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The Institute for Raptor Studies Expeditions in Mongolia, 1994-2000

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The Institute for Raptor Studies expeditions in Mongolia, 1994-2000

D.H. Ellis

Abstract

In 1994, 1995, 1997, 1998, and 2000, I led small teams of biologists across Mongolia in search of Saker Falcon (*Falco cherrug* Gray) and Golden Eagle (*Aquila chrysaetos*) eyries. We also counted raptors along our march route during the first three years. These expeditions documented: (1) occupancy and productivity rates, and described eyrie sites, for Saker Falcons (150 territories, 182 eyries) and Golden Eagles (27 known breeding territories), (2) mortality of Sakers and Upland Buzzards (*Buteo hemilasius*) due to entanglement with trash in nests and loss of Golden Eagle eggs due to concealment by trash in nests, (3) long-distance movements of an adult Steppe Eagle (*Aquila nipalensis*) and one young Monk Vulture (*Aegypius monachus*) via satellite telemetry, (4) occurrence of Gyrfalcon-like Sakers at many locations across Mongolia, (5) extensive variation in leg and foot feathering in the Upland Buzzard that probably is evidence that this species is the result of hybridization, (6) extensive use by Sakers of powerline support structures for nesting (7) Saker ground nesting, nesting on boulders, in attics, on buildings, and on many other novel supports, (8) use of paper money in Golden Eagle and Upland Buzzard nests as nesting materials, (9) the first observation of sibicide for falcons (Sakers) and a new falcon social display (played-toes-flight), also for the Saker, (10) extensive predation on mammalian and avian predators by the Golden Eagle, (11) breeding by pale Steppe Eagles, and (12) relatedness of Mongolian Sakers to other Saker and Gyrfalcon (*Falco rusticolus*) demes. In response to the propensity of Mongolian Sakers to nest on artificial structures, and from an apparent population limiting lack of suitable breeding sites, we began in 1997 to create artificial eyries for Sakers, with 150 built by 2000.

Key words: *Aquila chrysaetos*, *Buteo hemilasius*, *Falco cherrug*, Golden Eagle, Saker Falcon, Upland Buzzard

1. Introduction

Falcon Studies in Mongolia

This essay provides the historical context and details of five small expeditions to Mongolia to assess raptor populations. In 1993, T. Adyasuren, who eventually became Minister of the Mongolian Ministry of Nature and Environment (Ministry of Nature), travelled to the Washington, D.C. area and met with the National Aeronautics and Space Administration (NASA) and Patuxent Wildlife Research Center (PWRC) personnel and entered into negotiations for cooperative studies of Mongolian wildlife. Thereafter, NASA provided travel funding and satellite equipment, purchased satellite data from System Argos in Toulouse, France, and set up to manage location data collected from NASA's Tiros satellites. In May 1994, I travelled to Mongolia, representing NASA, PWRC, and the Institute for Raptor Studies (IRS), to begin fieldwork.

Because all five expeditions were logistically much alike, a general description is given here, while departures from the norm will be given in the yearly accounts. Each expedition involved a single vehicle, in each case a YAZ (Russian jeep). We were equipped each trip with climbing gear to access eyries, a blood sampling kit (for molecular genetics studies), and one or more global positioning system (GPS) receivers so that we could map the locations of eyries far from roads. This use was critical inasmuch as roads sometimes consisted of a maze of anastomosing dirt lanes. Further, we often abandoned roads entirely while searching for possible crossings of rivers and canyons as we explored rough terrain for nests. In three expeditions, we carried

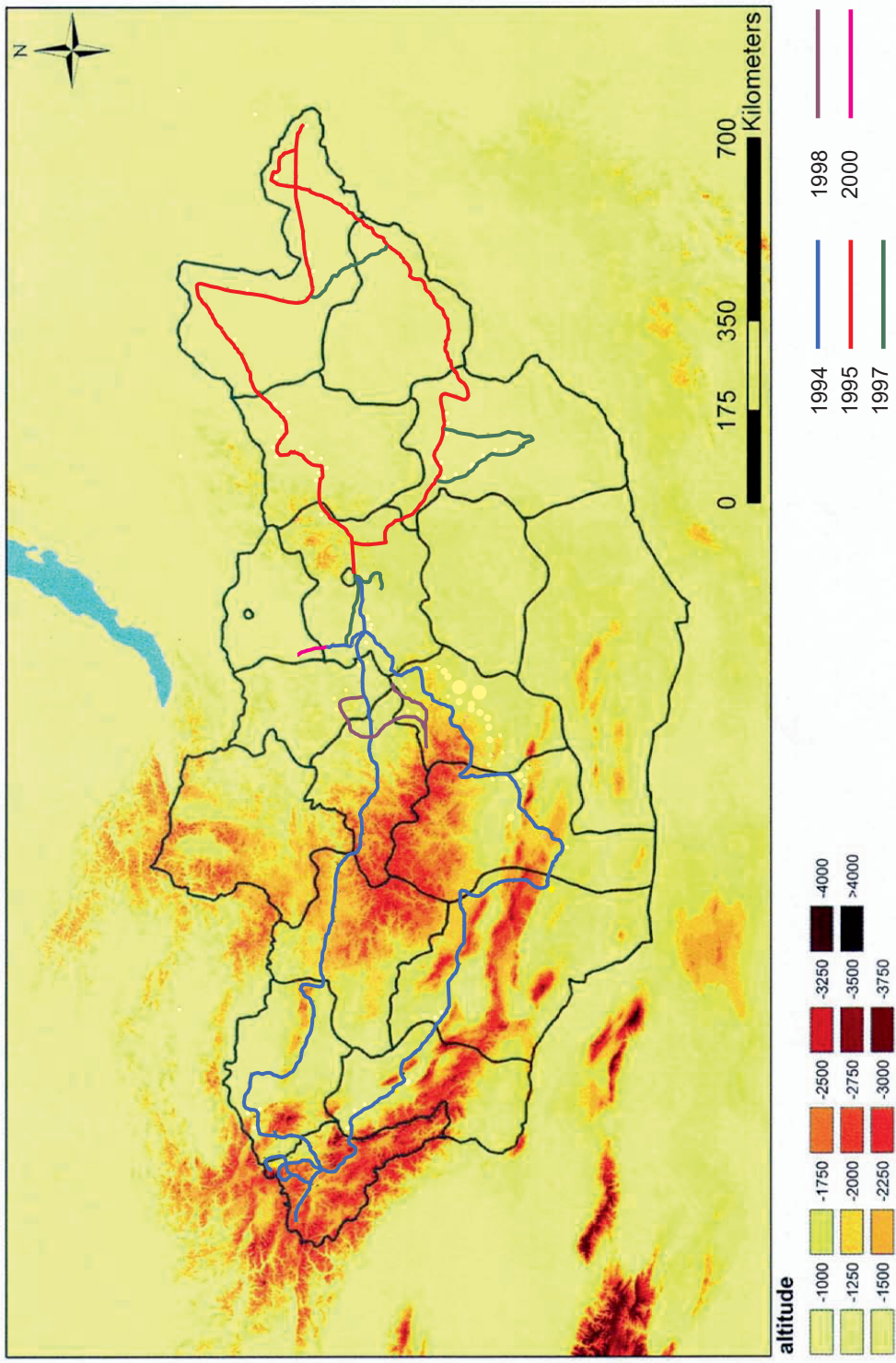


Fig. 1: Expedition routes from 1994 until 2000, the 1994 western and 1995 eastern expeditions, also showing extensions of coverage in later years.

PTTs (satellite transmitters) as back-pack mounts to track large birds on migration. On two expeditions, we instrumented young Sakers with PIT tags (passive transponders). In addition to the expeditions involving weeks or months (mapped in fig. 1), we also conducted several brief surveys (1-5 days). All of these were within 300 km of Ulaanbaatar.

The 1994 expedition coincidentally fell at the time the Ministry of Nature was beginning negotiations with wealthy Arab sheikhs to sell permits for the trapping and removal of saker falcons. Because eagles routinely respond to traps released for falcons, Arab saker trapping normally involves the shooting of eagles (UPTON 2002). Because all falcons and eagles were left unprotected in Ministry of Nature regulations, I focused our expeditions on Saker Falcon and eagle populations in hopes we could advise the government on raptor management. Sadly, populations of saleable wildlife (bird and mammal) are in deep decline across Mongolia (ZÄHLER et al. 2004).

Because Saker biology became the primary focus of my five expeditions, an introduction to research on this species (fig. 2) in Mongolia follows. There have been two papers published in *Falco* (newsletter of the National Avian Research Center (NARC), United Arab Emirates) on the history of Saker research in Mongolia. The first, SHAGDARSUREN (2000) is an overview of most early (pre-1970) expeditions by Russians and Mongols (for other expeditions see MEYBURG & MEYBURG 1983; PIECHOCKI 1983). Unfortunately, Academician Shagdarsuren's article introduces various errors including the misrepresentation that my first survey year was 1996 (it really was 1994) and that I was, from the beginning, financed by the United Arab Emirates (actually 1994 was financed by NASA and PWRC, agencies of the U.S. government). The second paper on the history of Saker Falcon research (ELLIS 2001) was written to correct various errors and omissions in the first.¹

The Saker was first reported in Mongolia in the travels of Przewalski (1876 in SHAGDARSUREN 2000) and was frequently reported in ornithological expeditions thereafter. Prior to 1970, Saker Falcon records for Mongolia were accrued and published merely as incidental observations made along the track of research expeditions. From the early expeditions came many (at least 78) Saker specimens. Most of these were used by DEMENTIEV and SHAGDARSUREN (1964) to evaluate the existence of what was believed to be a Gyrfalcon (*F. rusticolus* or *gyrfalco*) in the mountains of western Mongolia. This bird has been variously classified as *F. altaicus*, *F. c. altaicus*, *F. lorenzi*, and *F. rusticolus altaicus*, as a hybrid between the Gyrfalcon and the Saker (PFANDER 1994), or merely as a color morph of the Saker. (For detailed reviews of this topic, see ELLIS 1995, EASTHAM 2000, and ELLIS et al. 2008.)

Although KOZLOVA (1975) reported at least 22 nesting areas (all on cliffs and rocks) for Mongolia, the first scientist to focus specifically on Saker ecology in Mongolia was W. BAUMGART (1978a, 1978b, 1978c, 1980). He studied several pairs of tree nesting Sakers in central Mongolia and reported that they were subsisting largely on voles. He also reported three adult color morphs in the region but saw no dark gray-brown Altai Gyrfalcons. On a 4000 km expedition, he believed one pair nested on a ruined building and thereby hinted at a propensity we now know to be important (fig. 3).

In the 1990's, two groups became involved in financing and conducting Saker research in Mongolia. My projects, which were mostly financed by the U.S. government (details follow), began in 1994 and 1995 with a Mongolia-wide study of the nesting ecology of the Saker Falcon. These studies, which will be outlined later, continued each year through 2000 excepting 1996 and 1999. In total, over 150 breeding territories were found with over 180 eyries described.

Research in Mongolia funded entirely by the United Arab Emirates

In 1998 a larger effort began when Nicholas Fox was ordered by his Arab financiers at NARC to begin reconnaissance work in Mongolia (H. MacDonald, pers. comm., 13 January 1998). NARC

¹ However, the second paper was altered by the editor(s) of *Falco* and published (without notifying the author) to perpetuate the same errors and introduce others. This paper corrects mistakes and omissions in the earlier papers.



Fig. 2: Adult (probably female) Saker near its eyrie in north-central Mongolia (photos: D.H. ELLIS).



Fig. 3: Saker eyrie on the ruins of a building and composed of trash, probably built by ravens.



Fig. 5: Saker nestling about 16 days of age killing its tiny nest mate, southeastern Mongolia, 17 June 1997. A third nestling was present the previous day.



Fig. 4: Fledgling Saker tethered to its nest by rubbish and with all of its rectrices broken, presumably in its struggles to be free.

had also, in 1995, financed part of my work². Their cooperators included the Ministry of Nature, Mongolian State University, and the Mongolian Academy of Sciences (Academy). Details of these projects can be found in NARC's newsletter, *Falco* (at www.mefrg.org), and in the proceedings of two international conferences on the Saker Falcon (SAMOUR 1996; POTAPOV et al. 2001).

Research led by the author

My five field seasons dealt initially with the reproductive performance of the falcons (ELLIS et al. 1996) and unusual breeding situations (ELLIS et al. 1997). Pairs nested on such odd support structures as active railroad trestles (2), abandoned buildings (3), power and telephone poles (10), the ground (8), and very near other raptors (1). From expeditions since these publications, we have added to the number and variety of odd situations including attics of abandoned buildings (2) and the floor of a concrete well cistern (from which the young could not fledge) (ELLIS et al. 2009).

Not only were many nests in odd situations, but many were also composed mainly of manmade materials including cloth, wire, and twine brought by the original builders, mostly Common Ravens (*Corvus corax*), Black Kites (*Milvus migrans*), Upland Buzzards, and booted eagles (*Aquila* sp.). We found that two species of raptors sometimes become entangled in twine and cloth nesting materials (fig. 4). Some individuals were found dead; others would have died without our intervention (ELLIS & LISH 1999; see also POTAPOV et al. 1999).

Our work also led to observations of novel falcon social behaviour including the first direct observation of siblicide for any falcon (i.e., a two-week old nestling saker in eastern Mongolia was seen killing and consuming its much smaller nest mate: fig. 5) and a never-before-described falcon social display, splayed-toes-flight (ELLIS et al. 1999a). Other aspects of falcon biology were also explored by my teams. During three of our expeditions (1994, 1995 and 1997), we gathered prey remains from about 200 nesting attempts: this material contributed to a thesis at the State University of Mongolia (TSENPEG et al. 1996 unpubl; see also GOMBOBAATAR et al. 2001). Five papers dealt with the Altai Gyrfalcon enigma (ELLIS 1995, 1996, MOSEIKIN & ELLIS 2004, WINK et al. 2004, ELLIS et al. 2008) and one described our efforts to build artificial eyries (ELLIS et al. 1998). The last topic will be discussed in detail later. Because we encountered many nests of raptors other than the Saker, we also published papers on Golden Eagles (fig. 6) and the Upland Buzzard (citations to follow).



Fig. 6: Golden Eagle near its eyrie (left) and in open steppe habitat (above) in south-eastern Mongolia.

² Collaboration ceased after Fox (pers. comm., 19 November 1996) revealed that, while simultaneously funding my work, Sheik Khalifa bin Zayed (then crown prince of the United Arab Emirates and now its President, and one of two primary financiers of Fox's organization, NARC) was also financing smugglers. Many Sakers have, by the time of this writing, gone from Mongolia to NARC financiers.

2. Expeditions

Expedition I, 31 May to 11 July 1994, Central and Western Mongolia

Financiers (in order of financial commitment): PWRC, NASA, Institute for Raptor Studies.

Host Organization: Ministry of Nature

Participants: David H. Ellis (leader), P. Tsengeg (translator, field technician), Merlin H. Ellis (field technician), Gansook (driver)

Objectives: Raptor road counts. Find and describe Saker eyries. Describe Golden Eagle eyries. Deploy satellite radios. Deploy PIT tags and sample blood in nestling/fledgling Sakers.

During arrangements and negotiations for permits, driver's licenses, translator, car, etc., I met with Dr. A. Bold, ornithologist with the Academy, and learned of his long-term interest in and hypotheses concerning raptors in Mongolia and conservation in general. He pointed out that in the United States, it is widely believed that Yellowstone National Park (established in 1872) is the world's first national park. However, Bold assured me that a forested mountain near Ulaanbaatar (Bogdkhan) was protected 300 years ago (READING et al. 2006 use the date 1778). He also conjectured that the Saker was actually spread all across Mongolia centuries ago by the Mongol army. In conversation with Dr. Bold, I also learned: (1) that the Academy was interested in helping Arabs remove falcons, (2) that the Monk Vulture was migratory, and (3) that the Steppe Eagle was non-migratory.

Once all arrangements were made, we departed going west from Ulaanbaatar at 14:00 on 6 June. The pavement (asphalt) continued until Loon, and then the road turned into a profusion of anastomosing ruts with no primary lane and ruts joining and leaving the 100-m-wide highway at intervals. No road signs, no stop signs, and no hazard warnings would be seen for the next several weeks. Even missing bridges on main roads carried no warnings.

Out on the open grassland, we were surprised to see that, for most of each day, small mammals (mostly Brandt's vole (*Lasiopodomys brandtii*) scurried from our path. For much of the time, 5-10 voles were visible at once. Our first Saker eyrie (fig. 7) was accidentally found at the verge of the road on a powerpole within 30 km of Loon. This was the first we knew that Sakers nested on powerlines, but, as future years revealed, this is a practice common wherever ravens or buzzards (or other raptors) provide nests stable enough to survive the gales. Here we deployed 4 PIT tags (transponders) in ca 25-day-old young. Other raptors and vultures were conspicuous this first day also. We slept on a high ridge 157 km west of Ulaanbaatar. As happened each succeeding day, our driver/mechanic, Gansook, slept in the car.

The next day (7 June) we continued west and discovered our first ground nest of the Upland Buzzard and found our first Golden Eagle nest. One live eaglet, about 27 days of age, lay near a two-thirds eaten sibling. Many buzzards were seen during the day.

A cultural oddity (to the non-Mongol) was the procuring of drinking water near Bayanor from a board-covered rubber tire in an actively used corral. Below ground, the pit was framed by small logs which eventually disappeared into a layer of ice. The water was obtained by rope and bucket through a hole in the ice. Wildlife observations included a Demoiselle Crane (*Anthropoides virgo*) nest with two eggs: rather it was two crane eggs without a trace of a nest.

On 8 June, we found a Golden Eagle cliff nest (one eaglet, ca 36 days of age) and Sakers in an alternate eagle nest nearby (five young, ca 26 days of age). Continuing west, we entered the outer reaches of the Khangai Mountains and then continued on to Ektaimir.

With ruts coming and going at intervals, we missed our turn north and wandered several hours in the mountains but did find a Saker eyrie. It was located directly on top of a 10-m-tall, broad pillar of stone. From a distance, one tiny chick was visible, so we retreated without more closely examining the contents of the nest.

On 9 June, we pushed on toward Tariot and discovered a bridge like no other in my experience in 50 nations (fig. 8); it had dropped half way to the water and was still in use. Even after watching a tractor cross the river, I decided to wade across with our car following.

Crossing the high ridge of the Khangay Mountains, we noted pale cliffs far to the east and decided to hike there. Gansook stayed with the car as we three hiked through rain and hail for four hours and 50 minutes to cliffs that had Lammergeiers (*Gypaetus barbatus*) roosting on them. In the fading light, we rushed to heat water for our emergency rations and prepared for a cold, wet night without sleeping bags beneath a slab of rock at the east base of the cliff.

On 10 June, we continued west and found an adult Saker (probably male) that looked very much like a gray Gyrfalcon. While traveling on to Noomroog, we very much needed fuel, but at 19:30 the station was closed. We stopped at a ger (yurt) and tried to make friends in hopes the station manager would cooperate and allow us to buy gasoline so we could be on our way. The woman (most fuel stations in this era were operated by women) pulled a key from under a bed, retrieved the pulley belt from behind another bed, and exhumed the crank for the pump. After 15 minutes taking turns spinning the pulley wheels on what used to be an electric pump, we had full tanks of gasoline and headed west out of town. We camped that evening below a cliff, probably formerly used by Golden Eagles and now occupied by Sakers. We prepared for a climb the next morning and found four young ca 24 days of age.

On 11 June, we found a Saker ground nest (the first such record to be published for Mongolia: ELLIS et al. 1997). It was near the base of a tiny hillside cliff. That same day (17:30), we found the "Dream" Golden Eagle nest, and as my team prepared to camp and dine, I hiked to the nest and found that, unlike every other Golden Eagle eyrie I had ever visited from Alaska to Mexico, from Japan to Scotland, these adults did not flee. Instead, they circled low overhead. When they did drift off, I called the "wonk, wonk, wonk" location call (ELLIS 1979), and the female energetically fought the wind to rejoin me, circling barely 10 m overhead.

That night, rain threatened, but the high wind disallowed tents, so Merlin and Tsengeg slept under two collapsed tents. I then began a practice which no one will follow who knows about tarbog disease (marmot [*Marmota* sp.] disease: the plague or black death caused by *Ursinia pestis*). In the desert areas of Mongolia, it is often difficult to lie down (except on a thick tarp) without detecting plants with tiny thorns. So I often found it convenient (until I learned about tarbog disease) to flatten an earthen mound at the opening of a tarbog tunnel as my sleeping platform.

We continued to find raptors common along our route, and on 12 June entered Ulaan Gom. In the afternoon, we headed west out of town and offered a ride to a ca 15-year-old boy. His ger, he said, was only a little further, then a little further, until finally we had climbed a mountain pass where ten adults squatted, huddled in the cold wind around a rock pile shrine to the mountain spirit. Further on, we finally arrived at the boy's ger and were invited inside. We were warmed and warmly welcomed with horse milk curds (served in ca 0.5-liter-sized bowls without spoons). We slurped, and then licked clean the bowls. The family also thanked us for saving their son from an all night walk by giving us a leg of lamb. We drove on toward Ooreg Nuur (Lake Ooreg) and searched many sheltered coves for a campsite free of wind. Gers were in each sheltered spot until, in the fading light, we found a cave, built a fire, and boiled our lamb. Tsengeg informed me it was 01:12 before we dropped off to sleep.

The next day (13 June) I found a Lammergeier nest near camp while my team slept, then we broke the fast and continued on. Near Lake Ooreg we found a Golden Eagle eyrie and several other raptor nests in a small zone. A Saker eyrie (fig. 9) was unique in that it was an unsupported uric acid platform (the accumulation of decades) formerly underlain by a stick nest (probably built by ravens; ELLIS et al. 1997). At the Golden Eagle eyrie, we found a ca 35-day-old nestling on a ca 14 m, broken and sloping, cliff. Moulded primary remiges at the site appear much larger than for North American birds.

Our days were consumed with measuring eyries and cliffs (fig. 10), and it was 15 June before we left Lake Achit and drove on to Bayan Oolgee, a town strangely reminiscent of dusty villages in Mexico. Here we discovered that we could not buy gasoline without permission of the local parliament.



Incredible as it sounds, in three hours and 15 minutes, we obtained such permission and were headed north toward Tsaagan Nuur (white lake). Along the way, we found a Saker eyrie (three young ca 40 days of age) which we called Dead Horse Point because there was a horse skull and broken sheep shears on the eyrie ledge.

Fig. 7: Our first Saker eyrie was on a power pole near the highway. Merlin Ellis lowers nestlings for processing, 6 June 1994.



Fig. 8 (above, right): The bridge near Tariot: half way to the water and still in use.

Fig. 9 (left): This Saker eyrie formerly was supported by a stick nest, but it is now a hanging shelf of uric acid.

Fig. 10 (right): Merlin Ellis with expedition flag at our first eyrie with dark falcons, foothills of the Russian Altay Mountains, 13 June 1994.

The next morning (16 June), we rolled into Tsaagan Nuur and obtained a permit from the military to work in the region bordering Russia. Thus began a five-day adventure among the Kazakh eagle falconers (Boorkeetshee or Hoosbek). The first falconer (or eagler) had a large nestling. The second had a yearling that had killed 14 foxes the previous winter (fig. 11). Here a 96-year-old former hoosbek named Zhongoodee told us of his years hunting with the big byerkoot. He said that the people only recognize one species of byerkoot, but those which live at lower elevations (I interpreted these to be Steppe Eagles) are not good hunters. Zhongoodee had, in all his years flying eagles, taken only two wolves. His sister had lost an eye to one of his birds.

During our 18 days in the zone along the Russian border (fig. 12), we found that Mongols are now grazing the winter ranges of the argali sheep (*Ovis ammon*). We saw domestic camels and horses as high as 2700 m (see READING et al. 2006 for a review of grazing trends). On 30 June, we turned east to Bayan Olgee (at one place I counted a minimum of 27 lanes on our dirt road). On our way east to Hovd, and, upon crossing a small river at the wrong spot, our vehicle plunged in, floated to the surface, then slowly sank. We dragged the car to shore, then began drying gear. Gansook needed to dry spark plugs, so he poured gasoline on our right rear tire, lighted it, then held our primus stove in the flame until the generator on the stove began working. Then he dried the spark plugs over the primus. The headlights were one-third filled with water but still functioned. Between extracting our car from the waterhole, drying gear, and helping other swamped vehicles, we spent a whole day at this one crossing.

Near Hovd, we developed carburetor problems which resulted in flooding, so I rigged a hose from the carburetor to my window, and, as we drove along, I had to constantly pump gasoline into a bottle in my door. I did this for 201 km before we found a better solution. About 39 km west of Altay, we stopped to help eleven people in a stalled truck. They sold us gasoline and we agreed to take three children to Altay, but when it was time to go, their mother also came along. So, there were eight of us in a five-passenger "jeep."

On 4 July, we exited Altay for Chandman without obtaining the needed carburetor parts. In Chandman, we learned that the gas station owner went to a dance weeks ago in a far city and never returned. We travel on. At about 20:45, Gansook drove into a soupy bog; we dug until 23:20. We were still far from terra firma, so Tsengeg hiked to find a tractor. He found a truck that could help, but while waiting, found himself in a drunken brawl and was beaten until he escaped into the darkness where Gansook found him. The morning of 6 July, we awakened still bogged down to the axles. After digging for an hour, Tsengeg and Gansook hiked south for a tractor. Merlin and I buried our spare tire and rigged up a carabineer and climbing rope winch (fig. 13) and slowly moved the car toward dry ground.

Finally, Tsengeg arrived with two men and a big Russian tractor from Erdene. Very soon our car was out of the mud, but now we had to wait an hour for Gansookh who agreed to transport one of the tractor operator's sisters to town. When they arrived, it was not one sister, but two women, 30 pounds of cheese, a ten-year-old boy, and two babies. We could fit all but Tsengeg in the jeep, so he rode on the tractor. After Erdene, we continued toward Bayan Ondor and then on to Bayan Tsaagan.

On 7 July at 9:40, we arrived in the rain at Bayan Hongor and learned that the rest of our journey would be on asphalt. By 8 July, we still had not deployed a single PTT on an eagle, so when we spotted a rain-sodden Steppe Eagle, we pursued it cross country for 17 km until Gansookh nearly drove us over a short cliff. Back on the asphalt, we traveled to Arviheer and then on to Rashant. We spent the 9th on and off asphalt checking cliffs around Taleen Ulaan in hopes of finding a very large eaglet or very wet adult eagle for the PTT. Finally, we arrived in Loon, and then in the darkness drove on to Ulaanbaatar having completed a ca 5250 km loop. After one day in Ulaanbaatar, we flew to Beijing and home.

Reflections

I believe no one ever fully recovers from Mongolia. Many travelers would never return, but for me it was like a trip through an alien world (fig. 14). Ten thousand memories and more will enrich my life forever.

Accomplishments

26 Saker eyries were found, 40 Saker nestlings were instrumented with pit tags, and 6 Golden Eagle eyries were found. Novel observations included (1) runt (undersized but with plumage comparably developed like nest mates) nestling Sakers, (2) a raven nest built almost exclusively of rib bones of large mammals, (3) a Steppe Eagle bone nest, and (4) Sakers (2 pair) nesting on power poles. From examining many Upland Buzzard nests, we found that this species has greater variation in tarsal and foot feathering than any other raptor (ELLIS et al. 1999b).



Fig. 11: Shetigan with his very large yearling eagle on the border with Russia in northwestern Mongolia.



Fig. 12: Most nights we camped on the open steppe (here in the high mountain steppe near the Russian border in northwestern Mongolia).



Fig. 13: Extracting YAZ jeep from mud hole, 6 July 1994. The tire burial technique is illustrated.



Fig. 14: Merlin Ellis with herders in northwestern Mongolia, June 1994.

Expedition II, 23 May to 11 July 1995, central and eastern Mongolia

Financiers: PWRC, NASA, NARC (United Arab Emirates), Institute for Raptor Studies.

Host Organization: Ministry of Nature

Participants: David H. Ellis (leader), P. Tsengeg (translator, field assistant), Merlin H. Ellis (field assistant)

Objectives: Deploy satellite transmitters. Find more Saker and eagle eyries. Deploy pit tags in nestling Sakers. Collect falcon blood.

We left Ulaanbaatar on 26 May for a short (four day) expedition in central Mongolia. Our first new Saker eyrie is named Killer Pole because we found two dead Sakers, a raven, and an Upland Buzzard under a nearby pole. Next, we found that the first powerline eyrie located in 1994 was still occupied. We worked the next two days in Taleen Ulaan searching cliffs and trees; we found nesting Lammergeiers, several pair of Sakers and Upland Buzzards, and various other raptors including a Eurasian Eagle-owl (*Bubo bubo*).

On 31 May, we began our longer (5 week) expedition by taking the road east toward Jargalantkhan. Our first discovery was of a Saker ground nest on a rocky hillside. Moving east and then north, we found another pole eyrie, and various buzzard, eagle, and Saker eyries as we worked our way along the Hentee (Khenti) Mountain foothills. On 2 June, we finally found a cooperative Golden Eagle for our satellite radio. This bird, a third-year male, was gorged on a marmot. We swooped out of the hills in our rented YAZ jeep (perhaps the first car rental in Mongolia) and pursued the eagle up slope and down wind. Merlin and Tsengeg swarmed around him until he turned and faced them, then they dropped a cloth over his head and I grabbed his legs. (We followed this bird by satellite until October when his radio quit. He proved to be non-migratory.)

As we proceeded eastward toward Choibalsan, Sakers were encountered only rarely. One eyrie was of special interest. In the vast rolling steppe north of Choibalsan, we found two mummified nestling Sakers from the previous year below a powerline nest, but, although two adults were present, no other nest was seen. I determined to camp here if necessary to find the nest. Merlin went for water and while filling canteens in a marsh below a railroad bridge, he looked up to see three downy Sakers (oldest ca 27 days of age) watching him only 1.2 m above the water (fig. 15). This became the first of several Saker eyries found on very low railroad bridges.

Another use of a railroad bridge was as a means for us to cross marshes filled with water from recent rains. After disassembling the fence (wire fences are very rare in Mongolia except paralleling railroads), we listened, ear to rail, for distant trains, drove onto the tracks, raced across the bridge, disassembled the fence, and drove onto dry ground. On one such crossing, we were still reassembling the fence when a train roared by.

In the region of Choibalsan, most eyries were stick nests on power poles (fig. 16). From Choibalsan, we headed east toward China. Between lanes on the main road, we found a Steppe Eagle nest on the ground. Unfortunately, there was one egg and one hatchling, so the time was not right to attach a satellite transmitter even on the adult. We found very few nests of raptors as we proceeded east to the valley of the River Noomrog. On 16 June, Merlin and I rode horses with a soldier named Bat-tokh along the border with China. From Noomrog, we proceeded cross country in a south by west direction, arriving eventually at the wind-blasted village of Matad. Along the way, we broke a tie rod so steering was tentative until we discovered an oil drilling rig operated by many Chinese. After their welder repaired our steering rod, we were able to proceed much more rapidly.

From Matad, our route was east by south to Chongol (now Erdenetsagaan), and then directly west about 75 km whereupon we entered a huge burned zone with many black dust devils (whirl winds). In spite of the carbon-bearing winds, we stayed three days and found several falcon eyries, one of which had six recently fledged young (ELLIS et al. 1996). Another, the "Cinders" eyrie, had burned eggs on the top of a 5 m cliff. In this region was a tall volcanic cone which we dubbed Khan Mountain. On another ridge to the south, we nearly drove into a Saker eyrie with recently fledged young. We named it the "Drive In" eyrie. We found an active but failed eyrie on the rim of

a volcanic crater and, while examining this, we saw three wolf (*Canis lupus*) pups playing with a marmot hide. In Mongolia, we learned to expect the unexpected, but still it came as a surprise when on one small cliff (fig. 17), we found Sakers and Upland Buzzards nesting only 4.4 m apart.



Fig. 15: Saker eyrie in an old nest (probably raven) on a railroad bridge over water, extreme eastern Mongolia, 1995.



Fig. 16: Saker eyrie on wooden powerpole. In areas without cliffs, such structures probably support most nests.



Fig. 19: Small nestlings were merely counted, but large nestlings were injected with passive transponders, photographed, and measured. Blood was taken by clipping the tip of the talon of digit 4.



Fig. 17: Adult female Saker (in this case a yearling) feeds her young at the "Apartment" eyrie only 4.4 m above an Upland Buzzard nest.



Fig. 18: Saker eyrie in an electric transmission line pylon (note Tree Sparrow [*Passer montanus*] at its nest in the base of the falcon nest). This structure appears to have been built by Upland Buzzards.

Here we found a Golden Eagle nest on the very top of a basalt pillar, the first pillar-top nest I have ever seen for a Golden Eagle. Also in the lava zone, we found two Steppe Eagle nests with pale adults (ELLIS 2003). At one of these, the nestlings were old enough to be thermo-competent, so we made a nighttime approach and pounced on the adult female as she lay on the nest. This bird then received our second PTT, and from her movements on two migrations, we learned that she wintered, not in Mongolia, as Dr. Bold stated, nor in torrid India, but on the frigid Tibetan Plateau along the upper reaches of the Mekong River (ELLIS et al. 2001a).

From the lava zone, we drove west into Dariganga and replaced our tie rod with one from a World War II jeep. Then we continued west hoping eventually to reach the railroad from Ulaanbaatar to Beijing. West from Ongon, we entered a zone with scattered elm trees and found several Saker eyries in these. On a broken cliff, we found a Golden Eagle eyrie with unusual prey including three foxes (*Vulpes vulpes* and *V. corsac*), an adult Mongolian gazelle (*Procapra gutturosa*) pelvis and spine, two Eagle-owls, and a Demoiselle Crane. (On a 1997 visit, we were able to search the entire contents of this nest after it had collapsed and documented 27 foxes [ELLIS et al. 2000].)

Travelling west, we entered a zone of many white boulders and short cliffs. We found not only ravens, buzzards, and Sakers, but also a pair of Golden Eagles nesting among boulders on a hillside. Strangely, in a zone of many cliffs farther west (this is the area of the famous stone window), we found no Sakers. This is an oft repeated observation for Mongolia. I hypothesize that the scattered cliffs harbor Sakers but are not sufficient for mammalian predators, while zones with many cliffs harbor mammalian predators (e.g., Pallas' cat, *Felis* [or *Otocolobus*] *manul*) which eliminate Sakers.

Pushing farther west, we made two strange observations near an ephemeral lake bed. In one cliff nest, we found abandoned Saker eggs buried under a new Upland Buzzard nest. In a hillside nest perhaps 3 km away, we found Saker eggshell fragments and molted Saker primaries below a nest now defended by Upland Buzzards. Finally, on 4 July, we arrived at the railroad and began our route northwest to Ulaanbaatar. We supplemented earlier discoveries by finding more Saker eyries on the ruins of railroad outbuildings. On 5 July, we found the strangest of all Saker eyries. The nest site was on a 1.1 m diameter truck tire on top of a ca 11 m iron pipe among the ruins of an abandoned Russian military town.

For the next four days, we focused our attention on powerlines and the railroad to Ulaanbaatar and found several more Saker eyries on manmade structures (fig. 18). On 7 July, we arrived in Ulaanbaatar after a 4936 km trip. On 11 July, we flew out to Beijing.

Accomplishments

Injected 80 pit tags into young falcons and took blood samples for molecular genetics work (fig. 19). Deployed satellite transmitters on one immature Golden Eagle and one adult female Steppe Eagle (WILLIAMS et al. 1998). Found another 7 Golden Eagle nests and 60 Saker eyries. Made novel observations of entanglement mortality of Sakers and Upland Buzzards in trash brought by ravens and raptors to nest sites. Found that Golden Eagles sometimes prey heavily on mammalian predators (especially foxes) and large prey. Found that Sakers sometimes nest on ruins. Found proximal nesting records of Sakers and Upland Buzzards with nests less than 5 m apart. Found a Saker eyrie with a record brood, six fledged young.

Expedition III, 16 May to 28 July 1997, central and eastern Mongolia

Financiers: Union for the Conservation of Raptors, Institute for Raptor Studies, Turner Wildlife Fund

Host Organization: Mongolian Academy of Sciences

Participants: David H. Ellis (leader), P. Tsengeg (translator, field assistant), Peter Whitlock (field assistant)

Objectives: Create artificial eyries for Saker use. Expand data sets on Sakers and Golden Eagles. Check previously found eyries for Saker use.

This year's focus was on creating artificial eyries for Sakers in central and eastern Mongolia. But before the long expeditions, our first brief trip (19-20 May) was into the mountains south of Ulaanbaatar to create our first artificial eyrie. On 21 May, we began a ten-day trip building artificial eyries mostly on powerlines and abandoned buildings west and northwest of Ulaanbaatar. Our second fake we called "Electric Bipod" (figs. 20-22). We built it only about 5 m up on a wooden cross arm of a low-voltage electric distribution line. The foundation was mostly salvaged baling wire.



Fig. 21: "Electric Bipod" artificial eyrie was enlarged and used by Upland Buzzards in 1998.

Fig. 20: "Electric Bipod" artificial eyrie at the time of construction, May 1997.

Our long route mostly followed the 1995 march route, but we travelled the opposite direction. This year we towed a trailer behind a newly purchased Russian YAZ jeep: as we travelled, we were constantly scanning for cast-off clothing, wire, iron rods, rubber tires, and even debris from collapsed nests. Sometimes we found ground nests of Upland Buzzards, and, after driving three or more iron rods through the nest, lifted the top several inches, and harvested the lower layers. When we were out of cloth to line the nests, we sometimes even used horse dung. Fake nests were often named for construction materials, so we built the "Metal Door," "Horse Skeleton," "Dirty Shorts," and "Leaky Tire Bipod" nests. At railroad km 666, we built the "Dead Horse" nest on a ruin by first placing a mummified horse on the roof. As we traveled, we often swept far north or south to visit eyries found in previous years and to search for more eyries.



Fig. 22: "Electric Bipod" artificial eyrie was used by Sakers in 2000 and 2008.

Mongols believe it is very lucky to leave on a long trip on Tuesday in the rain, so on 3 June, we exited east on our main expedition, then followed the railroad south toward Sineshand. Our first new eyrie we called “Wet Saker,” then we camped in high winds behind the railroad berm. We called this site “Grozni Lagyer” (Russian for Terrible Camp). Lucky? May be. It snowed on us in the morning. We worked our way slowly south and built our 31st artificial eyrie near Sineshand (good water). Our consistent practice is to draw water from a well one day and boil enough for drinking the next day. Because one well was brackish and unpalatable, we risked drinking without boiling at another well and all three of us became sick. We continued to travel, but between the scours and the cold winds endured while building nests on towers, I lost 30 pounds (13.6 kg) before returning home. Turning north, we travelled without roads, to rejoin our 1995 route. Along the way we built artificial eyries on destroyed vehicles, on the wall at an abandoned Russian military base, in trees, and on iron tripods left as survey markers (fig. 23). On 11 June, we found our 1995 route and continued east visiting old eyries, finding new eyries, and building others. On the way, we found a Saker eyrie on top of a boulder less than 2 m tall (fig. 24) (ELLIS et al. 2009).



Fig. 23: Artificial eyrie built in 1997 on a geological survey marker, was used by Sakers in 1998 and 2008. Right photograph shows details of site.

On Friday the 13th, we found our most unusual Saker “eyrie” yet. The nestlings lay on the floor of a 2-m-tall cistern (ELLIS et al. 2009). That they had little likelihood of escape was evidenced by the mummified remains of fledglings from previous years. Fortunately, we are equipped to remedy the situation. With a heavy iron bar, we hammered on the wall creating a hole ca 1.1 m from the ground (elevated so foxes could not enter) and built a ladder inside so the young could escape.

South of Shireet, we revisited elm tree Saker eyries. Here we observed a ca 16-day-old Saker killing its much smaller sibling (fig. 5). This is the first documentation of siblicide for any falcon in the world (ELLIS et al. 1999a).

On 19 June, we arrived at Dariganga. Here we bathed in the shallow lake as tiny shrimp nibbled at our legs. We resupplied from the meager stores, noted the relatively high frequency of little boys naked from belly down, and then continued east into the lava zone. Our first newly found eyrie in this region was in the attic of an old well house. A second new eyrie was at the mouth of a 5-m-long lava tube on a canyon wall. We checked all the old eyries but found no manmade structures to support artificial eyries.

On 26 June, we headed north from Chongol toward Choibalsan and along the route created three more eyries. Traveling further north, we arrived at the Russian border, then turned southwest and south to cross the Oldz River. We were now on our final leg heading west and southwest toward Ulaanbaatar. On an electrical transmission tower, we found a fledgling Saker tethered to the nest with all his tail feathers broken (fig. 4). We freed him but could only wish him luck with his stiff and swollen leg and abbreviated tail feathers.

The days rolled by as we visited old eyries and created new ones. We awakened on 4 July to find frost on our sleeping gear. This day we collected many sticks from the base of a Golden Eagle cliff to make more nests. At the Henti Saker eyrie, we made an unusual find: four mummified young Sakers and an Eagle-owl feather. Our guess is that the owl killed or drove off the adults. Near the Herlen River (Kerulien on some maps), we saw a Golden Eagle pirate prey from a red fox (*Vulpes vulpes*). Then two marmots rushed the fox and drove it away.

On 7 July, we finally found someone with a slave cylinder for our clutch, so driving was again much safer; no more speed shifting. This day we returned to Ulaanbaatar after a 3925 km trip. The next several days were devoted to creating a cooperative agreement with the Academy, attending Naa-dam, and learning about Saker traffic. We spent 23 July searching the hills south-east of Ulaanbaatar to determine if a small population of Sakers could be found near town. Old Golden Eagle nests were found and one recently fledged eagle. Although some probable Saker sign was found (and one dead adult female), no eyries were located.



Fig. 24: Saker nested in this old raven's nest only 1.7 m from the ground in south-eastern Mongolia, 1997.

Accomplishments

Created 66 artificial eyries on thirteen different types of supports. (By revisiting these in the future, we can determine which types are used so we can make more of the preferred types.) Found 38 new Saker eyries and 6 new Golden Eagle eyries. Documented two new social behaviour patterns for falcons: siblicide and leg-dangle flight. Found Saker eyries in more novel places such as the floor of a cistern and attics of buildings.

Expedition IV, 18 May to 13 July 1998, central and eastern Mongolia

Financiers: PWRC, NASA, Smithsonian Institution, Institute for Raptor Studies

Host Organization: Ministry of Nature, Mongolian Bird Conservation Society

Participants: David H. Ellis (leader), D. Batdelger (assistant leader, translator), James W. Lish (photographer), Adele Conover (Smithsonian writer), O. Ochigerel (translator)

Objectives: Determine raptor use of artificial eyries. Find more eyries. Deploy one satellite transmitter. Gather more data on Sakers and Golden Eagles.

Our travels began with a short, three-person (Ellis, Lish, Conover), expedition (23-28 May) west from Ulaanbaatar to evaluate eyries created in 1997 and to determine occupancy and productivity in eyries found in 1994, 1995, and 1997. May 24 dawned with much frost on our equipment and the alarming discovery of a human skull (some skin attached) not far from camp. We found some artificial eyries had fallen: only one fake eyrie had young Sakers. Other fake eyries were being used by buzzards.

Back in Ulaanbaatar, my YAZ jeep was rammed by a Mercedes. The police found the Mercedes driver at fault, but I was ordered to pay for the repairs on his car. After considerable difficulties obtaining permits, we left Ulaanbaatar on 3 June for our long expedition east. Our primary goal was to determine whether the artificial eyries were in use, so we paralleled our 1997 route.

Our first novel discovery was of two cold Golden Eagle eggs lying under cardboard. Days later, we visited another Golden Eagle eyrie with its single egg also under rubbish. These, and other egg burial records and entanglement injuries through the years, led us to publish an article on trash-caused mortality (ELLIS & LISH 1999).

As we worked our way south, we found Sakers using our artificial nests on one railroad outbuilding and two electrical transmission towers (fig. 25). Proceeding north and then east, we visited another well house with a narrow (ca 0.5 m tall) crawl space between the ceiling and roof. Here we found five young Sakers. In the lava field east of Dariganga, we found a Golden Eagle nestling in a 1995 Saker eyrie. The nest was almost nonexistent: the ca 20-day-old eaglet lay on bare rock with a few sticks scattered about (ELLIS et al. 2009).

In 1995, we found the Cinders Eyrie with burnt eggs at the rim of a small cliff. In 1997, we pried boulders off the cliff to make a small cavity. On 12 June, we found three young Sakers in our artificial eyrie (fig. 26). To the north, in two Golden Eagle alternate nests, we found 13 marmot skulls, all with the brain cases torn open. This kind of damage is rare on marmot skulls elsewhere.

On 12 June, we arrived in Chongol (Wolf River), but our Mongolian ornithologist, Batdelger, was very sick of American cooking so we checked him into a hospital. We camped that night not far outside of town, then returned the next day for water and our friend. On 13 June, we turned north and at a newly found eyrie, we saw a fledgling Saker tethered to the nest by plastic twine. We found shelter that night from continuous rain in a sheep shed.

We traveled north to Choibalsan checking artificial eyries along the way and found another metal tripod with five young Sakers fledged from our artificial nest. Other tripod nests showed that Sakers spent much time there but produced no eggs and no young. We followed the 1997 route north of the Oldz River, crossed the river, and then travelled west through the Hentii Foothills.

Gale force winds blew all through the night of 17-18 June. I thought it would be too difficult to keep a tent up, so, as in such winds in times past, I rolled up in a tarp and sheltered by the car. Batdelger wisely stayed in the car, but Adele and Jim fought a losing battle as the wind slowly rolled their tent along. Around 05:00 they surrendered, collapsed the tent, and moved into the car.

On 18 June, we finally found the active nest of Golden Eagles first located in 1995. They were not nesting on the major rock face with about five old nests, but they were atop a short (ca 13 m cliff). The nest could be entered from above without climbing. On 20 June, we returned to Ulaanbaatar. With our one large and two small trips so far, we have traveled 4412 km.



Fig. 25: "Meadow Muffin Tower" artificial eyrie created in 1997 and in use by Sakers in 1998.



Fig. 26: At the "Cinders" eyrie, our artificial ledge was created in 1997. In 1998, it held three young about 28 days of age. Jim Lish pictured.

Jim Lish flew out early from Ulaanbaatar on 23 June because of drastic weight loss and other survival concerns. Batdelger was also not well and needed to be home to participate in local government meetings, so we found Ochigerel “Ochko” Ochirbat to help as translator.

On 25 June, we three (Ellis, Conover, and Ochigerel) headed west on the last expedition of the year. On 26 June, we visited the Takhi (Przewalski Horse [*Equus przewalskii*]) Reserve, met with officials, and searched for nests. Near the Reserve, we found a Monk Vulture nest on a high stone pillar. One adult stayed on the nest until I was only 4 m away (fig. 27). It thrashed the nest with its wings and moved slowly toward me. The nest contained a very large nestling, so I decided to attach a satellite transmitter. A second giant vulture joined the first on the ridge top about 400 m away. As I began working on the nestling, Adele and Ochko yelled that I was under attack: I looked up to see both adults, with legs dangling, only 100 feet away, side by side, and stooping down at me. As the birds closed in, I threw up my free arm and yelled. They veered away but passed within 10 m of me. The adults then circled and stooped many more times but none as threatening as at first. This young vulture carried his radio for a year and told us that he wintered in the hills north of Sineshand (350 km to the southeast).



Fig. 27: Adult Monk Vulture defends its nestling. Only rarely do adults remain on the nest when humans approach.

The next day, 27 June, we found an unusual adult Steppe Eagle at its nest. This bird had a pale (almost pure white) nuchal patch making it look much more like a Golden Eagle than a Steppe Eagle. We next moved through the steppe west to Harhorin, the ancient capital of Cheengees (or originally Teengees) Khan, and then south and west into the mountains along the Orhon River. My driveline began rattling, so I removed it and put the car in 4WD so the front axle was under power. We were advised to go to Hoojirt to find Gombosuren. Under his direction, 7 new bolts were manufactured out of rod stock on a Russian (Oktyabr) lathe. We also removed a broken bolt, and, with all reassembled, we drove away with renewed confidence.

We next travelled north to the Taimir River and continued upstream. We finally lodged the car on the big boulders in the river, and, although I rigged a winch with climbing ropes, progress was very slow. Finally, a muscular Mongol arrived with a 20-foot pole, and we literally lifted the car up so the ladies could slide rocks into the pits between the boulders and 1½ hours later we drove safely onto shore. To the north, we found a walk-in Saker eyrie amid boulders on a low hill on the valley floor.

We wandered north and east finding a few nests along the way. At Ulzij, we tried to cross the Orhon River. I waded it first and found a shallow path, but the water was running so fast that it began to move the YAZ jeep down stream and undermined the wheels, with the effect that the vehicle was in danger of rolling over. I rushed to ferry equipment to shore and told Ochigerel that we needed a tractor. She hurried to the far shore and in a few minutes returned saying a tractor was coming. Soon we were on shore and drying our gear.

We drove on to Mógd where an elderly couple adopted us. They filled our jeep with gas, took us inside, fed us, and dried our gear by the fire. We then drove a few miles to a secluded spot and spent a damp night. The next morning we drove back to Mógd to buy food for our friends at the gas station.

Traveling south out of town, we found several places with good raptor sign and found two Saker family groups but no Saker eyries. We found two Common Kestrel (*Falco tinnunculus*) chicks in an old Lammergeier nest.

Now en route to Ulaanbaatar, we visited a Golden Eagle eyrie found in 1994 and saw the remains of a 1997 nestling below the cliff. This year's nestling was alive but trapped in a long crevasse about 15 m from the nest. We managed to extract it and moved it back into the nest. On 7 July, we arrive at Ulaanbaatar having added an additional 2021 km from our 13-day expedition.

Accomplishments

The primary purpose of this trip was to assess the use of 66 artificial eyries built in 1997. Of 63 visited, 9 were occupied by Sakers and 10 were occupied by other birds (and thereby the nests were made more suitable for Saker occupancy in future years). We also deployed a PTT on a Monk Vulture, visited many old Saker eyries, and found 17 new ones. Much new data (including information on 6 new eyries) was also gathered on Golden Eagles. In addition to the scientific publications resulting from these expeditions, an article entitled "To Save a Falcon" was published in the Smithsonian magazine (CONOVER 1999).

Expedition V, 11 June to ca 1 July 2000, central Mongolia

Financiers: Institute for Raptor Studies, anonymous donor

Host Organization: Academy of Chingees Khaan

Participants: David H. Ellis (leader), Enkhtuya (translator, field assistant), Catherine H. Ellis (field assistant)

Objectives: Evaluate condition and use of artificial eyries built by my Mongol team. Visit other Saker and eagle eyries. Find new Saker and eagle eyries and measure all. Gather Golden Eagle food habits data.

Because our 1998 expedition demonstrated that Sakers were willing to use artificial eyries made in 1997, especially eyries on powerlines, in 1998, I organized a team of Mongols to build additional eyries. Between July 1998 and December 1999, this team of non-biologists created 78 artificial eyries (fig. 28). Nearly all were in central Mongolia. All but five were on powerlines.



Fig. 28:

Artificial eyrie built by my team of Mongol helpers. Although high winds removed most nesting materials from such eyries, enough remained at a few for Sakers to use the nest. Also, at many more, buzzards and, as in this case, ravens built larger nests which the Sakers pre-empted. These birds have already fledged.

On 16 June, we left Ulaanbaatar following the powerlines west and began checking artificial eyries. Although we returned on 23 June (after only 8 days of fieldwork), we managed to check 70 eyries created by my Mongol team. Only two of these had been used by Sakers, but several more were being expanded by ravens or buzzards. In addition, we visited many Saker and a few Golden Eagle eyries found previously. We also found two new examples of trash-entanglement mortality (one raven and one Saker nestling, both dead at the nest) and found a red deer (*Cervus elaphus*) antler and paper money in a Golden Eagle nest.

Accomplishments

From my Mongol team's 70 artificial eyries, 63 frames were still useable but only 14 were considered sufficiently filled with nesting material to be immediately usable by Sakers: eight of these were being used by Upland Buzzards and two by Sakers. Sakers were found nesting at nine new sites and Golden Eagles at two.

3. Conclusions

From seven long expeditions (1000 km or more) into eastern, central, or western Mongolia and many smaller trips in five survey years (1994, 1995, 1997, 1998, and 2000), we located over 150 territories where Sakers are known to have nested. From repeated visits to most territories, we documented 182 nest sites.

On these same expeditions, we located and described 27 eyries where Golden Eagles are now known to have bred. We saw adults at many more sites. Not included in these totals are more than a dozen alternate nests which are believed to be Golden Eagle nests, but which were not tallied because of uncertainty.

On our 1997 expedition, we created 66 artificial eyries for Sakers and enlarged a few natural eyries so nestlings would be less crowded (fig. 29). In 1998, we revisited 63 of our 66 artificial eyries and found 38 still suitable for occupancy (i.e., not destroyed by wind, ravens, or vandals, or, more accurately, Mongols). Of the 38 artificial nests suitable for occupancy, nine were occupied by Sakers and another 10 by ravens or buzzards. All six of the suitable power tower nests were occupied by some species.



Fig. 29:

Fledgling Sakers in the undersized "Malenki" (Russian for small) eyrie. Small shelves were often enlarged by my team.

Because our power tower nests were frequently occupied, we organized a small team of Mongols which created another 70 nests on metal power towers and several more nests on low voltage distribution lines or cliffs. Then in 2000, I returned to Mongolia and evaluated the 70 nests built by the

Mongol team on power towers. We also visited many natural eyries and a selection of artificial eyries from our 1997 fieldwork (ELLIS et al. 1998). Only two of the 70 artificial eyries created by the Mongol team were occupied by Sakers (fig. 28), but many more may be used by Sakers as their metal frames are built upon by ravens or raptors. As late as 2008, at least 10 of our artificial nests, including three by the Mongol team, were in use by Sakers. Further, the United Arab Emirates-financed team has now taken over the project and reports additional nests occupied each year.



Fig. 30: Adult (probably female) Saker in central Mongolia. Pale-tailed falcons with heavily barred backs and with diffuse face markings resemble Gyrfalcons from the far north.



Fig. 31: Extremely dark birds such as this nestling from the foothills of the Russian Altay Mountains command high prices in the Arab sookhs.

Because the Saker Falcon was being extensively removed for Arab falconry by the Ministry, the Academy, and foreign smugglers, and because all sizeable Saker Falcon populations outside Mongolia collapsed following the dissolution of the Soviet empire (LEVIN 2000, 2001), our emphasis from 1997 onward was to provide nesting sites for falcons (ELLIS et al. 2001b). Actually, two anthropogenic threats were underway (GOMBOBAATAR et al. 2004). First was the aerial broadcasting of rodenticides which threatened the falcons and other predators of small mammals with loss of prey and secondary poisoning. The

other threat to the Saker was from the trapping of adults (fig. 30) and juveniles for Arab falconry (fig. 31). Another concern was for Golden Eagle populations because of the propensity of falcon trappers to try to kill all eagles possible (Roger Upton, pers. comm., November 1995; UPTON 2002: 75).

Beyond creating the artificial eyries, the greatest contributions from the expeditions were the papers cited earlier and a few more still in preparation.

4. Acknowledgments

Rather than listing all supporting agencies and participants here, they were cited in the introductions to each expedition. All have my appreciation. Special mention should be made of my friends at the NASA-Goddard Space Flight Center who made satellite telemetry studies possible, not only in Mongolia, but also in a dozen other regions. Also my son, Merlin and my wife, Cathy, served without salary. Peter Whitlock served with very little salary. Thanks to all.

5. References

- BAUMGART, W. (1978a): Mongolischer Sakerfalk (*Falco cherrug milvipes*) als Baumhorster [Tree nesting of the Mongolian Saker (*Falco cherrug milvipes*)]. - Beitr Vogelkd., Leipzig **24**: 362-364.
- BAUMGART, W. (1978b): Concerning plumage, status, and migration of breeding eastern Saker Falcons (*Falco cherrug milvipes*). - Mitt. Zool. Mus. Berlin **54** (Suppl., Ann. Orn. **2**): 145-166. [In German].
- BAUMGART, W. (1978c): Ornithologische Eindrücke während eines Frühjahrsaufenthaltes in der Zentral-Mongolei. - Falke **25**: 372-385.
- BAUMGART, W. (1980): Der Sakerfalke. *Falco cherrug*. - NBB **514**, Wittenberg Lutherstadt.
- CONOVER, A. (1999): To save a falcon. - Smithsonian **29** (11): 102-116.
- DEMENTIEV, G.P.; SHAGDARSUREN, A. (1964): On the Mongolian Saker Falcon and on the taxonomic position of the Altai Gyrfalcon. - Arch. Zool. Mus. Univ. Moscow **9**: 3-37. [In Russian].
- EASTHAM, C.P. (2000 unpubl.): Morphological studies of taxonomy of the Saker (*Falco cherrug* Gray 1833) and closely allied species. - Ph.D. Thesis, Canterbury Christ Church University College, Canterbury, England, U.K.
- ELLIS, D.H. (1979): Development of behavior in the Golden Eagle. - Wildl. Monogr., No. **70**. 94 pp.
- ELLIS, D.H. (1995): What is *Falco altaicus* Menzbier? - J. Raptor Res. **29**: 15-25.
- ELLIS, D.H. (1996): The Altay Falcon: origin, morphology, and distribution. - In: SAMOUR, J. (ed.): Proceedings of the Specialist Workshop [Proc. First International Conference on the Saker Falcon and Houbara Bustard], Abu Dhabi, United Arab Emirates, 14-16 November 1995, pp. 143-168. Middle East Falcon Research Group, Abu Dhabi, U.A.E.
- ELLIS, D.H. (2001): Recent history of Saker Falcon studies in Mongolia. - Falco **17**: 5-6.
- ELLIS, D.H. (2003): Subadult and pale Steppe Eagles breeding in Mongolia. - J. Raptor Res. **37**: 75-77.
- ELLIS, D.H.; LISH, J.W. (1999): Trash-caused mortality in Mongolian raptors. - Ambio **28**: 536-537.
- ELLIS, D.H.; ELLIS, M.H.; TSENGEG, P. (1995): Preliminary raptor surveys in western Mongolia (abstract). - J. Raptor Res. **29**: 55.
- ELLIS, D.H.; ELLIS, M.H.; TSENGEG, P. (1996): Productivity of Saker Falcons (*Falco cherrug*) in Mongolia. - In: SAMOUR, J. (ed.): Proceedings of the Specialist Workshop [Proc. First International Conference on the Saker Falcon and Houbara Bustard], Abu Dhabi, United Arab Emirates, 14-16 November 1995, pp. 117-130. Middle East Falcon Research Group, Abu Dhabi, U.A.E.

- ELLIS, D.H.; ELLIS, M.H.; TSENGEG, P. (1997): Remarkable Saker Falcon (*Falco cherrug*) breeding records for Mongolia. - J. Raptor Res. **31**: 234-240.
- ELLIS, D.H.; TSENGEG, P.; WHITLOCK, P.L. (1998): Saker Falcon research and conservation efforts in Mongolia, 1997. - *Falco* **11**: 7.
- ELLIS, D.H.; WHITLOCK, P.L.; TSENGEG, P.; NELSON, R.W. (1999a): Siblicide, splayed-toes-flight display, and grappling in the Saker Falcon. - J. Raptor Res. **33**: 164-167.
- ELLIS, D.H.; WOFFINDEN, N.; WHITLOCK, P.L.; TSENGEG, P. (1999b): Pronounced variation in tarsal and foot feathering in the Upland Buzzard (*Buteo hemilasius*) in Mongolia. - J. Raptor Res. **33**: 323-325.
- ELLIS, D.H.; TSENGEG, P.; WHITLOCK, P.; ELLIS, M.H. (2000): Predators as prey at a Golden Eagle *Aquila chrysaetos* eyrie in Mongolia. - *Ibis* **142**: 139-142.
- ELLIS, D.H.; MOON, S.L.; ROBINSON, J.W. (2001a): Annual movements of a Steppe Eagle (*Aquila nipalensis*) summering in Mongolia and wintering in Tibet. - J. Bombay Natural History Society **98**: 335-340.
- ELLIS, D.H.; TSENGEG, P.; WHITLOCK, P.; LISH, J.W.; BATDELGER, D.; CONOVER, A. (2001b): Saker Falcons use artificial eyries in Mongolia. - Newsletter of the World Working Group of Birds of Prey and Owls (WWGBP) **29/32**: 27-29.
- ELLIS, D.H.; WINK, M.; MOSEIKIN, V. (2008): El halcón de Altai: ¿es un gerifalte, un sacre, una especie diferente, un mito, un morfotipo o fruto de la imaginación? [The Altai Falcon: is it a Gyrfalcon, a Saker, a unique species, a mutation, a color morph, or a figment of the imagination?]. - Anuario de la Asociación Española de Centrería y Conservación de Aves Rapaces [AECCA] **2007**: 8-19.
- ELLIS, D.H.; CRAIG, T.; CRAIG, E.; POSTUPALSKY, S.; LARUE, C.T.; NELSON, R.W.; ANDERSON, D.W.; HENNY, C.J.; WATSON, J.; MILLSAP, B.A.; DAWSON, J.W.; COLE, K.L.; MARTIN, E.M.; MARGALIDA, A.; KUNG, P. (2009): Unusual raptor nests around the world. - J. Raptor Res. **43**: 175-198.
- GOMBOBAATAR, S.; SUMIYA, D.; SHAGDARSUREN, O.; POTAPOV, E.; FOX, N. (2001): Diet studies of Saker Falcon (*Falco cherrug*) in Mongolia. - In: POTAPOV, E.; BANZRAGCH, S.; FOX, N.; BARTON, N. (eds.): Proc. Second International Conference on the Saker Falcon and Houbara Bustard, Mongolia, 1-4 July 2000, pp. 116-127. Middle East Falcon Research Group, Abu Dhabi, U.A.E.
- GOMBOBAATAR, S.; SUMIYA, D.; SHAGDARSUREN, O.; POTAPOV, E.; FOX, N. (2004): Saker Falcon (*Falco cherrug milvipes* Jerdon) mortality in central Mongolia and population threats. - Mongol. J. Biol. Sci. **2** (2): 13-21.
- KOZLOVA, Y.V. (1975): [Birds of the Steppe Zone and Deserts of Central Asia]. - Nauka [Science], Leningrad.
- LEVIN, A.S. (2000): Problems of Saker Falcon conservation in Kazakhstan. - *Falco* **16**: 8-9.
- LEVIN, A.S. (2001): On the critical state of the Saker Falcon population in Kazakhstan. In: POTAPOV, E.; BANZRAGCH, S.; FOX, N.; BARTON, N. (eds.): Proc. Second International Conference on the Saker Falcon and Houbara Bustard, Mongolia, 1-4 July 2000, pp. 64-79. Middle East Falcon Research Group, Abu Dhabi, U.A.E.
- MEYBURG, B.-U.; MEYBURG, C. (1983): Vultures in Mongolia. - In: WILBUR, S.R.; JACKSON, J.A. (eds.): Vulture Biology and Management, pp. 99-106. - Univ. of Calif. Press, Berkeley, CA, U.S.A.
- MOSEIKIN, V.; ELLIS, D.H. (2004): Ecological aspects of distribution for Saker Falcons (*Falco cherrug*) and Altai Gyrfalcons (*F. altaicus*) in the Russian Altai. - In: CHANCELLOR, R.D.; MEYBURG, B.-U. (eds.): Raptors Worldwide, Proceedings of the VI World Conference on Birds of Prey and Owls, Budapest, Hungary, 18-23 May 2003, pp. 693-703. WWBPO/Hancock House, Blaine, WA U.S.A.

- PFANDER, P.V. (1994): Once again concerning the Altay Gyrfalcon. - *Selevinia* **2**: 5-9. [In Russian].
- PIECHOCKI, R. (1983): Abriß der Erforschungsgeschichte der Avifauna mongolica. - *Erforsch. biol. Ress. MVR (Halle/Saale)* **3**: 5-31.
- POTAPOV, E.; BANZRAGCH, S.; SHIJIRMAAL, D.; SHAGDARSUREN, O.; SUMYA, D.; GOMBOBATAAR, M. (1999): Keep the steppes tidy: impact of litter on Saker Falcons. - *Falco* **14**: 11.
- POTAPOV, E.; BANZRAGCH, S.; FOX, N.; BARTON, N. (eds.) (2001): Proc. Second International Conference on the Saker Falcon and Houbara Bustard, Mongolia, 1-4 July 2000. Middle East Falcon Research Group, Abu Dhabi, U.A.E. 237 pp.
- READING, R.P.; BEDUNAH, D.J.; AMGALANBAATAR, S. (2006): Conserving biodiversity on Mongolian rangelands: implications for protected area development and pastoral uses. - USDA Forest Service Proceedings RMRS-P-39: 1-17.
- SAMOUR, J. (ed.) (1996): Proc. of the Specialist Workshop [Proc. First International Conference on the Saker Falcon and Houbara Bustard], Abu Dhabi, United Arab Emirates, 14-16 November 1995. Middle East Falcon Research Group, Abu Dhabi, U.A.E.
- SHAGDARSUREN, O. (2000): A short history of Saker Falcon (*Falco cherrug* Gray 1834) studies in Mongolia. - *Falco* **16**: 3-5.
- TSENGEG, P.; BOLD, A.; SHAGDARSUREN, O. (1996 unpubl.): Biology-ecology of Saker in Mongolia. - Bachelor Thesis, National Univ. of Mongolia.
- Baumgart, Wolfgang: Der *Sakerfalcon*. *Falco cherrug*. Wittenberg Lutherstadt, A. Ziemsen Verlag., 1980.8°, Broschur, Guter Zustand. 160 S. *NBB* 514 mit 74 Abb. R. (2002): Arab Falconry: History of a Way of Life. - Hancock House, Blaine, WA U.S.A.
- WILLIAMS, M.; LUNSFORD, A.; ELLIS, D.; ROBINSON, J.; CORONADO, P.; CAMPBELL, W. (1998): Satellite tracking of threatened species. - *Argos Newsl.* **53**: 6-17.
- WINK, M.; SAUER-GURTH, H.; ELLIS, D.; KENWARD, R. (2004): Phylogenetic relationships in the Hierofalcon complex (Saker-, Gyr-, Lanner-, Laggar Falcon). - In: CHANCELLOR, R.E.; MEYBURG, B.-U. (eds.): *Raptors Worldwide*, Proceedings of the VI World Conference on Birds of Prey and Owls, Budapest, Hungary, 18-23 May 2003, pp. 499-504 – WWGBP/Hancock House, Blaine, WA U.S.A.
- ZAHLER, P.; LHAGVASUREN, B.; READING, R.P.; WINGARD, J.R.; AMGALANBAATAR, S.; GOMBOBATAAR, S.; BARTON, N.; ONON, Y. (2004): Illegal and unsustainable wildlife hunting and trade in Mongolia. - *Mongol. J. Biol. Sciences* **2** (2): 23-31.

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