

THE GOLDEN EAGLE IN NORTH CAUCASIA AND TRANSCAUCASIA

ALEXANDER ABULADZE AND JEVGENI SHERGALIN

Bird Conservation Union of Georgia, Chavchavadze 31, Tbilisi 79, Georgia

ABSTRACT.—In the 19th and early 20th centuries, the Golden Eagle (*Aquila chrysaetos*) was reported to be a widespread common species inhabiting highlands throughout Caucasia. At present, it is a rare resident in winter, but it is widely nomadic. Large mountain slopes along river valleys are preferred habitats. An essential requirement for hunting is the presence of open habitats. The upper limit of elevation of breeding individuals is 2400 m, but more typically they are found at <1900 m. The present population is estimated to consist of 220–225 pairs. In the Russian part of northern Caucasia, the population appears to be relatively stable, where by the end of 1990 at least 125 pairs bred along valleys of large rivers at Peredovoi and along the Main Caucasian Ridge and its spurs. Breeding pairs may occur along the Skalistyi Ridge, but it has not been confirmed. The Transcaucasian population is estimated at 75–95 breeding pairs distributed in mountain forests of the Main Caucasian Ridge, its southern spurs, and in the highlands of Lesser Caucasia. The numbers of breeding pairs in the Transcaucasian countries are estimated at 15–25 pairs in Armenia where it is more common in southern areas and possibly as many as 60 pairs in Azerbaijan where there were only 30–45 pairs in the 1980s. In Georgia, not more than 30 pairs occur in the mountain forests of Greater and Lesser Caucasia (Ajara-Imereti Ridge) and at least 60% of the population occurs in the eastern part of the country. Due to military conflicts, there are no recent data from Chechnya, Ingushetia, Dagestan, Karabakh, Abkhazia, South Ossetia, and adjacent areas. The population appears to have declined most seriously from 1940–70. Since then, there does not appear to have been any additional declines. Causes of the decline in the species include a sharp decline in food resources, mortality in traps set for mammalian predators, and disturbance in breeding territories. Due to this, Golden Eagles have been included in the Red Data Books of the ex-USSR, Armenia, Azerbaijan, Georgia, and Russia.

KEY WORDS: *Golden Eagle; Aquila chrysaetos; Caucasia; distribution; conservation.*

El águila real en el norte del Cáucaso y Transcaucasia

RESÚMEN.—En el siglo XIX y principios del siglo XX, el águila real (*Aquila chrysaetos*) era reportada como una especie común y ampliamente distribuida que habitaba las tierras altas a lo largo y ancho del Cáucaso. En la actualidad es un residente raro pero, en invierno, es ampliamente nómada. Sus hábitats preferidos son las pendientes de las grandes montañas a lo largo de los valles de los ríos. Uno de sus requerimientos esenciales para cazar es la presencia de hábitats abiertos. El límite altitudinal superior de individuos durante la reproducción es 2400 m, pero se encuentran más típicamente a <1900 m. Se estima que la población presente consiste de 220–225 parejas. En la parte Rusa del Norte del Cáucaso, la población parece ser relativamente estable, allí al final de 1990 al menos 125 parejas procrearon a lo largo de los valles de los grandes ríos en Peredovoi y a lo largo de la principal cordillera Caucásica y sus estribaciones. Las parejas reproductivas pueden ocurrir a lo largo de la cordillera Skalistyi, pero esto no ha sido confirmado. La población transcaucásica se estima en 75–95 parejas reproductoras distribuidas en bosques de Montaña de la principal cordillera transcaucásica, sus estribaciones sureñas, y en las tierras altas del Cáucaso menor. Los números de parejas reproductoras en los países transcaucásicos se estiman en 15–25 parejas en Armenia en donde es más común en áreas sureñas y posiblemente tantas como 60 parejas en Azerbaijan donde habían 30–45 parejas en los 1980s. En Georgia, no más que 30 parejas ocurren en los bosques montañosos del Gran y Menor Cáucaso (Cordillera Ajara-Imereti) y al menos 60% de la población ocurre en la parte oriental del país. Debido a los conflictos armados, no hay datos recientes de Chechenia, Ingushetia, Dagestan, Karabakh, Abkhazia, Sur Ossetia, y áreas adyacentes. La población parece haber declinado más seriamente de 1940–1970. Desde entonces, parece que no ha habido declinaciones adicionales. Las causas del declive en la especie incluyen una abrupta disminución de los recursos alimenticios, muertes en trampas colocadas para

mamíferos predadores, y disturbios en los territorios de apareamiento. Debido a esto, las águilas reales han sido incluidas en los Libros de Datos Rojos de la ex-USSR, Armenia, Azerbaijan, Georgia, y Rusia. [Traducción de César Márquez y Victor Vanegas]

Based on our long-term studies and observations, this report provides new information on population status, distribution, numbers, habitats, reproduction, and other biological aspects of the Golden Eagle (*Aquila chrysaetos*) in northern Caucasus and Transcaucasia. Until recently, the Golden Eagle has been one of the least studied species of the avifauna of Caucasus. A few short papers have been published on its status in some parts of the region; however, all have been based on casual observations. As a result, information has been scarce and contradictory. No previous long-term work on this species has been carried out within the region.

METHODS

Our research on Golden Eagles was done during the period 1973–99 in the Caucasian part of Russia and the Transcaucasian states of Georgia, Armenia, and Azerbaijan. Data on the distribution, numbers, and biology of the species were collected during field studies, from summaries and analyses of published data, and from unpublished reports. In all, 40 papers containing data on the species were examined. Most of the data were gathered during regular fieldwork in Georgia, western and central areas of Azerbaijan, northern Armenia, and some parts of northern Caucasus (Stavropol and Krasnodar regions, Dagestan).

Field methods are described in Abuladze (1990a). All known territories were checked every year. The diet was analyzed by means of direct observations and by analyzing pellets and remains of prey collected at and around nests. We identified prey remains using prey specimens previously collected in the study area and collections kept in the Institute of Zoology, Tbilisi, Georgia. Data on Golden Eagle numbers in some regions were gathered by local volunteers participating in counts carried out in the 1980s. Due to the unstable political situation and to financial problems, no fieldwork was carried out during the period 1992–94, but work was resumed in 1995.

RESULTS

Distribution and Numbers. The Golden Eagle is considered to be a rare, year-round resident with a restricted breeding range in the north Caucasian part of Russia and the Transcaucasian countries of Georgia, Armenia, and Azerbaijan. The number of Golden Eagles in the area decreased in the 20th century (Red Data Book of Georgian SSR 1982, Red Data Book of the RSFSR 1983, Red Data Book on Fauna of Armenian SSR 1987, Red Data Book of Azerbaijan SSR 1989). During the nesting season, it occurs only in upper forested belts of moun-

tains and alpine meadows in the highlands of Greater and Lesser Caucasus. After the breeding season and in winter, the Golden Eagle is typically nomadic. Its change in behavior is related to its winter feeding habits as well as difficulties associated with hunting of live prey, marked seasonal declines in prey abundance, and unfavorable weather conditions in the highlands. In winter, it occurs in the lowlands, plains, tablelands, semideserts, and floodlands of large rivers, and as a vagrant in coastal wetlands along the Black and Caspian Sea coasts.

In northern Caucasus, breeding pairs of Golden Eagles occur on the slopes of the Skalistyi Ridge, Peredovoi Ridge, and the Main Caucasian Ridge and its spurs. In Georgia, breeding pairs are found on the slopes of the Main Caucasian Ridge and its spurs including Gagra, Bzipi, Chkhaltha, Kodori, Svaneti, Egrisi, Germukhi, Racha, Kharuli, Alevi, Mthiuleti, Gudamakari, Karthli, and Kakheti Ridges and Ajara-Imereti Ridge in Lesser Caucasus (Abuladze 1994, Kutubidze 1985, Zhordania 1992). In Azerbaijan, Golden Eagles occur on the southern macroslopes and spurs of the Main Caucasian Ridge and the Murovdag and Karabakh Ridges in Lesser Caucasus (Mustafaev and Gambarov 1977, Red Data Book of Azerbaijan SSR 1989, Patrikeev 1991, our data). Breeding pairs may occur along the border of Iran in Zuvand and possibly in parts of the Nakhichevan Autonomous Region, but there are no confirmed nesting records. In Armenia, Golden Eagles occur along the Zangezur, Bargushat, Bazum, Pambak, Vardeniz, Gegam, and Megri Ridges as well as Mount Aragats and the Karabakh Plateau (Red Data Book on Fauna of Armenian SSR 1987, Adamian and Klem 1997, our data).

Preferred breeding habitats of Golden Eagles include the watershed areas and upper belts of mountain slopes along valleys of large rivers that are separated by lateral valleys and covered by old forests. Topographically, these areas are very diverse and are typically adjacent to open areas such as large glades and pre-alpine and alpine meadows with rocky massifs and crossed by streams. Breeding sites are usually inaccessible to people. The elevational limits of the breeding distribution range from 700–3200 m, with nests occurring most often

at about 1900 m. Hunting territories are located in pre-alpine meadows along the upper limits of forests where there are high densities of Galliformes and other prey species.

We estimated the present total Caucasian population of Golden Eagles at 220–225 pairs (Abuladze 1997, Abuladze et al. 1998). There has been no change in the breeding distribution since the 1970s and the population appears to be stable. In northern Caucasia, the population is also stable and, at the end of 1990s, at least 125 pairs bred along the valleys of the large rivers in Greater Caucasia. Over 20 pairs occurred within the mountainous part of the Stavropol region (Khokhlov 1996), two nests were known in the North Ossetian Nature Reserve (Komarov 1985, Lipkovich 1988), and no less than 4 pairs occurred in the Caucasian Nature Reserve (Til'ba 1989, our data). Nesting pairs may also occur at the Skalistyi Ridge, but they have not been confirmed.

The Transcaucasian population is estimated at 75–95 breeding pairs, occurring in mountain forests of the Main Caucasian Ridge, its spurs, and the highlands of Lesser Caucasia. The Main Caucasian Ridge and its spurs support up to two-thirds of the breeding population. Within the Transcaucasian countries, there are perhaps 15–25 pairs currently in the southern portion of Armenia. In Azerbaijan, the total number has been estimated at 13–16 pairs (Red Data Book of Azerbaijan SSR 1989), but our data do not agree with this estimate. Our data, collected in the 1980s, indicated that no less than 15 nesting territories occurred in the northern and western parts of the country. Based on this and data information from local specialists and amateurs, we estimate the number of pairs in the Azerbaijan part of Greater Caucasia is 30–35 breeding pairs and, in Lesser Caucasia, it is 10–20 breeding pairs. The possibility of several breeding pairs in mountainous areas along the border with Iran cannot be ruled out, but there is no information available. Therefore, we concluded that as many as 60 pairs of Golden Eagles breed in Azerbaijan.

The Georgian population is estimated at not more than 30 breeding pairs, which occur in the mountain forests of the Main Caucasian Ridge, its spurs, and Lesser Caucasia. On the southern macroslopes of Greater Caucasia in eastern Georgia, we estimated that there are about 20 pairs and no significant changes have occurred in the status of the population in this area from 1970–90. Numbers of breeding pairs were stable varying between

27–30 pairs. Based on our results, we concluded that there has been an increase in the population in recent years on the macroslopes of Greater Caucasia, within the watershed area of the Ajara-Imetreti Ridge, and along the Turkish border. This may be attributed to the sharp decline in human activity (e.g., forest destruction, heavy grazing, construction of roads, and recreational pressure) in the 1990s. It is possible that the total number of breeding pairs is gradually increasing and, at present, it could be as high as 35–40 breeding pairs.

The Golden Eagle population in the region of northern Caucasia and Transcaucasia has remained relatively stable during last two to three decades. There are no recent data from Abkhazia, Karabakh, Chechnya, Dagestan, Ingushetia, and South Ossetia due to military conflicts in these areas.

Breeding Biology. Golden Eagles are resident and territorial throughout the area and nesting areas are used for many years in succession. Each pair has as many as 4 nests, usually situated within a relatively restricted area. Nests are used in turn, sometimes with intervals of several years between occupations. Pairs appear at nesting sites from late February to early March. We recorded 54 courtship display flights from 26 February–19 March. Repair of old nests and building of new ones also occurs at this time. Nests are constructed on extremely inaccessible cliffs often in the upper parts of vertical rocks, cliffs in gorges, rocky ridges, walls of canyons in the forest belt of mountains, and at the upper limits of forests. Nests are built on shelves under ledges, small caves and niches, and in cracks. In the foothill regions of the Stavropol area, nests are usually built on rock outcrops, using juniper (*Juniperus* spp.) shrubs to support the base. We did not record nests in trees, and there is no mention of tree-nesting in the region. All nests occurred between 920–2400 m and most (31 of 39 nests) were located between 1400–1800 m. The direction of exposure was usually toward the southeast or east (southeast = 19, east = 9, southwest = 4, south = 2, south southwest = 1, west = 1, northwest = 1, north northeast = 1 nest). Nests measured 1.0–1.3 m in diameter and 0.3–0.5 m in height. Typically, they consisted of dry branches of various lengths and 5–20 mm in thickness. The nest cup was lined with dry grass and sheep wool. Occupied nests are decorated with fresh twigs from conifer trees.

Eagles hunt at distances of 0.3–2.0 km from their nest sites. All known nest sites were located at lower

Table 1. Measurements of Golden Eagle eggs in Georgia.

CLUTCH	LENGTH (mm)	WIDTH (mm)	MASS (gm)	DATE	LOCATION OF NEST (ELEVATION m)
1	72.5	56.3	—	24 March 1978	Lagodekhi Reserve, Matzimi Gorge (1840 m)
2	74.3	57.5	124.0	2 April 1982	Terek River valley, Darial Gorge (1480 m)
3	76.2	58.0	—	19 April 1984	Abkhazia, Bzipi Ridge (1765 m)
4	73.2	57.7	123.5	10 April 1988	Dusheti district, Lomisi Ridge (1910 m)
5	75.5	57.0	120.8	7 April 1990	Kazbegi district, vicinity of Sno (1870 m)
6	74.0	57.5	124.6	11 April 1991	Borjomi Nature Reserve
	71.7	55.5	121.0		Kvabiskhevi Gorge
Min	71.5	55.5	120.1		
Max	76.2	58.0	124.6		
\bar{x}	73.4	56.8	122.2		

altitudes than hunting areas. This probably allowed the birds easier transportation of prey to nests in these mountainous areas.

Copulation was recorded on 28 February and 3 and 7 March. Eggs were laid in the latter half of March (19 March–3 April), mainly in the last 10 d of March. Normally, full clutches have either one or two eggs. Among 41 monitored clutches, 6 (14.6%) contained one egg and 35 (85.4%) contained two eggs. In total, 41 clutches consisted of 76 eggs with an average clutch size of 1.85 eggs. The average size of 10 measured eggs in six clutches was 73.39×56.78 mm (range = 71.5–76.2 mm \times 55.5–58.0 mm). The average weight of seven eggs in four clutches was 122.17 g (range = 120.1–124.6 g) (Table 1). Incubation lasted 44–45 d.

Hatching occurred in the first two weeks of May with young hatching from 5–16 May ($N = 9$). Young left nests in late July or early August (range = 27 July–7 August, $N = 10$). In all successful nests, only one young survived to fledging ($N = 43$).

Data on 78 nesting attempts were obtained in 1978, 1981, and 1985–91 (Table 2). In addition to our own data on 41 breeding attempts, we also obtained unpublished data collected in different parts of Caucasus. Our own data were collected mostly in western and central parts of the southern macroslopes of Greater Caucasus, the territory of Georgia, and northwestern Azerbaijan. The total number of breeding territories observed each breeding season ranged from 4 in 1976 to 12 in 1985. An average of 77.4% (range = 60.0–90.9%)

of these nesting attempts was successful fledging an average of 0.79 fledglings per successful attempt (range = 0.7–1.0 fledgling). The mean number of fledglings per occupied territory was 0.61 (range = 0.44–0.83) and the mean number of fledglings per nesting pair was 0.68 (range = 0.5–0.83).

Data were collected in Georgia in 1995–97. In eastern Georgia, at least 5 breeding pairs raised 4 young in 1995 and 4 breeding pairs in the Aragvi and Terek River basins and Ajaria raised 2 and 3 young in 1996 and 1997, respectively. No differences in nesting success were evident from 1970–98. Breeding pairs were very aggressive to nomadic, nonbreeding eagles that were near occupied nests.

Feeding Ecology. The diet was studied in detail in Greater Caucasus in Georgia and northwestern Azerbaijan. The diet of the Georgian population was similar to that recorded in other parts of Caucasus. Nevertheless, there were some regional differences that reflected the local availability of certain prey species. Altogether 189 prey items were identified (Table 3). Of these, 88 (46.6%) were mammals (12 species) and 101 (53.4%) were birds (17 species). Dominant prey species were the European hare (*Lepus europaeus*, 12.7%) and Galliformes, especially Caucasian Snowcocks (*Tetraogallus caucasicus*, 16.4%), Caucasian Black Grouse (*Tetrao mlokosiewiczi*, 12.7%), and Chukars (*Alectoris chukar*, 8.5%). Marked variation in diet occurred between years and locations. The main causes for variation in diet were annual variation in the numbers of

Table 2. Breeding success of Golden Eagles in Caucasia.

INDICES ¹	YEARS								
	1978	1981	1985	1986	1987	1988	1989	1990	1991
A	7	10	12	10	9	10	6	7	7
B	5	10	11	10	9	8	6	6	7
C	5	9	11	9	8	7	5	6	5
D	4	8	10	7	5	6	3	5	4
E	1	1	1	2	3	1	2	1	1
F	80.0	88.9	90.9	77.8	62.5	85.7	60.0	83.3	80.0
G	4	6	7	5	4	5	3	5	4
H	1.0	0.75	0.7	0.71	0.8	0.83	1.0	1.0	1.0
I	0.8	0.6	0.64	0.5	0.44	0.63	0.5	0.83	0.57
J	0.8	60.67	0.64	0.56	0.5	0.71	0.6	0.83	0.8
K	2	0	1	0	0	2	0	1	0

¹ A—Number territories checked, B—Number territories occupied with pairs, C—Number territories with eggs, D—Number successful nesting attempts, E—Number unsuccessful nesting attempts, F—Percent of successful nesting attempts (D/C), G—Number of fledglings, H—Number of fledglings/successful nesting attempt (G/D), I—Number of fledglings/occupied territory (G/B), J—Number fledglings/established nesting attempt (G/C), K—Number territories with no activity.

prey, especially rodents; seasonal variation in availability of prey influenced by factors such as timing of hibernation, timing of reproductive period, emergence of young rodents from burrows, and the fledgling and migratory behavior of birds; daily variation in prey availability caused by activity patterns of the prey species; influences of habitat on species composition, numbers, and availability; influences of weather conditions on prey availability; and differences between individual eagles or pairs.

In addition to live prey, Golden Eagles also fed on carrion, especially in winter, including the remains of items killed by wolves (*Canis lupus*) (Abuladze and Baratashvili 1982). In all, 157 cases of carrion feeding were recorded (Table 4). We made 22 observations of eagles feeding to satiation on carrion on the western slope of Mount Didi Borbalo on 6 June 1978 and the eastern slope of Mount Diklo on 28 July 1980. Mean feeding time was 41.35 min (range = 18–66 min). Eight cases of kleptoparasitism were recorded on other eagles, and twice on Common Buzzards (*Buteo buteo*).

DISCUSSION

Threats and Limiting Factors. The greatest decline in the Golden Eagle population in the region occurred from 1940–70. Increasing human disturbance, including the construction of public and forestry roads in the highlands, the felling of native mountain forests, recreational pressure, and use of insecticides in forestry all contributed to the decline. In addition, the main problem was an orga-

nized campaign to exterminate birds of prey in the former USSR, including Caucasia, before the mid-1970s (Abuladze 1986). Other factors contributing to the decline were a sharp decline in available food, mortality in traps and from poisoned baits, and various forms of human disturbance in breeding habitats. From 1960–90, one of the major threats to the population was human disturbance from recreational pressure caused by tourists and alpinists. During this time, Caucasia was one of the most popular tourist areas in the former USSR. After 1991 and following the breakup of the USSR, this form of human disturbance has practically disappeared.

At present, main threats to the population are illegal shooting, mortality in traps, and poisoned baits. Human disturbance has been largely absent from some areas in recent years. In addition, some new dangers now threaten the species. Prior to the 1990s, extensive sheep breeding was the most common form of stock raising in Caucasia. Numerous flocks of sheep annually moved from winter pastures in steppe areas in the lowlands of Lesser Caucasia to summer pastures in the alpine meadows of Greater Caucasia. Numbering in the millions, these sheep were one of the main sources of food for large raptors, including Golden Eagles. At that time, there were no state borders between the various Caucasian republics and the administrative borders were crossed by shepherds who drove sheep to pastures on the lowest passes of the Main

Table 3. Prey recorded from pellets and food remains of Golden Eagles collected in Georgia, 1977–99.

PREY SPECIES	NUMBER	% FREQUENCY
Mammals		
Hedgehog (<i>Erinaceus europaeus</i>)	1	0.5
Shrews (<i>Sorex</i> spp.)	3	1.6
European hare (<i>Lepus europaeus</i>)	23	12.2
Red squirrel (<i>Sciurus vulgaris</i>)	9	4.8
Caucasian squirrel (<i>Sciurus anomalus</i>)	1	0.5
Fat dormouse (<i>Glis glis</i>)	2	1.1
Wood mouse (<i>Apodemus sylvaticus</i>)	7	3.7
Mice (<i>Mus</i> spp.)	14	7.4
Voles (<i>Microtus</i> spp.)	12	6.3
Rodents (<i>Rodentia</i> spp.)	11	5.8
Chamois (young) (<i>Rupicapra rupicapra</i>)	1	0.5
Domestic goat (young) (<i>Capra hircus</i>)	1	0.5
Common marten (<i>Martes martes</i>)	1	0.5
Stone marten (<i>Martes foina</i>)	2	1.1
Total mammals	88	46.6
Birds		
Mallard (<i>Anas platyrhynchos</i>)	1	0.5
Caucasian Snowcock (<i>Tetraogallus caucasicus</i>)	31	16.4
Caucasian Black Grouse (<i>Tetrao mlokosiewiczi</i>)	24	12.7
Chukar (<i>Alectoris chukar</i>)	16	8.5
Quail (<i>Coturnix coturnix</i>)	2	1.1
Domestic hen (<i>Gallus domesticus</i>)	2	1.1
Woodcock (<i>Scolopax rusticola</i>)	2	1.1
Common Wood Pigeon (<i>Columba palumbus</i>)	2	1.1
Tawny Owl (<i>Strix aluco</i>)	1	0.5
Black Woodpecker (<i>Dryocopus martius</i>)	1	0.5
Great Spotted Woodpecker (<i>Dendrocopos major</i>)	1	0.5
Song Thrush (<i>Turdus philomelos</i>)	1	0.5
Ring Ouzel (<i>Turdus torquatus</i>)	3	1.6
Thrushes	2	1.8
Eurasian Jay (<i>Garrulus glandarius</i>)	1	0.5
Hooded Crow (<i>Corvus corone cornix</i>)	1	0.5
Yellow-billed Chough (<i>Pyrrhocorax graculus</i>)	5	2.6
Corvids	3	1.6
Small Passeriformes	2	1.1
Total birds	101	53.4
Total number of prey	189	100

Caucasian Ridge. Since 1992, free movement across these borders has become very difficult, and in many places impossible. Border constraints, new forms of human activity prompted by land privatization, and a developing economic crisis together with the general social unrest and military events which have occurred during the last decade have contributed to the end of traditional forms of pastoralism and livestock rearing. In the last decade, sheep numbers have dropped dramatically leading to a reduction in the food resources for large raptors.

In total, 38 cases of mortality of eagles were recorded during the study period. The main cause was illegal shooting. Unfortunately, in spite of legal protection in the Caucasian states, 14 cases of shooting (36.8%) were noted in 1973–96. An additional 14 eagles (36.8%) were caught in baited traps set for predatory mammals such as wolves, foxes, and jackals. Poisoned baits also create a serious danger. A total of 8 eagle mortalities (21.1%) were recorded. The distribution of all known causes of death of adult eagles in Caucasasia by season was as follows: 21 (55.3%) in winter, 10 (26.3%)

Table 4. Species taken as carrion by Golden Eagles in Caucasia.

CARRION SPECIES	NUMBER	% FREQUENCY
Domestic sheep (<i>Ovis dom.</i>)	77	49.0
Goat (<i>Capra hircus</i>)	11	7.0
Cattle	15	9.5
Domestic pig (<i>Sus scrofa dom.</i>)	7	4.5
Horse (<i>Equus caballus</i>)	6	3.8
Donkey (<i>E. asinus domesticus</i>)	2	1.3
Domestic dog (<i>Canis familiaris</i>)	4	2.3
Total domestic mammals	122	77.7
Caucasian red deer (<i>Cervus elaphus</i>)	10	6.4
West Caucasian goat (<i>C. caucasica</i>)	2	1.3
East Caucasian goat (<i>C. cylindricornis</i>)	18	11.5
Chamois (<i>Rupicapra rupicapra</i>)	1	0.6
European wild boar (<i>Sus scrofa</i>)	2	1.3
Roe deer (<i>Capreolus capreolus</i>)	1	0.6
Common fox (<i>Vulpes vulpes</i>)	1	0.6
Total wild mammals	35	22.3
Overall total	157	100

during the breeding season, and 7 (18.4%) in the postbreeding period and in autumn.

Egg loss mostly resulted in the loss of entire clutches. Hatching failure was due to the protracted interruption in incubation during early stages of incubation. This was probably the result of disturbance at nests by people. In two cases, corvids robbed clutches and one nest was robbed by a person.

Conservation. Golden Eagles are included in the Red Data Books of ex-USSR (1984), Russia (1983), Georgia (1982), Armenia (1987), and Azerbaijan (1989). The birds, their nests, and breeding and feeding habitats are protected in the following nature and game reserves: Caucasian Nature Reserve (263 300 ha), Teberda Nature Reserve (85 000 ha), Kabarda-Balkarian Nature Reserve (74 100 ha), North Ossetian Nature Reserve (30 000 ha), and Guton Game Reserve (34 600 ha) in Russia; Shikakhokh Nature Reserve (10 000 ha), Khosrov Nature Reserve (29 200 ha), and Dilijan Nature Reserve (28 000 ha) in Armenia; Pirkuli Nature Reserve (1520 ha), Zakatala Nature Reserve (23 800 ha), Gei-Gel' Nature Reserve (6739 ha), Ilisu Nature Reserve (9300 ha), and Ismaily Nature Reserve (5800 ha) in Azerbaijan; and Ritza Nature Reserve (16 300 ha), Pskhu-Gumista Nature Reserve (40 800 ha), Borjomi Nature Reserve (18 000 ha), Kazbegi Nature Reserve (8700 ha), Akhmeta Nature Reserve (16 300 ha), Lagodekhi Nature Reserve (17 800 ha), Kintrishi Nature Reserve (13 893

ha), and Kabali Game Reserve (6500 ha) in Georgia. All known nests are located on state-owned land (Sokolov and Syroechkovskii 1990, Abuladze 1990b).

The main measures needed for effective conservation of the Golden Eagle in Caucasia include more extensive surveys covering all parts of the region to obtain more accurate information on the population size, registration of all known nests and granting them special protection, strict control of the use of traps for predatory mammals in the breeding and feeding habitats of Golden Eagles, a ban on poisoned baits throughout all Caucasia, strict control of illegal hunting, extension of some nature reserves, provision of additional carrion in winter, intensive use of the mass media to enlist public interest and support, cooperation and joint efforts between all Caucasian specialists in order to coordinate the study and conservation of the species in this region, and establishment of a working group for the study and protection of the Golden Eagle in Caucasia.

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