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STATUS OF THE TAITA FALCON (*FALCO FASCIINUCHA)* AND OTHER CLIFF-NESTING RAPTORS IN BATOKA GORGE, ZIMBABWE

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ABSTRACT.—The Taita Falcon (*Falco fasciinucha*) is a globally vulnerable cliff-nesting, bird-eating raptor, sparsely distributed down the eastern side of sub-Saharan Africa. It seems to occur in small, isolated pockets of a few breeding pairs, clustered around localized patches of ideal habitat. One such pocket has been the Batoka Gorge system on the Zambezi River, immediately downstream of Victoria Falls on the border of Zimbabwe and Zambia. The species was first recorded here in the late 1950s, and subsequent observations over the next 40–50 yr established Batoka Gorge as an important location for this species worldwide. Regular and intensive surveys in the early to mid-1990s identified at least six breeding territories in the first 40 km of the gorge, and a strong likelihood of more pairs farther downstream. We surveyed this same section of the gorge in July 2013 and November 2014, accumulating >100 hr of observation time at previously occupied Taita Falcon sites. This was the first systematic search of the area for Taita Falcons in nearly two decades. Although we found similar numbers of cliff-nesting Peregrine Falcons (*F. peregrinus*) and Verreaux's Eagles

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(*Aquila verreauxii*) as in the earlier surveys, we did not record any Taita Falcons in the area. The reasons for this decline in numbers and the implications of this finding for the conservation status of this little-known species remain speculative.

Key Words: *Taita Falcon*; Falco fasciinucha; *Batoka Gorge*; *breeding*; *cliff-nesting raptor*; *conservation biology*; *field survey*; *Zimbabwe*.

ESTATUS DE *FALCO FASCIINUCHA* Y DE OTRAS RAPACES QUE ANIDAN EN ROQUEDOS EN EL CAÑÓN DE BATOKA, ZIMBABUE

Resumen.—*Falco fasciinucha* es una rapaz vulnerable a nivel global que anida en roquedos y se alimenta de aves, distribuida de forma discontinua debajo de la parte oriental del África subsahariana. La especie parece estar presente en pequeños agrupamientos aislados de unas pocas parejas reproductoras, agrupados alrededor de parches localizados de hábitat adecuado. Uno de estos agrupamientos ha sido el sistema del Cañón de Batoka en el Río Zambezi, inmediatamente por debajo de las Cataratas Victoria en la frontera de Zimbabue y Zambia. Esta especie fue registrada por primera vez en este sitio a finales de 1950, y observaciones subsecuentes a lo largo de los siguientes 40–50 años establecieron el Cañón de Batoka como un sitio importante para esta especie a nivel global. Muestreos regulares e intensivos desde principios hasta mediados de la década de los 90 identificaron al menos seis territorios de cría en los primeros 40 km del cañón, y sugieren una elevada probabilidad de que haya más parejas río abajo. Muestreamos esta misma sección del cañón en julio 2013 y noviembre 2014, acumulando >100 h de tiempo de observación en los lugares previamente ocupados por *F. fasciinucha*. Esta fue la primera búsqueda sistemática de *F. fasciinucha* en el área en aproximadamente dos décadas. Aunque encontramos números similares de individuos de *F. peregrinus* y *Aquila verreauxii* anidando en los roquedos con respecto a los muestreos anteriores, no registramos ningún individuo de *F. fasciinucha* en el área. Las razones para esta disminución de los registros y las implicaciones de este resultado para el estatus de conservación de esta especie poco conocida siguen siendo especulativas.

[Traducción del equipo editorial]

The Taita Falcon (*Falco fasciinucha*) is a small, bird-eating, cliff-nesting raptor that occurs patchily down the eastern side of Africa, from southern Ethiopia to northern South Africa (del Hoyo et al. 1994, Ferguson-Lees and Christie 2001). The species is poorly known, but generally favors rugged, well-wooded terrain (Hartley 2000, Jenkins and Hartley 2005), and is unevenly distributed in localized, isolated pockets of relative concentration. The Taita Falcon is currently listed as globally vulnerable, with an estimated global population of <1500 birds (International Union for Conservation of Nature 2017). The species may have been overlooked in areas of apparently suitable but remote or inaccessible habitat (Thomson 1984, Thomsett 1998), confounding efforts to accurately assess its conservation status. Also problematic is a lack of recent data on the welfare of the few, small populations that have been located and documented in the past 60 yr.

One such habitat patch used by this falcon is Batoka Gorge, a system of precipitous gorges carved by the Zambezi River along Zimbabwe's border with Zambia. This complex of riparian cliffs extends from Victoria Falls generally eastward for approximately 120 km (Hartley 1993). The Taita Falcon was first recorded in this area when a resident pair was found on the cliffs just below the falls in the early 1950s (Benson and Smithers 1958). The gorges were subsequently the focus of a series of opportunistic surveys to search for more breeding pairs, conducted from the 1960s to the 1990s by researchers from the Peregrine Fund, members of the Zimbabwe Falconers' Club (ZFC), and staff of the Bulawayo Museum (Hustler 1989, Hartley 1990, Weaver et al. 2002). These surveys were generally restricted to all or sections of the upper 30–40 km of the Batoka Gorge system, and were continued until 2007, with a particularly intensive period of more regular and thorough fieldwork in the early to mid-1990s (Hustler 1989, Hartley 2000). During the latter period, Batoka Gorge was identified as an important core area for the Taita Falcon, known to support six breeding pairs and thought to hold more (Hartley 2000). Until our study, however, the gorge had not been fully searched for Taita Falcons for nearly two

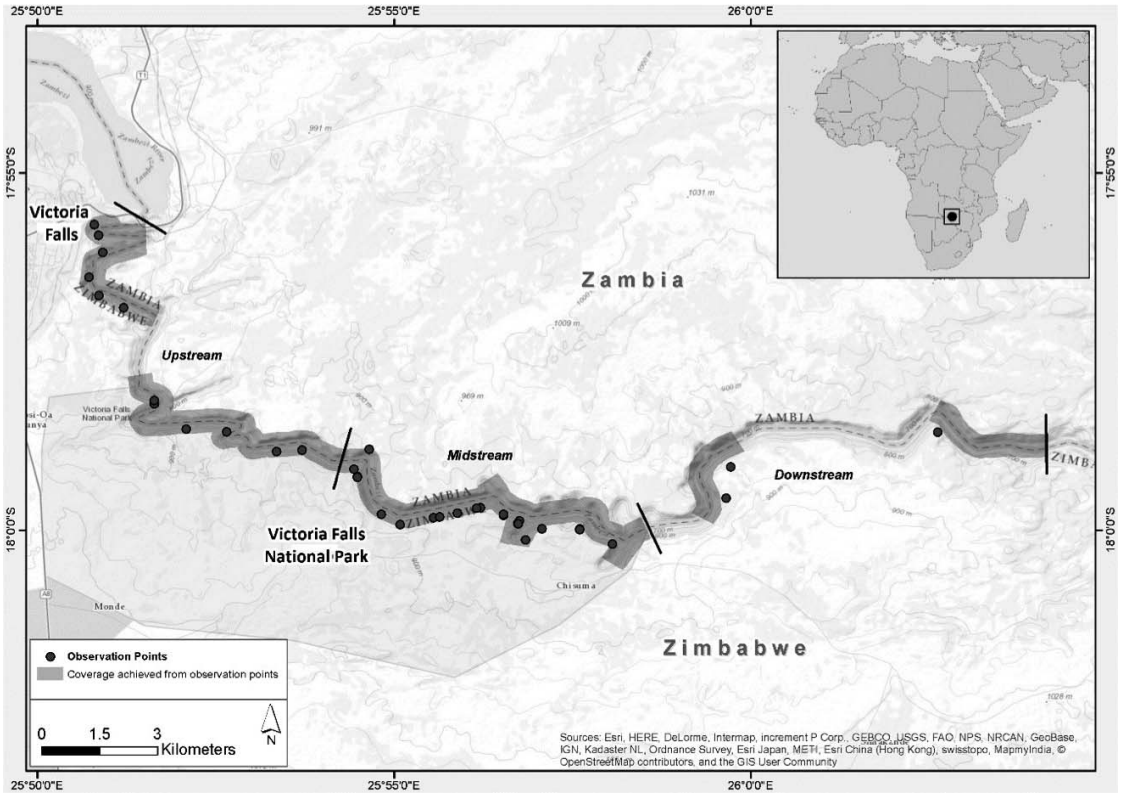

Figure 1. Approximate coverage of surveys conducted in Batoka Gorge on the Zambezi River, Zimbabwe, for Taita Falcons and other cliff-nesting raptors in July 2013 and November 2014.

decades and the current condition of the population remained uncertain.

We detail the findings of a systematic survey of cliff-nesting raptors completed in 2013–2014 along the upper 40 km of Batoka Gorge. The surveys generated count and spacing data for apparently resident pairs based on effort comparable to earlier surveys for Taita Falcons and a suite of other species.

METHODS

Study Area. The Zambezi River drops about 100 m at Victoria Falls and zig-zags southeast through a series of east-to-west sandstone fissures in the surrounding basalt plateau, making up Batoka Gorge (Hartley 1993, Environmental Resources Management 2015; Fig. 1). We surveyed most of the gorge system from just below Victoria Falls to a point approximately 40 km downstream. Coverage included the proximal ends of reentrant gorges created by smaller rivers feeding into the Zambezi River from the north and south. The area surrounding the gorges features undulating terrain covered predominantly by deciduous woodland (mainly mopane [*Colophospermum mopane*], but also miombo [*Brachystegia* spp.] and mixed myrrh [*Commiphora* spp.]), whereas riparian forest grows along the Zambezi River and its tributaries. The towns of Victoria Falls and Livingstone flank the river on the Zimbabwe and Zambian sides of the falls, respectively. Much of the land immediately below the falls is fenced and conserved (Victoria Falls National Park and other privately run protected areas), whereas the areas farther downstream feature scattered rural settlements with low-intensity livestock farming and agriculture (Environmental Resources Management 2015). The altitude ranges from approximately 880 m above mean sea level (amsl) at the falls to about 650 m amsl at the lower end of the study area. Average annual rainfall of 730 mm occurs mostly in summer (November to March). Average maximum temperatures range from 26°C–37°C and average minimum temperatures range from 6°–19°C. Sun-

Table 1. Summary of historical Taita Falcon nest records from Batoka Gorge, Zimbabwe. Breeding was defined as the laying of eggs, and was evidenced by observations of parental care of eggs or young.

Year	Month	Site	Breeding?	Notes	Reference
1957	July	T	No	Pre-breeding	Benson and Smithers 1958
	December	T2	Yes	3 fully-feathered nestlings	
1958	November	T2	Yes	3 fledglings	Holliday 1965
1961	September	T2	Yes	Incubating	Holliday 1965
1964	August	T1	Possibly	Pre-breeding	Holliday 1965
1970	December	T1?	Yes	1 fledgling	Madge 1971
	September	T2	Yes	Incubating	Colebrook-Robjent 1977
1971	September	T2	No	Adults present	Colebrook-Robjent 1977, Dowsett 1983
1972	Unknown	T1	Yes	Incubating	Colebrook-Robjent 1977, Dowsett 1983
	October	T2	Yes	Incubating (4 eggs)	
1973–1978	Unknown	T1	Yes	In most years	Dowsett 1983
		T2	Yes	In most years	
1982	July-October	T1	Yes	At least 1 nestling	Hustler 1989
1983	July-October	T1	Yes	2 nestlings	Weaver 1984, Hustler 1989
1984	November	T1	Yes	1 nestling	J. Weaver pers. comm.
		T6	No	Pair present	
1987	September	T1	No	Adult present	Weaver 1987
		T2	Yes	Pair present	
1988	October?	T9	Possibly	Possibly pair present	Heinrich 1988
1990	November	T1	No	Pair present	Hartley 1990
	August	T16	No	Pair present	
1991	Unknown	T1	Yes	1 downy chick, 1 egg	N. Deacon pers. comm.
		T16	Yes	3 downy chicks	
1992	October	T1	Possibly	Adult present	J. Grobler pers. comm.
		T6	Possibly	Adult present	
		T9	Possibly	Pair present	
		T16	Possibly	Adult present	
1993	December	T16	Yes	1 fledgling	J. Grobler pers. comm.
		T18	Yes	3 fledglings	
1994	October	T9	No	Adult present	R. Hartley pers. comm.
2006	August	T6	Yes	Opposite active Peregrine Falcon site	A. Middleton pers. comm.
2007	Unknown	T6	No	Pair present	A. Middleton pers. comm.

rise to sunset periods were 0645–1800 H in July 2013 and 0540–1840 H in November 2014.

Literature Review. Before commencing fieldwork, we reviewed existing published and unpublished information on the cliff-nesting raptors of Batoka Gorge, extracting and collating all data pertaining to the location and number of Taita Falcon territories or nest sites present, as well as those of Peregrine Falcons (*F. peregrinus*), Lanner Falcons (*F. biarmicus*), Verreaux's Eagles (*Aquila verreauxii*), and Augur Buzzards (*Buteo augur*). The results of this literature search (Table 1) informed our survey work and established a historical baseline for comparison.

Field Surveys. Seven or eight experienced observers surveyed the study area during two visits to Batoka Gorge. The first visit took place from 23–29 July 2013, included 111 hr spent in the field, and involved 205 person-hr of observation. This survey coincided with the Taita Falcon pre-breeding season, when we assumed all falcon pairs (even those that subsequently failed to breed) would be conspicuously present on their territories (Hartley et al. 1993, Hartley 2000, Malan 2009). The second visit took place from 16–20 November 2014, included 63 hr spent in the field, and involved 178 person-hr of observation. This survey coincided with the end of the Taita Falcon breeding season, when we assumed it would be easy to locate successful falcon pairs tending large nestlings or recently fledged young (Hartley 2000, Malan 2009).

Observations were made during 36 discrete 1.1–11.3-hr periods, starting as early as 0545 H and

extending as late as 1825 H, at 32 vantage points distributed along the 40-km study area (Appendix). Mainly for logistical reasons, most vantage points were on the Zimbabwe side of the Zambezi River (Fig. 1). We strategically selected the vantage points to ensure maximum effective coverage of (1) cliffs previously occupied by Taita Falcons or close to previously used sites, (2) high-quality cliffs (i.e., the tallest and steepest in a given section of the gorge), and (3) as many cliffs as possible within the 40-km study area. All observers were equipped with good-quality 10 × binoculars, 20–60 × spotting scopes, two-way radios, appropriate 1:50,000-scale topographic maps, and GPS units. We recorded all sightings of cliff-nesting raptors in as much detail as possible, emphasizing evidence of territory or site status, with (1) at least one adult present on a cliff previously recognized as a nest site of the relevant species (Jenkins and van Zyl 2005, Jenkins et al. 2008), (2) a pair constantly, regularly, or repeatedly present on a cliff heavily marked with fresh whitewash, or (3) a pair performing obvious courtship or pair-bonding behavior at a cliff marked with fresh whitewash, all (1–3) indicative of an *occupied territory*, and (4) a pair obviously tending eggs or young at a recognizable nest site, indicative of *breeding*.

Survey Coverage. To facilitate interpretation of results, we identified three sections of the gorge system: (a) upstream gorge – 17 km from the falls to the downstream boundary of Victoria Falls National Park (gorge made up of sharp zig-zags, with a narrow valley bounded by continuous, sheer-sided walls); (b) midstream gorge – 9 km from national park boundary down to rapid 23 (gorge made up of a series of straights and tight corners, with a relatively open valley bounded by high cliffs); and (c) downstream gorge – 12 km from rapid 23 downstream to where usable road infrastructure ceases (gorge made of longer straights, with a relatively open valley and occasional high cliffs; Fig. 1). We were unable to systematically search approximately 8.5 km (22%) of the 38 km we attempted to survey. The omitted areas included one short section of the upstream gorge that clearly featured some high-quality cliff faces (i.e., relatively tall and sheer), but was too difficult to access. Two other omitted sections, including one 5.4-km section of the lower gorge, featured markedly lower-quality cliff faces, were difficult to access, and were given lowest priority in our planning of the two site visits.

RESULTS

Historical Record. Previous records of Taita Falcon pairs in Batoka Gorge focused on the upstream section of the gorge below Victoria Falls. The first pair was found on the cliffs just below Victoria Falls Hotel (Benson and Smithers 1958). It appeared this pair subsequently moved to a regularly occupied site farther downstream, and a second pair was found at Songwe Gorge at the confluence of the Zambezi and Songwe Rivers (Benson and Smithers 1958, Holliday 1965; Table 1). The ZFC later denoted the latter two sites T1 and T2, respectively, in the context of their attempts to survey and monitor the species over a much wider area (Hartley 2000). Thereafter, biologists revisited these two sites through the 1970s and found them to be consistently occupied by pairs of Taita Falcon and frequently used for nesting (Madge 1971, Colebrook-Robjent 1977, Dowsett 1983), and T1 was confirmed as occupied again in the early 1980s (Weaver 1984, Hustler 1989; Table 1).

Biologists from The Peregrine Fund began to visit the area regularly in the 1980s, primarily to locate nests from which to take nestlings to establish a captive breeding program. They conducted several surveys of the upper reaches of the gorge system from 1982–1989, mostly using inflatable boats on the river (Weaver 1984, Heinrich 1988). These surveys revealed two additional Taita Falcon nest sites (T6 and T9; Table 1).

More intensive survey work by the ZFC occurred from 1990 to 2008, with the most systematic coverage in the early to mid-1990s (Hartley 1990, R. Hartley pers. comm., N. Deacon pers. comm., J. Grobler pers. comm.; Table 1). These surveys involved variable effort and did not always include all of the previously known nest sites. In addition, the time spent at each surveyed cliff appeared to vary widely, making it difficult to determine if a lack of sightings during a given year confirmed a site vacancy. As a result, our summary of the findings of these and previous surveys focuses only on positive evidence of territory occupation and breeding (Table 1).

The ZFC surveys in the 1990s confirmed two additional Taita Falcon nest sites (T16 and T18), bringing the total of known sites in the upper 40 km of the gorge to six, with a strong possibility of more farther downstream (Hartley 2000). Note, however, that the highest number of occupied territories confirmed in a single breeding season was four in 1992 (Table 1). More recent ZFC surveys conducted from the late 1990s through the 2000s confirmed a

Table 2. Number of pairs of Taita Falcons and other cliff-nesting raptors found occupying territories in three sections of Batoka Gorge, Zimbabwe in the 1990s and during this study in 2013/2014.

	Number of Occupied Territories							
	Upstream (17 km)		Midstream (9 km)		Downstream (12 km)		Total (38 km)	
Species	1990s	2013/14	1990s	2013/14	1990s	2013/14	1990s	2013/14
Taita Falcon	2	0	3	0	1	0	6	0
Peregrine Falcon	3	4	2	2	2	0	7	6
Lanner Falcon	0	1	0	1	0	1	0	3
Verreaux's Eagle	3	1	1	2	0	1	4	4
Augur Buzzard	–[a]	1	–	4	–	0	–	5

[a] Observations of this species were not recorded during the 1990s surveys.

sharp decrease in the number of Taita Falcons present in Batoka Gorge, including zero on several occasions and only a single occupied territory confirmed in 2006 and 2007 (N. Deacon pers. comm., A. Middleton pers. comm.).

The Peregrine Fund and ZFC surveys also documented sites occupied by other cliff-nesting raptors, including seven Peregrine Falcon territories and four Verreaux's Eagle territories. In addition, although no Lanner Falcon pairs were present in the gorge during the early to mid-1990s, a pair was first observed in the late 1990s (Middleton 2005, R. Hartley pers. comm.) and two pairs were present by 2006/2007 (A. Middleton pers. comm.).

To design our field surveys, we compiled and collated these historical records to develop a composite community map of all known territories of cliff-nesting raptors in the study area, including accommodating interannual shifting of pairs between alternative nest sites.

Survey Results. We observed no Taita Falcons during the study, despite spending >100 hr (>200 person-hr) at sites previously occupied by resident pairs (5.75–24.80 hr observation per site; Appendix). We found at least 18 pairs of other cliff-nesting raptors (Table 2). Peregrine Falcon was the most numerous species, followed by Augur Buzzard, Verreaux's Eagle, and Lanner Falcon. The mean spacing between nest sites was 3.3 km for Peregrine Falcon ($n=6$; range: 1.9–6.7 km), 8.7 km for Lanner Falcon ($n=3$; range: 8.1–9.2 km), 5.1 km for Verreaux's Eagle ($n=4$; range: 3.9–6.3 km), and 3.9 km for Augur Buzzard ($n=5$; range = 2.0–8.3 km). The density of cliff-nesting raptors varied from 0.4 pair/km of river in the upstream section of the gorge, to 1.0 pair/km in the midstream section, and 0.2 pair/km in the downstream section (Table 2).

Discussion

We conducted the first thorough search for Taita Falcons in the Batoka Gorge since the 1990s, using a significant workforce and substantial observation times at all cliff habitat previously occupied by the species along the first 40 km of the gorge downstream of Victoria Falls. Our failure to find any sign of the species suggests that Batoka Gorge is no longer a stronghold for the Taita Falcon, and that the upper section of the gorge no longer supports breeding pairs. However, in reaching this conclusion, we must acknowledge some weaknesses in our approach.

First, we did not survey some areas of good habitat that could have held a pair of Taita Falcons. Although the pattern of spacing between pairs of Peregrine Falcons suggested that a seventh pair of peregrines may have occupied this gap, we have no direct evidence for or against this assertion.

Second, financial and logistical constraints limited our study to only 12 field days, and precluded our working from both sides of the gorge simultaneously or extending the survey farther than 40 km below Victoria Falls. We were also unable to work from the river to access more remote sections of habitat and camp *in situ* to be present under prime cliffs in the early morning or late evening when Taita Falcons may have been most active and obvious (e.g., Möller 1989, Thomsett 1998). Instead, our surveys were restricted to using roads on the Zimbabwe side of the river to get observer teams as close to the gorge as possible, then walking to vantage points on the edge of the gorge, arriving as early in the day as possible.

Despite these potential limitations, our effort rivalled or surpassed that of previous surveys and we are confident that our results accurately reflect the current status of Taita Falcons in the upper 40 km of the Batoka Gorge system. This conclusion is

supported by prior evidence of a decrease in Taita Falcon numbers from the late 1990s through mid-2000s (R. Hartley pers. comm.). In contrast, we documented similar numbers of Peregrine Falcon and Verreaux's Eagle pairs as in the earlier surveys (Table 2), as well as continued growth of the Lanner Falcon population since the late 1990s (R. Hartley pers. comm.). In addition, the overall densities of cliff-nesting raptors that we documented in the three surveyed sections of the gorge were similar to those recorded in the 1990s (0.5, 0.7, and 0.3 pair/km in the upstream, midstream, and downstream sections, respectively; R. Hartley pers. comm.).

At present, we can only speculate about why the Taita Falcon breeding population has decreased so markedly at Batoka Gorge. Declining river water quality and its attendant effects on insect abundance could have reduced numbers of aerial insectivores (in particular, Black Swift [*Apus barbatus*], the dominant aerial insectivore in the system), possibly resulting in a reduction in prey availability for Taita Falcons (Möller 1989, Hartley et al. 1993). Adventure tourism and helicopter traffic in the gorges might have caused excessive disturbance (Hartley 1995). Growth in the rural human population on both sides of the gorge might have reduced woodland cover and created more open, disturbed conditions better suited to the more generalized Lanner Falcon than the highly specialized Taita Falcon (Hartley 1993, 1995, 2000; Jenkins and Hockey 2001).

A cursory assessment of land cover changes within 2.4 km of the six known historical Taita Falcon nest sites (i.e., radial assessment areas extending out to approximately half of the mean inter-pair distance) showed that the extent of croplands had increased by approximately 20% over the last decade, whereas the extent of closed woodland had decreased by 30%. Lanner Falcons appear to have benefited from this escalating degradation of natural habitat, with at least three pairs colonizing the study area between the late 1990s and mid-2010s. The resulting net increase in the density of large, dominant falcons (peregrines and lanners) might have exerted unsustainable competitive pressure on the smaller Taita Falcons, ultimately displacing them from the relatively limited cliff habitat available in the gorge (Hustler 1989, Hartley 2000).

Another perspective is that this apparent change in the importance of Batoka Gorge for the Taita Falcon may not be permanent, but rather a temporary response to periodic changes in the climate, prey base, and/or status of competing species. There is evidence that Taita Falcon populations may be inherently prone to fluctuation, with apparently established breeding pairs and even localized pockets of several pairs having disappeared suddenly from other areas (Hartley 2000, South Africa Taita Falcon Survey Team pers. comm.). Although the conservation implications of this tendency remain unexplained (and may be associated with still-unrecognized natural cycles), it raises serious concerns about the potential for long-term survival of this hyper-rare species (International Union for Conservation of Nature 2017). It also further emphasizes some common ecological traits between the Taita Falcon and the similarly specialized and sparsely and erratically occurring Orange-breasted Falcon (*Falco deiroleucus*) of the Neotropics (Berry et al. 2010, Baker et al. 2012). Although the two species are quite different in key aspects of their biology and taxonomy (Fuchs et al. 2015), these significant demographic parallels suggest that the two species should be receiving comparable allocations of research and conservation effort; however, currently this is not the case.

The Batoka Gorge area supports a wide diversity of both resident and migratory birds of prey, and high densities of both cliff- and tree-nesting raptors (Hartley 1993), as well as important populations of other rare or threatened species (e.g., the seven pairs of cliff-nesting Black Storks [*Ciconia nigra*] found during our surveys). As such, it has been proposed as a special reserve for Zimbabwe raptors (Hartley 1995) and has been registered as a Zimbabwean Important Bird and Biodiversity Area (Childes and Mundy 2001). This elevated conservation status is justified, even allowing for the current absence of Taita Falcon as a breeding resident, and warrants due consideration in future management of the system. The proposal to impound the Zambezi River about 50 km below Victoria Falls to provide hydroelectric power is a case in point (Hartley 1993, Environmental Resources Management 2015). Completion of this project would flood much of the cliff and woodland habitat of Batoka Gorge, with serious adverse consequences for the affected avifauna (Hartley 1993, 1995).

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Appendix. Timing and findings of surveys for cliff-nesting raptors conducted from vantage points along the edge of Batoka Gorge, Zimbabwe in 2013–2014. Abbreviations refer to species names and nest-site numbers in terms of a nationwide raptor survey and monitoring protocol used by The Peregrine Fund and the Zimbabwe Falconers' Club from the late 1950s until the early 2000s (T = Taita Falcon, P = Peregrine Falcon, BE = Verreaux's/Black Eagle). Sites listed in square brackets were found either before or after this period and were not recorded in this way (T = Taita Falcon, PF = Peregrine Falcon, LF = Lanner Falcon, AB = Augur Buzzard). Sites that were reconfirmed in subsequent observations appear in italics.

Date	Observation Point[a]	Number of Observers	Start Time	Total Observation Time (hr)	Corresponding Historical Sites	Nest Sites / Territories Recorded
23 July 2013	1	3	0615 H	3.5	T9, [AB]	Augur Buzzard
	2	1	1125 H	5.1	T9, [AB]	Peregrine Falcon
	3	1	1147 H	6.3	T9, [AB]	–
	4	1	1150 H	6.1	T9, [AB]	*Augur Buzzard*
24 July 2013	5	1	0820 H	4.2	T6, BE3, [PF]	–
	6	2	0835 H	4.1	T6, BE3, [LF]	Lanner Falcon
	7	1	0804 H	2.3	P114	–
	8	1	1030 H	2.0	T6, BE3, [PF]	–
	9	1	1700 H	1.1	[PF]	–
25 July 2013	10	2	0730 H	8.0	[T]	Peregrine Falcon
	11	2	0840 H	5.6	T1, P32, BE1	Augur Buzzard
	12	2	0810 H	7.1	T1, P31	*Augur Buzzard*
26 July 2013	13	2	0945 H	5.3	T2, BE2	–
	14	3	0815 H	3.1	T1, P32	Peregrine Falcon
	15	3	1255 H	1.3	P32	–
	16	1	0814 H	6.8	T2	Peregrine Falcon Verreaux's Eagle
27 July 2013	17	2	0700 H	11.3	–	Verreaux's Eagle
	18	2	0810 H	6.6	P84, [AB]	Peregrine Falcon Augur Buzzard
	19	2	0715 H	8.2	T16, BE4, [LF]	Lanner Falcon
28 July 2013	20	1	0915 H	2.8	P116	–
	21	3	0640 H	1.4	P114, [AB]	–
	22	1	1010 H	2.8	P116	Verreaux's Eagle
	23	1	1000 H	3.3	T6, P115	–
29 July 2013	24	5	0725 H	3.6	T6, PF, BE3	Augur Buzzard Verreaux's Eagle
16 November 2014	25	2	0630 H	6.5	–	–
	4	3	0700 H	6.0	–	–
	26	2	0715 H	5.8	P116	Augur Buzzard
	27	7	1700 H	1.0	[T]	–
17 November 2014	28	7	0815 H	5.8	T18, BE6	Lanner Falcon
18 November 2014	29	2	0720 H	7.0	P3	–
	30	2	0750 H	6.7	T2, P119	–
	31	3	0820 H	6.6	T6, BE3, [LF]	Peregrine Falcon *Lanner Falcon*
19 November 2014	19	2	0930 H	6.5	T16	*Lanner Falcon*
	32	2	0915 H	5.3	P114	–
	18	2	1015 H	5.0	P84, [AB]	*Augur Buzzard* *Peregrine Falcon*
20 November 2014	5	2	0545 H	1.0	T6, BE3, [PF]	–

[a] The locations of all observation sites are shown in Figure 1. The locations of specific observation sites, as identified in this table, are not mapped to protect sensitive nest-site locations.