nest trees, the Golden Eagle in Oman is being threatened by illegal harvesting of either eggs or fledged young by humans. All information has been provided to Ministry of Environment and Climate Affairs personnel in connection with their work in protecting this species in Oman and to the Oman Bird Records Committee, with the recommendation that it remains confidential. The information is of course available to any other genuine researcher who needs the data.

## RESULTS

### 1. RESULTS 2010

#### Site 1

11<sup>th</sup> February 2010. This area was known to have more than one eyrie (Mike Brown pers. comm.) but Ian Harrison had only previously located one of these. The last known successful breeding at this site was in the 2005-2006 season when IH checked the nest in February 2006 - two chicks. Fresh greenery had been found on the nest in a number of previous seasons (1998-1999, 2001-2002 and 2004-2005) but no successful breeding had taken place. During this current survey the area was covered intensively on foot. This location is only one of two known sites in Oman where eyries are constructed on cliffs.

This eyrie, on a low cliff, had fresh sprigs of *Salicornia* sp. The skull of a Rüppell's Fox *Vulpes rueppellii* was found at the nest – the first time that this prey species had been recorded (Brown and Gallagher, 1981; Oman Bird Records Committee database.)



Nest of Golden Eagle *Aquila chrysaetos*, 11 February 2010. One of three known cliff sites in Oman.



Same nest showing fresh *Salicornia* sp.

A second eyrie was found but had no sign of recent use.

A single *Aquila* eagle was seen at 12.00, circling on thermals towards the main Adam – Haima road and was presumed to be a male Golden Eagle holding territory.

## Site 2

12<sup>th</sup> February 2010. The old nest in a small area of *ghaf* trees had been visited in 1998/1999, 1999/2000 and 2000/2001 but on each occasion there had been no evidence of breeding and no adults had been seen. On this survey visit it was noted that one half of the nest had collapsed because of a broken branch. There was no evidence of breeding or recent activity and it appears that the unsuccessful breeding attempt in 1996/1997 (cold eggs in December 1996) was the last occasion when the eyrie was used.

Further exploration northwards along the sandy wadi revealed a new eyrie three kilometres approximately from the original nest. This was in one of the fairly large isolated *ghaf* trees in the middle of the wadi. Two adults were present in a nearby tree at 17.15 on 11 February but were not seen on 12 February. When the nest was examined at 09.30 on the 12th, it was found to be empty; there was no fresh greenery and there were no egg shells to indicate possible predation and no sign of any food scraps to indicate that young had fledged earlier than usual. The two adult birds were clearly holding territory which is likely to hold breeding birds in the future - the site needs to be checked regularly.



Non-active nest in a *Prosopis cineraria* (Arabic Ghaf) tree, at Site 2, 12 February 2010.

### **Site 3**

12<sup>th</sup> February 2010. This is an area of small shallow wadis and low hills with small to medium sized *ghaf* trees; the area was extremely dry and the trees and bushes were under severe stress. We surveyed the broad wadi north from the road as far as 21°24.01' N, 56°11.81'E where the trees were smaller, thinner and further apart. No nests, new or old, were found in any of the trees and no suitably high cliffs were found in the area.

Jens and Hanne Eriksen surveyed the area in December 1999 (adult sitting on two eggs), January 2000 (two chicks still covered in down) but in January 2001 the nest tree could not be found (OBRC database). It is possible that the regular bedu practice of cutting off the fresh green branches for fodder for livestock had caused the tree to die away completely – particularly if there had been little or no rainfall in the area. It is strange, however, that no evidence of the old nest was found either in 2001 or in 2010 – where this had occurred elsewhere the remains of the very often massive nest were on the ground nearby.

No Golden Eagles were seen in the area during the current survey and it would seem that this territory is not currently occupied although it still appears potentially suitable..

### **Site 4**

23 February 2010. The wadi was checked from the northern end. The trees are very thin and spindly and there are a number of permanent settlements in or on the sides of the wadi. An adult Golden Eagle was seen soaring (approximately 55km from the nearest known site).

### **Site 5**

12 /13<sup>th</sup> February 2010. One Golden Eagle nest was located. No new greenery and one side of the nest had collapsed; it appears that this nest has not been used for several years. The last time that this nest was used was in the 1993-1994 season when breeding was noted by Mike Brown on 23 December, 1993. Visits were made by Ian Harrison in February 2001 and January 2005. A single eagle was seen on the 2001 visit but not in 2005 and there was no fresh greenery at the nest site on either occasion. IH conducted a foot search in January 2005 but no new site was found. On the current survey visit we searched extensively by vehicle and on foot but no new sites were found.

It was noted that there was a lot more human activity in the area than on previous visits – for example there was a major encampment and watering point with a large number of camels present and increased grazing activity.

It would seem that this Golden Eagle territory is not currently occupied although it certainly appears potentially suitable.

### **Site 6**

21<sup>st</sup> / 22<sup>nd</sup> February 2010. This area consists of sand dunes rising above gravel plains with a number of “fjords”. We crossed from one group of dunes to another either over sand spurs or along the gravel plain where the dunes were isolated. The following were located:

- a) One old Golden Eagle nest. Eight Brown-necked Raven nests in five of the other trees including two in an isolated *ghaf* tree south-west of the main group of trees. Striped Hyena *Hyaena hyaena* tracks noted.
- b) A single largish *ghaf* tree with a small tree next to it contained a raven nest. All the trees were checked on the north side of the gravel plain.
- c) An old Golden Eagle— no evidence of recent breeding; the nest was dry and dusty and very flat.
- d) A Golden Eagle nest. Good condition, fairly fresh grass, probably but not definitely, this season, 2009/2010. It is recommended that this site be checked in subsequent years.

#### **Site 7**

14<sup>th</sup> February 2010. There are two trunk spurs remaining of the single lone *ghaf* tree. The large nest had been recently lined with wool but it was unclear whether this been done by an eagle or a raven although no Brown-necked Ravens were in fact seen in the area. This site may have been last used in 1991/1992 – a bird flew off the nest in December 1991 but the last proved breeding was in February 1989.



Site 7. 14 February 2010; the only suitable tree for many kilometres but unfortunately no longer active. One of the original two nests found in 1980-1981.

#### **Site 8**

14<sup>th</sup> February 2010. A large former eagle nest was checked; it had collapsed on one side and had possibly been used in recent years by a Brown-necked Raven. There was no

evidence of any breeding by eagle or raven on this visit and it would seem that the last recorded breeding events occurred in 1983-84 and 1984-85 at this site.

#### **Site 9**

Coordinates of a previously recorded site were visited but there was no evidence of any nest in any of the comparatively small trees in the area. Four Booted Eagles *Aquila pennata* were the only raptors seen.

The following sites were visited on 15 February 2010.

#### **Site 10**

We spent some time walking along the top and along the base of cliffs but no signs of nesting or perching posts were found.

#### **Site 11**

There was the only possible site for a nest in the area. The previously recorded 2004 eagle nest therefore still needs to be relocated.

#### **Site 12**

We surveyed the large trees in the area (mainly *Acacia* sp.) but no nests were found of either eagle or raven (and no ravens seen).

#### **Site 13**

An old largish nest in a *ghaf* tree at with no sign of current or recent breeding attempts – no wool, no fresh greenery. A second nest was narrow and elongated and possibly built up high on top of an eagle nest and was thought to be a Brown-necked Raven nest – there was a single raven in the vicinity. Two Golden Eagle chicks had been found at this site in February 1997.

#### **Site 14**

An old eagle nest in the single tree in the area; no evidence of breeding. Last recorded breeding 1997-98 (one chick).

The following sites were visited on 16<sup>th</sup> February 2010.

#### **Site 15:**

Two *ghaf* trees at this site. Tree 1 contained a large nest with rags and baler twine in the cup but there was no evidence of recent breeding. Tree 2 contained two raven nests, one high up and one lower down about 3m above the ground.

#### **Site 16**

Two large nests in one *ghaf* tree. The lower one had collapsed but the upper one had fresh greenery, polythene bags, rags. There was, however, no evidence of definite recent breeding – no egg shells or prey items. There was a lot of 'splash' on the ground on the shady south/south-west/west side of the tree. Two eggs were laid in 1999/2000.

#### **Site 17**

Two *ghaf* trees, one with a probable old eagle nest but which now looks like an inactive raven nest.

**Site 18**

One massive eagle nest in a lone, smallish *ghaf* tree. Two adult Golden Eagles took flight when about 750m away from the tree – they circled upwards and then disappeared. Faded greenery on the nest (although definitely this season's decoration, there was nothing very fresh) plus plastic bags and rags. There was no evidence of breeding or of predation although egg theft presumably cannot be ruled out. 'Splash' on the ground under the tree. One chick was raised in 1996/97 and in 1999/2000 at this site. It would seem that this territory is still active although breeding does not appear to have taken place this season; the site certainly needs checking in subsequent years.



Nest site in a comparatively small *Ghaf* tree 16 February 2010.

**Site 19**

One small ghaf tree with a raven nest. Two other trees in the area – one very spindly and one with a raven nest. An adult Golden Eagle and a chick were seen at this site on 1 February 1998 but neither of the nests found on this occasion were big enough for Golden Eagle.

**Site 20**

This is a woodland area of very degraded habitat and many dead trees; no vegetation under the trees – having been eaten by the many goats from the nearby village. All the trees were checked but no nest was found. An adult Golden Eagle was seen on a perching post. It was very reluctant to fly and it circled over the woods before coming in again to a different tree on the west side of the wood. IH saw a single adult in more or less the same location on 3 December, 2000. Breeding took place in 1993/94 and

1994/95 at this site (although there is potential confusion with names of this and another woodland site which are also mentioned in the breeding notes for the site).



Site 20: 16 February 2010.

#### **Site 21**

One adult Golden Eagle flew from a perching post at 17.00 and headed down the wadi. The following morning at 08.00, 17 February, it was perched on a nearby headland. The rest of this area was checked during the day but no further signs of eagle were seen, but it is considered worth surveying in future years.



Site 21: A single Golden Eagle seen on perching posts 16 & 17 February 2010.

**Site 22**

17<sup>th</sup> February 2010. Many mature *ghaf* trees with settlements on the south-east and north-east sides of the woods. All the trees were checked but no nest found and no eagle seen. An old known nest site could not be found – the tree appeared to have been bulldozed for the laying of a pipeline or for road improvement.



Site 22: 17 February 2010. Compare the vegetation with Site 20, above.

**Site 23**

17<sup>th</sup> February. A disused Golden Eagle nest in a single *ghaf* tree among the *Acacias* sp. contained old rags and bits of inner tube but no fresh or faded greenery.

Further up the wadi were two large *ghaf* trees about 100m apart with a large nest in the northern one of these. Two well fledged chicks – wings well feathered and some white feathers on the breast – were on the ground tied to the base of the tree with electricity cable and rope. The Ministry of Environment and Climate Affairs as well as the Oman Bird Records Committee was alerted and we were informed that the local rangers from the Ministry visited the area in order to talk with the local *bedu* and to try to ensure that the young birds fledged. We do not have information on whether or not this action was successful.



Site 23: 17 February 2010. The only successful Golden Eagle breeding site in Oman 2009-2010. Note the many vehicle tracks and the two young eagles tied to the left of the tree.



Site 23: 17 February 2010. Releasing the two young eagles; they were still being fed by the adult birds and would probably have been free flying after about another seven to ten days..

#### **Site 24**

18<sup>th</sup> February 2010. Three nests were found and checked.

- a) No signs of recent use of this nest in a very climbable tree.
- b) A double nest – the upper one built on the lower collapsed one. Fresh greenery round the lip of the nest (*salicornia* sp.) but no evidence of breeding. A ladder was necessary from the top of the vehicle to inspect the nest.
- c) An old nest – a large flat platform – with no greenery and no evidence of breeding.



Site 24. 18 February 2010. A typical nest site in a small area of mature *Prosopis cineraria*. Last used 2004-2005.

**Site 25**

18<sup>th</sup> February 2010. Three trees checked – no nest and in fact only one tree is a potential nest tree.

**Site 26**

18<sup>th</sup> February 2010. This long-standing Golden eagle site is now a very sad sight – ironically this where the BBC filmed breeding Golden Eagles in December 1996 with Hanne Eriksen. Most of the large trees are dead or dying through a combination of severe pollarding (cutting of young branches to give as fodder to goats or camels) and the probable lack of underground water. That said, smaller trees and bushes are surviving but it will take decades for these grow to any height. It is hoped that good rains in the area will help the surviving large trees to regenerate but further branch cutting for fodder will only make the situation worse again.

There is also a lot of evidence of seismic survey activity round and in the middle of the area; the thousands of tracks include, obviously, the large tracks from the seismic vehicles but more importantly include smaller tracks of the support vehicles which seem to be literally everywhere. The large tracks of the seismic vehicles cause comparatively little damage since they follow a number of fairly narrow transects – it is the seemingly random driving of the support vehicles which has flattened much of the vegetation and moreover, has severely compacted the soil. When rains do come, the water will not be able to permeate the compacted soil and will run off further down the wadi meaning that the stressed trees will not get the water they need.

The whole area was checked. There had been two nest trees previously known, the territorial pair having built a new nest in 1996/1997 but on this occasion the only nest found was on the ground having fallen from the broken branches.

It is worth checking the area in subsequent years given the successful breeding history here, but for the time being at least, the site does not hold a breeding pair of eagles.



Site 26: 18 February 2010. Note the large number of heavy vehicle tracks and the extremely degraded habitat.

**Site 28**

Three areas were checked on the 18<sup>th</sup> February 2010.

- a) Brown-necked Raven nest. No nest in the other trees.
- b) No nests.
- c) Brown-necked Raven nest – bird sitting.

**Site 29**

18<sup>th</sup> February 2010. A large wadi with many small sand dunes and many *ghaf* trees. All trees checked. No Golden Eagle or Brown-necked Raven nests. One raven seen.

**Site 30**

19<sup>th</sup> February 2010. A long wide wadi with many mature trees; two farms/settlements and a concrete block factory. There was also a new oil pipeline being driven through the area – with the usual hundreds of large and small vehicle tracks damaging the habitat. A sub-adult Golden Eagle had been seen from the road on 20 February, 2000 but no birds were seen on this occasion. An old eagle nest was located in a semi-dead *ghaf* tree but it was impossible to estimate when this had last been used.

### Site 31

21<sup>st</sup>/22<sup>nd</sup> February 2010. Two nests had been reported with photographic evidence by a seismic survey crew in March 1997 (precise dates of nest location uncertain). It is unwise to visit this area in a single vehicle so the nest sites had not been checked since 1997. (It should be noted that our two vehicles had three major punctures and two slow punctures in the day and a half we spent in the area, the sharp bushes puncturing the sidewalls as well as the bottom of the tyres. Two spare tyres on each vehicle are essential.) It took about three and a half hours to get to the first site from the graded road and a further hour to get to the second site.

The first nest had been found in a *Calligonum crinitum* bush (one chick). The vehicles were left at the coordinates given by the seismic survey crew, and all potential *Calligonum crinitum* bushes checked in a square approximately 2.8km by 2.8km with the vehicles at the centre of the square. This was done by walking the whole area - potential bushes outside the square were scoped. No nests or any evidence of breeding were found.

The second nest had been found in a *ghaf* tree. The lone tree was located and no other trees were in sight from our vantage point on the high dune. There was a large platform about 1.5m above the ground but with a raven nest with fresh rags and paper on the top of the tree – a single raven was seen flying round the area and two birds seen the following morning. There was fresh ‘splash’ (raven probably) and a number of bones on the ground. It would seem that this territory is no longer used.

It is of note that when the two nests were found in 1997, they were only 6km apart; either the territories overlapped or both nests were on the edge of the respective territories.

## RESULTS 2014

### Site1

Visited 4 February 2014. Both nests found in 2010 were still present. The first nest had been decorated with fresh *Salicornia* sp. and grass and there was a lot of ‘splash’ on the edge of the site. There were the remains of one egg as well as prey remains, including two or three large lizards, indicating that the nest had been used in one of the breeding seasons since 2009-2010. However, although fresh greenery had been added this year, it was not possible to determine when exactly breeding had occurred at the site.



Prey remains at Site 1, 2014.

The second nest found was still present but empty. It had a small amount of grass added but no other signs of use.

As in 2010 an eagle was seen from the main road nearby.

#### **Site 2**

4<sup>th</sup> February 2014. The remains of the old nest, three-quarters collapsed, was still present and the second nest found in 2010 was also still present but with no signs of it having been used since 2010. No birds were seen in the area.

#### **Sites 5 & 6**

5<sup>th</sup> February 2014. A very old nest, falling apart, was still present with no signs of use since 2010. We were not able to access other previously visited sites in this area due to much drifting sand and very little recent human use. Track crossings of dunes had disappeared and the top of the central valley was now full of embryo dunes across previously used tracks.

#### **Site 14**

5<sup>th</sup> February 2014. The remains of a very old nest was still present in a tree with no signs of recent use. There is another nest, probably ravens, higher up in the tree but again not in current use.

#### **Site 16**

6<sup>th</sup> February 2014. A partially collapsed nest is still present with no signs of recent use. Another tree contained two nests. A lower one was partially collapsed but an upper nest

was still intact. Although this nest showed signs of use in 2010 there were no signs in 2014. No new twigs had been added, there was no greenery and no splash.

**Site 17**

6<sup>th</sup> February 2014. A tree with two nests was found in 2010. Both of these nests were still present. The upper one was an active raven's nest this year; the larger nest below was still intact but with no signs of any use since 2010.

**Site 18**

6<sup>th</sup> February 2014. A very large nest present and although empty there was some faded greenery which was probably this year's indicating presence of birds. No other sign of occupancy.

**Site 20:**

6<sup>th</sup> February 2014. No nests or birds seen. The area was very heavily grazed and disturbed.

**Site 21**

6<sup>th</sup> February 2014. A large nest was present in a cave high up on the cliffs just below the site where an eagle was seen perched in 2010. The nest was decorated with rags and plastic. No birds were seen and as the nest was inaccessible it is impossible to know if it has been recently used. This is now the third known cliff site.



Cliff nest site at Site 21.

**Site 24**

7<sup>th</sup> February 2014. This site has three trees with old nests – the only large trees the area. An eagle flew off as we approached the site. A nest with one large downy chick was found. There were no signs of recent human activity around the site and the fact that the bird flew off when we were some distance away indicates there is little regular disturbance here.



Chick in nest at Site 24

#### **Site 26**

7<sup>th</sup> February 2014. A 'new' nest that was not present in 2010 was found. There were no signs of current use, although an eagle was seen the site shortly after we arrived. Remains of encampment immediately below the tree. No remaining signs of the collapsed nest found in 2010.

#### **Site 23**

7<sup>th</sup> February 2014. The tree with the nest found in 2010 appeared to have lost some branches so that the nest is now more exposed, but there was a nest nearby. A sitting eagle flew when we approached the nest on foot and were about 50m from the nest. The nest was well decorated with rags. To minimise disturbance we did not climb the tree so the contents of nest are unknown but one can safely assume eggs or, more likely, chick or chicks. The fact that the bird only flew when we were so close indicates that they are used to disturbance. There is a large encampment c500 metres away although it appeared unoccupied and there are no signs of current activity or grazing in the general area.

There is another old nest further down the wadi but the tree is now within an encampment (currently unoccupied) and is therefore unlikely to be reused.

#### **Site 22**

7<sup>th</sup> February 2014. As in 2010 no signs of a nest were found and no birds seen. The vegetation present in 2010 had all been grazed off. Compare photo below with that above in the 2010 results.



Site 22 - 2014

**Site 31**

7<sup>th</sup> February 2014. The remains of a nest were still present in a tree but there were no signs of any recent use. The tree is partially dead offering no shade to the old nest. There is much human activity in the area.



Nest examination 2014

### Summary of 2010 and 2014 surveys

Site	2010	2014
<b>1</b>	Previously known nest with fresh greenery but no evidence of successful use.	Greenery, old eggs and old prey items plus splash present but unclear if in use 2014.
	Alternative site to above – no recent signs of use	As 2010
<b>2</b>	Old nest present – no sign of use.	Nest partially collapsed.
	New nest found. Birds present but no signs of breeding.	Nest still present but no sign of use and no birds.
<b>3</b>	Potential area with previous records but no nests found.	Not visited
<b>4</b>	No previously known nests but an eagle seen.	Not visited
<b>5 &amp; 6</b>	Old nest that shows no signs of use for some years	Nest still present but in state of collapse
	Old nest with no signs of recent use	Not visited due to drifting sands making access impossible
	Old nest with no signs of recent use	Not visited due to drifting sands making access impossible
	Fairly fresh nest with some greenery added this or last season	Not visited due to drifting sands making access impossible
<b>7</b>	Old nest with wool lining, possibly by Raven	Not visited
<b>13</b>	Old nest with no signs of recent use.	Not visited
	Old nest with no signs of recent use	Not visited.
<b>14</b>	Old nest with no signs of recent use.	Nest still present but not signs of use.
<b>15</b>	Old nest with no signs of recent use.	As 2010.
<b>16</b>	Nest with no sign of recent breeding but 'splash' markings present.	No signs of any use or added material since 2010.
<b>17</b>	Very old nest with no signs of use	Nest still intact but no sign of use.
<b>18</b>	Nest present with decoration and pair of eagles present but no	Some faded greenery which was probably this years indicating presence

	sign of breeding.	of birds. No other sign of occupancy.
19	Old nests but small – probably ravens	Not visited
20	No nest found but adult eagle present.	No birds seen and area very disturbed.
22	Old site – nest not found	No nest or birds seen
23	Not present	Occupied nest, contents unknown.
	Nest with tethered chicks	Nest unoccupied.
24	Old nest	Old nest
	Old nest	Nest with one chick present
	Old nest	Old nest
26	Old nest fallen from tree	'New nest but with no signs of recent use.
31	Old nest	Not visited.

## DISCUSSION

As Golden Eagles are sporadic breeders and may not breed in years where poor conditions prevail (for example, shortage of prey species or adverse weather conditions) it may be the case that 2009-2010 was a poor year. However, we would have expected to have seen more birds on territory even if not breeding and it is worrying that so many sites were vacant with no signs of recent nest use. The results of the 2010 survey, albeit over only one breeding season, therefore indicated an alarming decline in the Oman Golden Eagle population. The 2014 survey showed no improvement. While two successful nests were located, single birds were seen in only two locations as opposed to two non-breeding pairs in two locations and a further three single birds seen in three locations in 2010. (To summarise, only six adult eagles were located in 2014 with two nests found, while nine birds with only one active nest were located in 2010 – compare with the eight active sites as late as 2000.)

There are a number of possible reasons for this. First, there is obvious increased disturbance because of oil-related activities (seismic surveys, pipeline maintenance), road building/maintenance, larger numbers of goats, sheep and camels, more vehicles, more development; there are simply many more people and activities in the central desert. Indiscriminate driving over and through fragile eco-systems damages vegetation, compacts the ground, kills invertebrates, destroys cover for mammals – all this has a knock-on effect on Golden Eagles.

Second, there is a possible decrease in food supply – although there is no evidence either way to support this. Anecdotal evidence based on a decline in the number of road kills observed indicate a decline in the number of prey items such as Spiny-tailed Lizard *Uromastix* sp, Cape Hare *Lepus capensis*, Ethiopian Hedgehog *Paraechinus aethiopicus*. Further research would be useful.

Finally, the most worrying development is that the 2010 survey provided evidence that Golden Eagle chicks are being illegally taken from the wild. We assume that once the adults were beginning to feed the chicks less often and once the chicks were almost ready to fly, they would be taken off for sale, probably to the Emirates but possibly also to locations within the Sultanate. They would be put in private aviaries/zoos or possibly taken further to Kazakhstan, Mongolia, China where Golden Eagles are used for hunting.

This is a very worrying development in Oman – while it is known that attempts to export Oryx and gazelles to the Emirates, sometimes successfully, have been made, this is the first time that we have reason to suspect that birds are being exported.

Given that there was only one successful breeding pair in the 2009/2010 season in the whole of the Sultanate, and that in 2014 only two potentially successful nests were located, with also an apparent decrease in the number of adult birds, the future of the Golden Eagle as a continuing breeding species in Oman seems very much in doubt.

## REFERENCES

Cramp S and Simmonds KEL. 1980. Birds of the Western Palearctic. OUP.

Gallagher, M D & Brown, M R (1982) The Golden Eagle Breeding in Oman, Eastern Arabia. *Sandgrouse* 4: 100-106

Watson, J. 2010 The Golden Eagle (2nd Edition) Poyser.

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