On the distribution and ecology of the Lesser Kestrel *Falco naumanni* in Armenia

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Plate 1 (left). Adult male Lesser Kestrel, May, Armenia. © *Vasil Ananian*

Plate 2 (right). Adult female Lesser Kestrel, May, Armenia. © *Vasil Ananian*

Although global distribution and various aspects of the ecology of the Lesser Kestrel *Falco naumanni* are relatively well covered in the literature (Dementiev & Gladkov 1951, Cramp & Simmons 1980), little is known about the species from Armenia (Plates 1 & 2, Figure 1). The Lesser Kestrel is one of the most endangered raptors in the Western Palearctic and has dramatically declined throughout its range during the last few decades (Ferguson-Lees & Christie 2001). The species has apparently undergone similar decline in Armenia, as in historical sources it is reported as more widespread and common in the country. The present study describes recent observations at a breeding colony, as well as summarizing all available information from Armenia. The paper is based mainly on opportunistic observations.

HISTORY

The first reports of Lesser Kestrel from Armenia and adjacent areas of Turkey, Georgia and Azerbaijan were reviewed by Lyaister & Sosnin (1942). They cited various works on the Caucasian avifauna since the late 1870s and mentioned reports on presence of the species in the middle and lower course of the Kura and Arax rivers and the Javakheti plain (SW Georgia). They also reported the falcon to be common on the Armenian plateau (which extends especially over the Eastern Anatolia region of Turkey) and listed the discovery of large colonies in NE Turkey. In addition to reviewed literature, Lyaister & Sosnin (1942) described their own information from Armenia, including breeding evidence. Dahl (1954) briefly summarized the distribution and status of Lesser Kestrel in Armenia, based primarily on the book by Lyaister & Sosnin (1942) and other early works. There were very few subsequent records from Armenia (Adamian & Klem 1999) until recent years. The latter authors noted an observation of a copulating pair in 1995. A breeding colony in Syunik province was discovered in 2000 (Ananian *et al* 2002) and five years later another, smaller, colony was found in the same area, both on buildings (pers obs).

METHODS

Since its discovery in 2000, the first colony (colony A) in Syunik near Gorayk village, has been regularly visited throughout the breeding season as part of the itinerary of birdwatch-

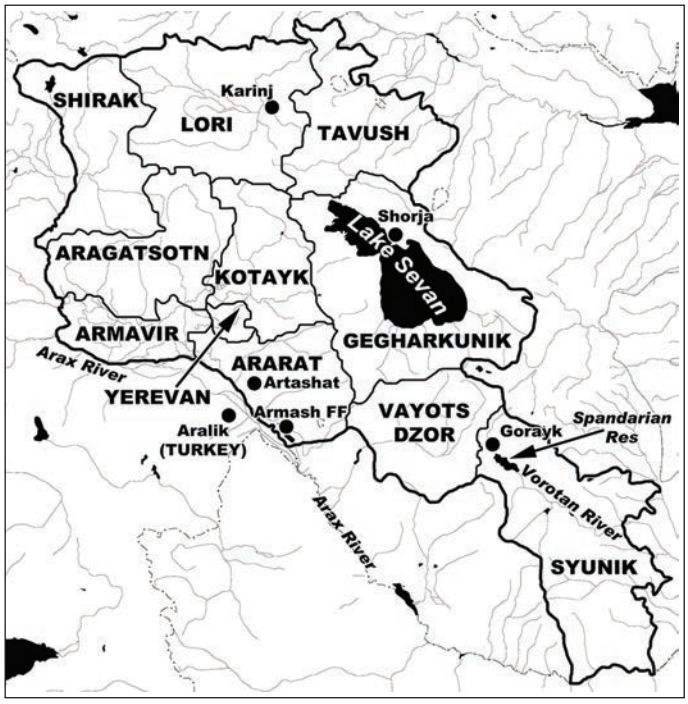

Figure 1. Map of Armenia showing provinces and key locations mentioned in the text. © *Vasil Ananian*

ing tours and during general ornithological surveys in the province. Visits were usually combined with other studies and time spent near and in the vicinity of the colony varied from 0.5–4 h at various times of day. Prey items were identified visually *in situ* or later by examining photographs and pellets. The content of some accessible nests was not examined to avoid unnecessary disturbance. Birds at the second colony (colony B) had to be observed and counted from a distance as the colony is in a military camp.

Unpublished observations by foreign and local birders, all individual records from the last nine years (partially so for 2006) and published data on the Lesser Kestrel in Armenia are summarized.

DISTRIBUTION AND POPULATION

In the early 1900s Lesser Kestrel was reported to be common, and locally a very common breeder, in the Arax valley from Aralik village (Igdir province, E Turkey), Yerevan and its outskirts, and south-eastwards through Nakhichevan and north-east to the Jabrayil district of SW Azerbaijan (Lyaister & Sosnin 1942). In the breeding season, it is still occasionally observed in the Arax valley, but there is no modern-day proof of breeding there. Thus, in Ararat province (Figure 1) one bird was recorded near Artashat town on 7 May 1995 and another was at Armash fish farm on 21 May 1995 (Adamian & Klem 1999). A pair was seen at the Armash fish farm in late June 2005 (pers obs & Birdquest). In the same general area, a few kilometers SE of Armash, a flock of *c*20 birds, including males performing courtship feeding behaviour, was observed near an abandoned construction in mid-April 2006 and in May 2007 (K Aghababyan).

Dahl (1954), repeating a statement by Lyaister & Sosnin (1942), listed Lesser Kestrel as breeding in the Lake Sevan basin, but without details. This was possibly based on a single juvenile collected by GV Sosnin on 17 August 1938 near Shorja, NE shore of the lake. There have been surprisingly few records since, until recent times. Adamian & Klem (1999) listed a single individual for 1958, two sightings for 1993 and *c*43 records for 1995. Those observations in 1995 that suggest probable or possible breeding in other parts of Armenia include a record of copulating birds near Karinj in the east of Lori province, two birds on 8 May and three on 28 May in the north and south of Kotayk province respectively, one bird on 12 May in the SE of Aragatsotn province, one bird on 12 June in the NW of Gegharkunik

province and 1–15 individuals counted during 8–10 August in the NW of Shirak province (Adamian & Klem 1999). Breeding bird surveys at the latter area during April–July 2008 produced no records of the species (pers obs). Adamian & Klem (1999) considered the number of breeding pairs in Armenia to be 50–100 but this seems to have been a considerable overestimate.

The two colonies recently found in the NW of Syunik province, situated *c*7 km from each other, are the only known breeding sites in Armenia since 1928. Interestingly, two single individuals were recorded in that same general area on 19 May 1995 (Adamian & Klem 1999), suggesting that Lesser Kestrels possibly bred there before 2000. The size of colony A was estimated as *c*15–20 pairs in 2000 (Ananian *et al* 2002) and has apparently remained relatively stable since, although proper nest counts were not performed 2003–2005, and number of pairs was estimated from the count of adult birds. In 2007, there were at least 17 active nests at this site. At colony B, during the peaks of breeding seasons 2005–2008, *c*8–10 birds were always detectable perched and flying near the nesting site. The currently known breeding population of Lesser Kestrel in Armenia seems to be at least 17–20 pairs. Other breeding colonies may well exist.

On spring and autumn migration, Lesser Kestrel is still not uncommon in the lowlands and mid-elevations and occurs across most of Armenia, but seems to avoid wooded massifs in the NE and SE of the country. Migrating birds are usually recorded in groups of 1–15 individuals, but autumn parties not infrequently comprise 30–50 individuals (Lyaister & Sosnin 1942, Adamian & Klem 1999, Ananian *et al* 2002, K Aghababyan pers obs, VA pers obs).

PHENOLOGY

Spring migration of Lesser Kestrel appears to occur in Armenia from the last week of March at the earliest (Lyaister & Sosnin 1942, Dementiev & Gladkov 1951, VA pers obs), though Adamian & Klem (1999) listed a single report for 6 March. Spring passage of the species in the country takes place mainly in the first half of April though some birds apparently continue through to the end of the month (Ananian *et al* in prep). Autumn passage is observed from mid-August and continues to the last week of October, with the highest numbers reported throughout September (Lyaister & Sosnin 1942, Adamian & Klem 1999, VA pers obs).

The first local breeders are found at their breeding sites in Armenia from late March, when migrant birds are still on passage in the country. Thus, Lyaister & Sosnin (1942) reported occurrence of several pairs at a breeding site in Yerevan on 26 March 1930. In 2008, the first birds were seen at colony A on 29 March (K Aghababyan). At this site, arrival of breeders is apparently unsynchronized, as the maximum number of breeding pairs is not observed before 15–25 April in most years.

Likewise, the egg-laying period is equally prolonged in Armenia. In Yerevan (*c*1000 m asl), two clutches were collected on 14 May 1928, one of which consisted of three recently laid eggs, and the other had five eggs at an advanced stage of incubation (Lyaister & Sosnin 1942). The copulating pair near Karinj village (*c*1100 m asl) was observed on 9 May 1995 (Adamian & Klem 1999). At colony A (2164 m asl), copulation was recorded on 8 May 2008. At this colony, judging by the observations of downy nestlings (observed at the mouths of some nest holes), fledglings and dependent juveniles in some years, it is estimated that eggs are laid by various pairs there from the last week of April and throughout the first three weeks of May. These limited data, suggest that nest-site altitude has little or no influence on the timing of Lesser Kestrel breeding in Armenia.

At colony A, juveniles hunting in parties with adults are observed on average from mid-July onwards, while on a few occasions some fledglings with incompletely grown flight feathers are still found at the end of July. The birds are still attached to and visit the breeding site until at least about mid-August. Certainly, they are absent from the site from the second week of September, when possibly the same local breeders are found dispersed over the general area within several kilometers of the breeding site (pers obs).

HABITATS

During spring and autumn migration in Armenia the species uses a variety of habitats. It is seen in semi-deserts, arid mountain steppes, meadow-steppes and not infrequently observed in subalpine meadows, when crossing mountain ridges. Most often it is observed at *c*800–1500 m asl. Migrating Lesser Kestrels are attached here to open terrain, cultivated fields, flat or gently sloping and predominantly rocky areas sparsely covered with xerophytic scrub and vegetation, such as buckthorn *Rhamnus* sp, camel's thorn *Alhagi* sp, milk vetch *Astragalus* sp and wormwood *Artemisia* sp (Plate 3).

In the past, Lesser Kestrel was reported to breed primarily in semi-deserts and in small numbers in mountain steppes in Armenia (Dahl 1954). The two Syunik colonies are found on a highland plateau. The plateau is crossed by the Vorotan river, which is fed by several tributaries. The river valley is dominated by spurs of the Zangezur range on the west and south and by the Syunik upland on the north. There are a few man-made reservoirs in the Vorotan valley, and colony A is found near the northern bank of the largest of them, the Spandarian reservoir (Figure 1). The reservoir is at *c*2050 m asl, while the highest points of the surrounding mountains are at 2988 m asl (Mt Amulsar), 3093 m asl (Mt Siskatar) and 3221 m asl (Mt Bazenk). The relief around the reservoir is relatively gently sloping and is irregularly indented by ravines and the Vorotan tributaries descending down into the reservoir. The original vegetation around the

Plate 3. Transition zone between semi-desert and arid mountain steppe in the Arax river valley, a typical habitat in Armenia used by Lesser Kestrels on migration. © *Vasil Ananian*

Plate 4 (left)**.** Environs of the Lesser Kestrel breeding sites, Vorotan river valley near the Spandarian reservoir, Armenia. © *Vasil Ananian*

Plate 5 (right)**.** View from the Lesser Kestrel breeding tower, colony A, late April, Armenia. © *Vasil Ananian*

Left, top to bottom

Plate 6. The Lesser Kestrel breeding tower, colony A. The nests are situated along the edge of the main roof of the building as well as under the roof of the entrance with green doors. © *Vasil Ananian*

Plate 7. Female near nest entrance, main roof of the tower, colony A, April. © *Vasil Ananian*

Plate 8. Building situated near the main breeding tower, colony A. Lesser Kestrel nests are found in the larger holes of the concrete roof (mostly entered from larger entrances on the rear side), while some of the smaller-diameter holes are occupied by Common Starling. © *Vasil Ananian*

Spandarian reservoir is a meadow-steppe with associations of predominantly fescue *Festuca* spp, herd's grass *Phleum* sp, barley *Hordeum* sp, sedge *Carex* sp and clover *Trifolium* sp. Rose *Rosa* sp bushes are common in the area, particularly along the streams, in the ravines, near rock exposures and patchily in talus areas. In the Vorotan valley, at the Spandarian reservoir, there is a sparse stand of willow *Salix* sp trees and a few small man-made fish ponds fringed with reeds *Phragmites* sp. Large areas of the original landscape of the Vorotan valley are under agriculture and used for cereal cultivation and potato fields. Steeper parts of slopes up to the subalpine meadows are used for hay and pasturage (Plates 4 & 5). Average air temperature in the Spandarian reservoir area is 2–4° C in April and 12–14° C in July. Precipitation is 300–500 mm, April to October, with 50–100 mm July–August (Valesyan 2006). Patches of snow remain around the breeding site up to mid-April, while night frosts and hail are not uncommon even in summer.

The Syunik colonies, one of which is at 2345 m asl, are perhaps some of the highest known breeding sites in the Western Palearctic. The species is known to breed up to 2200 m asl in the Kopet Dag, Turkmenistan, and up to 3000 m asl in the Tien Shan (Dementiev & Gladkov 1951, Cramp & Simmons 1980).

NEST SITES

In Armenia, the Lesser Kestrel is reported to breed in holes and cavities of clayey cliffs,

on buildings, and in fissures in rocks and walls (Dahl 1954). The two nests found in Yerevan in 1928 were situated in walls of a building (Lyaister & Sosnin 1942).

Both of the Syunik colonies inhabit *c*18 m tall TV transmitter buildings. At colony A, the birds breed under the metal edge of the main roof (*c*18 m above the ground) of the building and under the roof of the entrance at *c*2 m above the ground (Plates 6 & 7). A few pairs breed in nearby lower buildings, occupying interstices under roofing slates and in horizontal borings in a concrete roof (Plate 8). Entrances of the various nests are, at the closest, *c*30–50 cm apart. Based on a few observations of brief conflicts between birds, it appears that some pairs may have a common entrance to reach their neighbouring nests. An entrance to one of the nests was a narrow vertical hole on the lower surface of the main roof overhang, without a suitable perch near the hole, but birds experienced no difficulties in entering straight in even with a large prey item in the beak.

NOTES ON BEHAVIOUR

In general, social pattern and behaviour observed on our short visits to colony A, *eg* courtship (Plates 9, 10), aerial activity and heterosexual behaviour, seemed largely consistent with Cramp & Simmons (1980). In one breeding season, a first-summer male was regularly seen delivering food to a nest, but it is unknown whether it was feeding its own chicks or assisting in the rearing of young of another pair (see Cramp & Simmons 1980).

The hunting and insect-hawking technique used at colony A is as described by Cramp & Simmons (1980), although insect

Plate 9. Male Lesser Kestrel during courtship feeding, with a Sand Lizard, mid-May, Armenia. © *Vasil Ananian*

Plate 10. The lizard (Plate 9) is then offered to the attracted female, mid-May, Armenia. © *Vasil Ananian*

hunting by walking about the ground and by night near artificial light were not observed. At colony A, the birds obviously preferred to hunt in a moderate to relatively strong wind. During short windless periods many birds remain perched on the tower or other elevated support, but with a gust of wind most or all of the perched birds leave to hunt. Insect hawking and eating in the air was observed in both breeding and migrant birds.

Near colony A, adult birds were never seen to land on a rock or on the ground, except when picking up terrestrial prey. The perches used are electricity pylons and, primarily, antennas and metal constructions on the buildings' roofs, window ledges and the fence around the transmitting station. Higher perches on the buildings are used for roosting. Groups of migrating birds, elsewhere in Armenia, are often found perching on electricity pylons, telegraph poles and wires (Plate 11).

Plate 11. Migrant Lesser Kestrels frequently gather on telegraph poles and wires, September, Armenia. © *Vasil Ananian*

Interactions with other species at colony A was noted for Common Starlings *Sturnus vulgaris* and Western Jackdaws *Corvus monedula*. The Starlings breed in smaller holes and fissures of the same tower and the falcons exhibit high tolerance to the species. Western Jackdaw does not breed at the tower, but small parties are always present around, visiting from nearby Gorayk village where they breed. Lesser Kestrel and Jackdaw were frequently seen perched close to each other in the vicinity of the kestrel nests, but only on one occasion did I observe a faint attempt by a female kestrel with prey in its talons to drive off an interested Jackdaw. Jackdaws were not seen to try to enter the kestrel nests or be mobbed by kestrels, although they were several times noted exhibiting passive kleptoparasitism, collecting fresh remains of kestrel prey (partially eaten or complete rodent bodies) found on the tower roof and near the bottom of the building.

Plate 12. Fledglings of a pair of Common Kestrel *Falco tinnunculus*, colony A, early July. © *Vasil Ananian*

A pair of Common Kestrels *Falco tinnunculus* regularly breeds on one of the buildings at the tower and shares a roof with a pair of Lesser Kestrels (Plate 12), but the only antagonistic behaviour observed between the two species was occasional and brief aerial

pursuits. Outside the breeding season, a mixed migratory party of Lesser Kestrels and Eurasian Hobbys *Falco subbuteo* was observed in September 2000 (Ananian *et al* 2002).

Colony A is exposed to the permanent presence of TV transmitter station personnel. Birds breeding at lower heights on the building invariably exhibit a degree of anxiety when people are seen nearby. The anxiety is accompanied with frequent calls and birds do not enter nests until personnel leave their close vicinity. At the breeding site adult birds of both sexes as well as chicks in the nests are highly vocal and the various calls noted are as described in Cramp & Simmons (1980). Vocalizations were not heard from migrant birds.

FOOD

In Aralik park, Turkey, Lesser Kestrels were feeding mainly on small rodents and lizards (Lyaister & Sosnin 1942). The stomach of a male collected in Yerevan on 3 July 1931 contained 6–7 sunspiders (Solpugidae) sp (Lyaister & Sosnin 1942). According to Dahl (1954), the diet predominantly consists of insects, including locusts, but they also catch spiders, lizards and small rodents.

Prey items taken in Armenia on migration include mantids *Mantis* sp, locust hoppers (Acrididae), bush-crickets (Tettigoniidae) and beetles (Scarabaeidae) (per obs). Vertebrate species taken in the breeding season include Sand Lizard *Lacerta agilis*, a shrew *Crocidura* sp (probably *C. guldenstaedti*, B Sheftel via N Formozov pers comm 2008) and Common Vole *Microtus arvalis* (Plates 13–18). Birds are apparently taken too, but perhaps only exceptionally. I once watched a male carrying a passerine (probably a lark *Alauda arvensis*/*Melanocorypha* sp or Corn Bunting *Emberiza calandra*) to a nest. Many passerines are hit by cars on the highway that passes quite close to colony A, so injured birds could easily be picked up by the kestrels.

The Lesser Kestrel's adaptability to prey abundance in the breeding season (Cramp & Simmons 1980) is well pronounced in Armenia. Early in the breeding season (late March–April) Common Vole is nearly the only prey item observed at colony A. Later, when the weather warms up and reptiles in the area become more active, Sand Lizards (or their tails) are offered to females by males during advertising courtship feeding along with voles. From May, insects are increasingly added to the diet and form the substantial part in July–August, particularly in years of mass emergence of large flightless locusts in the area. Then, pellets consist almost exclusively of chitin (Plate 19). Common Voles appear to be the dominant prey item of the breeding season, followed by locusts and other insects. The pellets (Plates 19 & 20) of Lesser Kestrel are *c*20–40 mm long and *c*15–20 mm in diameter. They are cohesive, laterally compressed, rounded at one end and more or less pointed at the other.

There is abundant prey for kestrels around colony A. Rodent colonies are profuse and widespread in the area, while the large locusts in some years are found at *c*1–3 per *c*9 m^2 densities. On all visits to the site and throughout each breeding season, most of the adult birds were seen carrying food and hunting successfully in the immediate vicinity of the breeding tower and thereabouts. All or at least the majority of individuals appear to be foraging within a radius of no more than *c*1 km from the tower, and are irregularly observed outside this limit. During nestling feeding in mid-June, an adult male was observed to deliver a vole or other prey item to the nest as often as once every 9–13 min, with the longest noted interval between deliveries *c*40 min.

Another indicator of sufficient prey availability is the amount of rodent, and less frequently lizard, remains found at the base of the breeding tower. These remains are commonly found there as complete bodies or their major parts. Many of the rodent bodies examined were beheaded or with just the brains eaten. On several occasions, in the middle

Plate 13. Prey items at colony A include bush-crickets … © *Vasil Ananian*

Plate 14. . . . large flightless locusts . . . © *Vasil Ananian*

Plate 15. . . . Sand Lizard . . . © *Vasil Ananian*

Plate 16. . . . a *Crocidura* shrew . . . © *Vasil Ananian*

Plates 17 & 18. . . . and Common Vole. © *Vasil Ananian*


Plates 19 & 20. Lesser Kestrel pellets consisting mainly of insect chitin (left) and fur (right), colony A. © *Vasil Ananian*

of the breeding season, we have observed how a freshly caught vole, uneaten or with a partially-eaten head, was accidentally or deliberately dropped by an adult Lesser Kestrel, and ignored afterwards, despite it remaining within sight and access of the bird.

THREATS AND LIMITING FACTORS

The reasons for the Lesser Kestrel's apparent decline in Armenia since the early 1900s are not clear. Intensification of agriculture is likely to be the major cause of the decline as elsewhere throughout the species' range. Current post-Soviet farming practices around the Syunik breeding colonies are comparatively less intense. Repair of the breeding towers' roofs would block access for most pairs.

Accessible nests and fledglings of Lesser Kestrels at colony A could be attacked by Stone Marten *Martes foina*, Weasel *Mustella nivalis*, Red Fox *Vulpes vulpes*, Raven *Corvus corax*, Peregrine *Falco peregrinus* and other raptors. Dead young were recorded in the area on two occasions: a flightless chick and a juvenile with fully grown flight feathers were found at the base of the TV tower of colony A. The former had apparently fallen from a nest under the high roof, while the other died of unknown cause and showed no external injury. A juvenile Common Kestrel was found hit by a car on the highway near the TV tower.

Poaching is one of the major threats in Armenia for all breeding and migrating raptors. Although birds of prey are illegal to hunt in the country and are officially protected (Fundamentals of Republic of Armenia Legislation on Nature Protection, adopted by the Supreme Council of the Republic of Armenia on April 25, 1996), they are still shot for taxidermy or collected for other purposes. The location of the Syunik colonies is well known to local birders and zoologists. The TV tower personnel of colony A are informed about the species and 'keep an eye' on them, and access to the areas of the buildings at colonies A and B is restricted.

DISCUSSION

The Lesser Kestrel was not included in the Red Data Book of Armenia (Ayrumyan & Movsesyan 1987). Given its current global and national status, the species should be included in the forthcoming edition and appropriate measures for its protection should be developed and put in practice. One measure that has proved effective in other countries, is to provide the birds with artificial nesting supports through provisioning of suitable breeding towers with nest cavities, nest boxes and clay pots in appropriate habitats within protected areas (Catry *et al* 2007). Preliminary observations of abandoned barns and other constructions in some potentially suitable habitats in Armenia showed that the majority of

these constructions lack suitable cavities. Thorough surveys could reveal hitherto unknown Lesser Kestrel colonies especially in semi-desert and mountain steppe areas. It is particularly recommended that such surveys are carried out within the National State Reserves and National Parks of Armenia.

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