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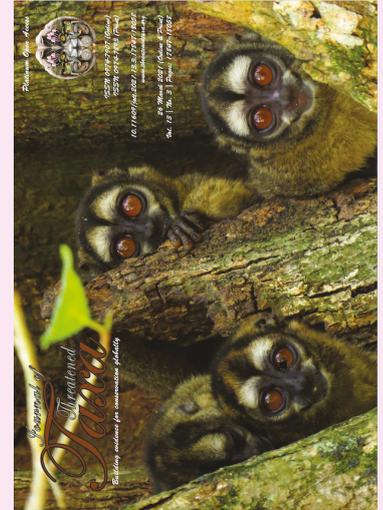
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ARTICLE

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Decline of White-throated Bushchat *Saxicola insignis* Gray J.E. & J.R. Gray, 1847 (Aves: Passeriformes: Muscicapidae) in Nepal: implications on its global status

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Abstract: The White-throated Bushchat, also known as Hodgson's Bushchat, is a long-distance migratory and specialist grassland bird categorized as Vulnerable on the IUCN Red List. In Nepal, White-throated Bushchat winters in the lowlands, and has been primarily recorded in large Phantas (=open plains of grassland). We present the population status of the species in Shukla Phanta, the largest continuous lowland grassland in Nepal that is known to hold the largest wintering population of White-throated Bushchat in the Indian subcontinent. Our 2013–2014, 2016–2017, and 2017–2018 winter surveys for White-throated Bushchat followed the same method used in the 1997–1998 and 2007 surveys in Shukla Phanta for comparable assessment of the status of the species. Our study provided overwhelming evidence that the species has undergone a steep decline over the last two decades (probability of 92% for a decline greater than 5% per year). Shukla Phanta is dominated by the species' preferred habitat of *Imperata cylindrica*, *Narenga porphyrocoma*, and *Saccharum bengalensis*. Grassland patches managed through controlled burning leaving enough reeds for perches, grazed at medium level of intensity by wildlife and within close distance to water were found to support higher numbers of White-throated Bushchat. Given the observed steep decline in the largest known wintering population of the species and similar declines observed in the wintering populations in India, its status warrants uplisting to Critically Endangered, and we recommend an urgent review of its global status.

Keywords: Abundance, Hodgson's Bushchat, IUCN Red List, lowland grassland, Shukla Phanta, status, winter visitor.

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For Nepali abstract, Author details & Author contribution see end of this article.

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INTRODUCTION

White-throated Bushchat *Saxicola insignis* J.E. & G.R. Gray, 1847 is a grassland specialist and one of the poorly known *Saxicola* species; Jerdon's Bushchat *Saxicola jerdoni* is the other little known species that is recorded in Nepal (Urquhart 2002; Clement & Rose 2015). *Saxicola insignis* is listed under the Vulnerable category in the IUCN Red List due to its declining population throughout its restricted range (BirdLife International 2018). The global population is estimated to be between 3,500 and 15,000 individuals based on assessment of recent records and surveys carried out by BirdLife International (2019); however, more recent information indicates the global population to be significantly lower.

White-throated Bushchat breeds locally in alpine or subalpine rocky meadows and scrub in the mountains of Mongolia and adjacent parts of Russia, and migrates southward across the Himalayan mountain range to winter in the Gangetic plain of the Indian subcontinent (Ali & Ripley 1987; Gombobaatar et al. 2011; BirdLife International 2018). It has been recorded on passage in northern and western China, including Tibet. The species' wintering range is restricted west from Haryana (Ambala), east through Uttar Pradesh, Uttarakhand and Bihar to northern West Bengal and Assam (Manas) through the Nepal Terai and Jalpaiguri duars (Ali & Ripley 1987; BirdLife International 2018). As a long-distance migratory bird facing threats, the species has been listed in Appendix II of Convention on Migratory Species (CMS 2018).

In Nepal, White-throated Bushchat has been recorded in six localities: Chitwan (winter visitor and passage migrant), Kathmandu Valley (passage migrant), Koshi (Koshi Tappu and Koshi Barrage, winter visitor and passage migrant), Lumbini Farmscape (winter visitor and passage migrant), Banke National Park (winter visitor) and Shukla Phanta (winter visitor and passage migrant) (Fig. 1) (Inskipp et al. 2016). In 1998 the wintering population in Nepal was estimated to be 110 individuals (Baral 1998). Shukla Phanta in the far southwestern Nepal has been reported to support the largest wintering population of the species in the region (Baral 1998; Yadav 2007; Thakuri 2012). There have been very few observations of the species in the other localities in Nepal (Inskipp et al. 2016). Given its restricted wintering habitats, continuing habitat loss and observed declining population since 2007 it has been classified as Endangered in the Nepal bird Red Data Book (Inskipp et al. 2016, 2017). The species has also been recommended to the Government of Nepal to be

listed as a protected species under the National Parks and Wildlife Conservation Act (Baral 1998; Inskipp et al. 2016).

Habitat loss and degradation, due to overgrazing, cutting and burning of grassland, is the major threat to the White-throated Bushchat in Nepal (Baral 1998; Yadav 2007; Thakuri 2012). Most of the suitable grassland habitats for the species are now confined to protected areas, and outside protected areas very little lowland grasslands remain in Nepal (Baral 2001).

This study was undertaken to update the status of the species in its major grassland sites in the Nepal Terai, and assess its implication on the species' global status. It formed part of a wider species monitoring project in Shuklaphanta National Park.

MATERIALS AND METHODS

Study area

Shukla Phanta with an area of 34km² is the largest lowland grassland area in Nepal, located within Shuklaphanta National Park (ShNP 2017, Fig. 2, Image 1). The grassland consists primarily of *Saccharum bengalensis*, *S. spontaneum*, *Imperata cylindrica*, *Narenga porphyrocoma*, and *Desmostachya bipinata*. The grassland also harbors a number of threatened species including the globally Critically Endangered Bengal Florican *Houbaropsis bengalensis*; the Endangered Bengal Tiger *Panthera tigris*, Hog Deer *Axis porcinus*, & Hispid Hare *Caprolagus hispidus*; and the Vulnerable Jerdon's Babbler *Chrysomma altirostre*, Swamp Francolin *Francolinus gularis*, Greater One-horned Rhinoceros *Rhinoceros unicornis*, & Swamp Deer *Rucervus duvaucelii*. Shuklaphanta National Park has



Image 1. Habitat of White-throated Bushchat, Shuklaphanta, Nepal.

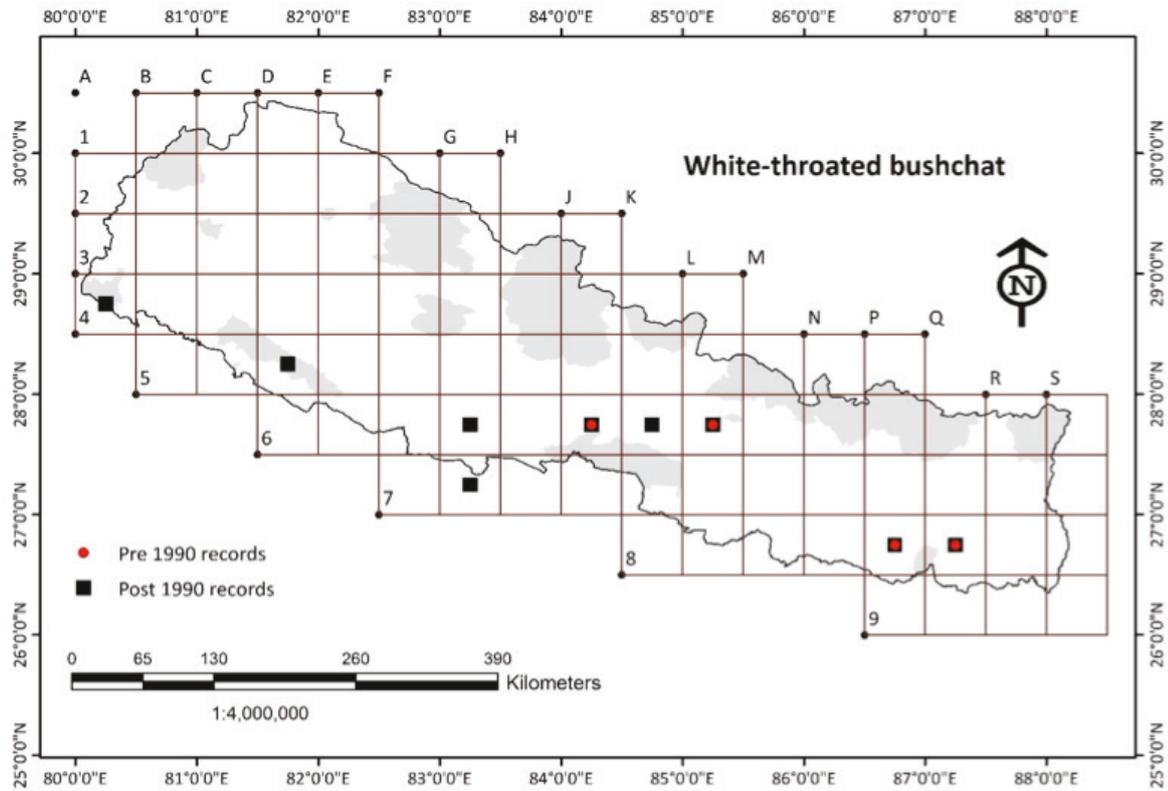


Figure 1. White-throated Bushchat distribution in Nepal based on pre and post 1990 sighting records (Source Inskipp et al. 2016).

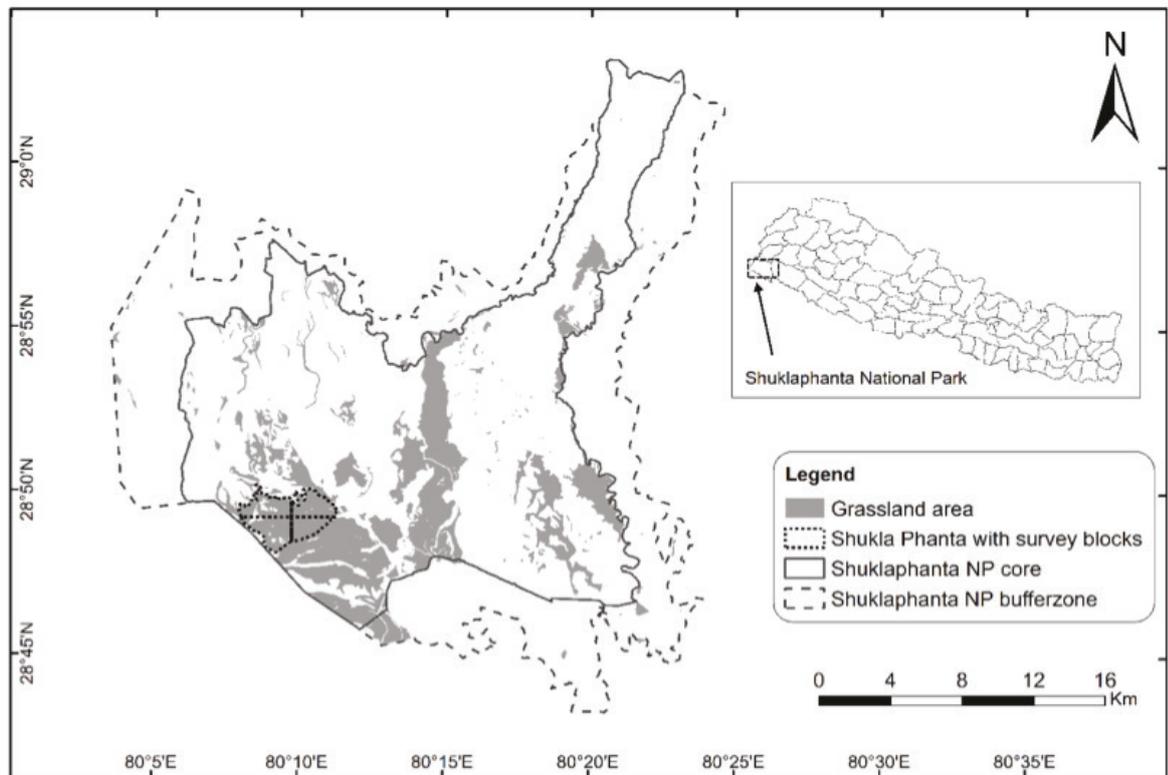


Figure 2. Location of Shukla Phanta grassland within Shuklaphanta National Park in the far southwestern corner of Nepal. The surveyed area is also shown.

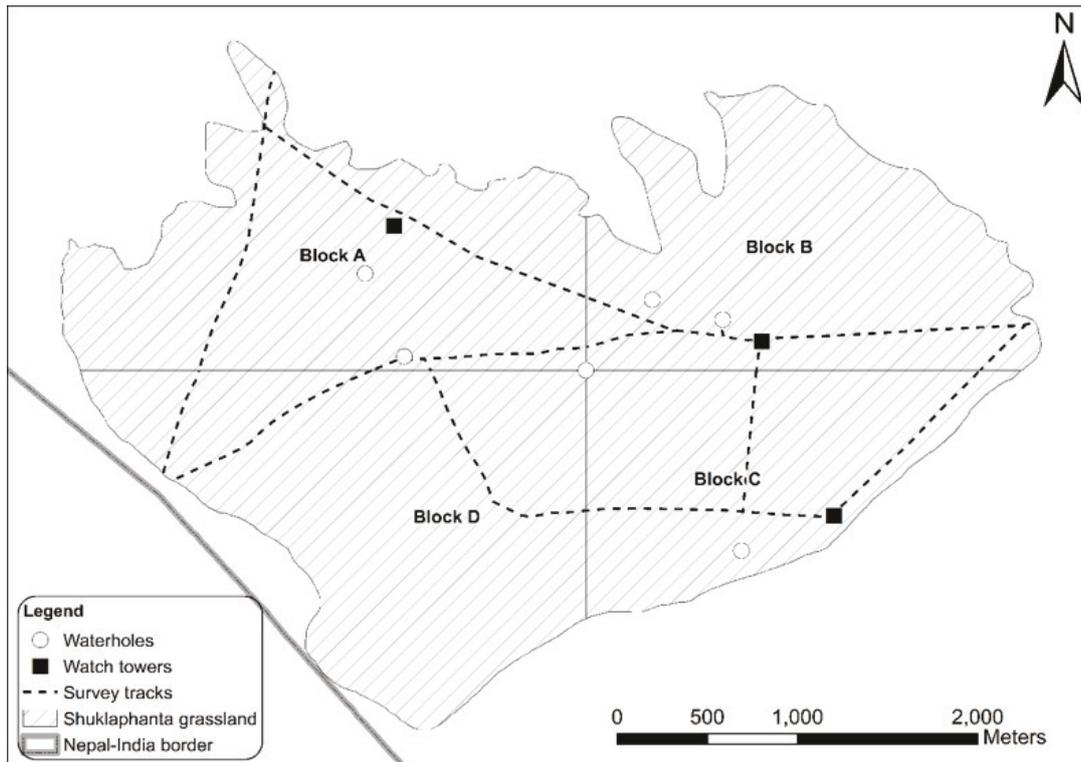


Figure 3. Shukla Phanta study area with survey blocks and tracks.

a sub-tropical monsoonal climate with three distinct seasons, monsoon (July–October), cool-dry (November–February) and hot-dry (March–June).

Field methods

Systematic surveys for the White-throated Bushchat (Image 2) were conducted over three winters in Shukla Phanta: winter of 2013–2014, 2016–2017, and 2017–2018. The line transect survey method was the same as that used in the previous 1997–1998 and 2007 surveys. Other smaller grasslands in Shuklaphanta National Park (Singhpur, Radhapur, Sundari Phanta) were also searched for the species as part of the reconnaissance at the beginning of each survey. Field ornithologists were consulted to verify the information collected on bird sightings, their numbers and for their perceptions on the status of the species (T.R. Giri & D.R. Joshi pers. comm. 2014).

A total of 11 trained individuals, which included technical national park staff, non-profit field workers, and freelance field ornithologists participated in the surveys. Prior to each survey, participants were familiarized with the identification of White-throated Bushchat in the field, and determining its sex based on morphological characteristics (Grimmett et al. 2000). Participants were also provided with a guidebook to help with bird species

identification. Two of the participants had also taken part in the previous 1997–1998 survey.

The study was conducted in a portion of the larger Shukla Phanta grasslands where the species had been recorded in the past and the area also covered in the previous surveys. The 11.7km² survey area was divided into four blocks (Fig. 3). Surveys were carried out along 15.3km of motorable trails (Table 1) between 06.00–09.00 h when the species is most active. Each survey was carried out for a total of 16 days over a 3-month period. Three observers scanned grassland and other habitats for White-throated Bushchat using Opticon 8 x 42 binoculars and telescopes (Nikon FIELDSCOPE ED50 and Swarovski ATS 60 HD), from an open-back jeep travelling at 10km per hour. On sighting the species, the vehicle was stopped and data recorded on a data form. The recorded data included the GPS location, date and time, number of birds, their sex (except for immatures), and their activities (feeding, perching). The grassland condition was recorded as uncut and unburned, uncut and burned, and cut and burned. Dominant grass species were recorded, based on visual observation, along with grazing intensity (low, medium, high). Distance to the nearest water body and grass sward height were also recorded. Double counting was minimized by surveying all blocks at the same time and double-checking records

Table 1. Summary of combined survey effort for the White-throated Bushchat in the Shukla Phanta study area over the 2013–2014, 2016–2017, 2017–2018 wintering seasons.

Survey block	Area (km ²)	Total number of days surveyed	Total length of motorable trails surveyed (km)
A	3.12	16	5.05
B	2.89	16	3.67
C	2.15	16	3.32
D	3.52	16	3.26



Image 2. White-throated Bushchat, Shuklaphanta, Nepal.

at the end of each survey.

Data analysis

Observations of White-throated Bushchat were tabulated in Microsoft-Excel. Species maximum count for each survey period were compared with the 1997–1998 survey results and the percentage of White-throated Bushchat sightings in the three grassland conditions, in the three grassland grazed intensities, and distance to water bodies were calculated.

We assessed population trend by regressing natural log of counts against survey years (1997–1998, 2005–2006, 2013–2014, 2016–2017, 2017–2018) (Baral 1998; Yadav 2007). The slope of the regression provides an estimate of the instantaneous growth rate (r) (Caughley 1977). A significant positive slope implies an increasing population and a negative slope implies population decline, while a slope of zero implies a stationary population (Caughley 1977). To provide further insight we used Bayesian analysis (Crome et al. 1996). We assumed a flat prior and treated the scaled likelihood curve as the posterior probability. On this basis, we calculated the probability of no decline ($\text{trend} > 0$), a small decline ($-0.05 < \text{trend} < 0$) and a steep decline ($\text{trend} < -0.05$) by calculating the area under the respective parts of the curve.

RESULTS

A total of 63 White-throated Bushchat sightings was recorded over a total of 16 days in the three surveyed seasons. In the 2013–2014 wintering season, a maximum of seven individuals was recorded on the 20 and 25 March, while a minimum of two individuals was recorded on 22 April. In 2016–2017 season, a maximum of six individuals was recorded on the 14 January, and a minimum of two individuals on 12 January. Similarly, in 2017–2018 season, a maximum of six individuals was recorded on 18 March, and a minimum of one individual on 19 and 20 March (Table 2). Male White-throated Bushchat ($n=37$) were observed more frequently than females ($n=26$). No birds were recorded in the smaller grassland patches during the reconnaissance surveys.

The species was only observed in grassland habitat dominated by *Imperata cylindrica*, *Saccharum spontaneum* or *Narenga porphyrocoma* with a sward height greater than 30cm. More than two-thirds of the Shukla Phanta grasslands are covered with dense stands of taller *Narenga porphyrocoma* and *Saccharum bengalensis* either single species or mixed, and in the

Table 2. Maximum and minimum sighting records of White-throated Bushchat in the wintering survey periods of 2013–2014, 2016–2017, and 2017–2018.

Survey winter period	Number of individuals sighted in a day	Date
2013–2014	7 (maximum)	20 March 2014 and 25 March 2014
	2 (minimum)	22 April 2014
2016–2017	6 (maximum)	14 January 2017
	2 (minimum)	12 January 2017
2017–2018	6 (maximum)	18 March 2018
	1 (minimum)	19 March 2018 and 20 March 2018

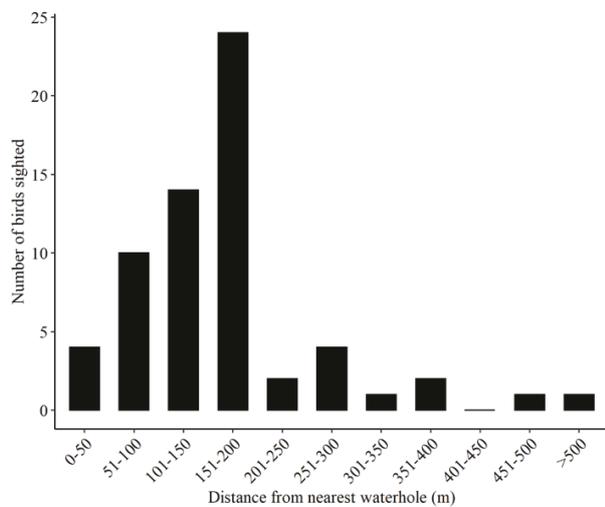


Figure 4. Number of White-throated Bushchats sighted at different distance range from nearest water body.

southeastern corner *Phragmites karka* monostand forming the largest contiguous *Phragmites* marshland of Nepal. Even during the fire season, most of these wetter patches of grasslands remain unburnt or only partially burnt. Previous surveys have already established that these *Phragmites* marshland habitats are not used by White-throated Bushchats.

There was significant correlation between sighting of the birds and distance from the nearest water body ($\chi^2=20.86$, $df=2$, $p=0$). Nearly half of the sightings (45%; $n=28$) were within 150m from a water source while more than 90% of the sightings ($n=58$) were made within 300m from a water source (Fig. 4).

The highest number of White-throated Bushchat sightings (63%; $n=40$) were in uncut but burned grassland patches followed by uncut and unburned patches (21%; $n=13$), and cut and burned patches (16%; $n=10$) (Fig. 5). In terms of grazing intensity, 57% of White-throated Bushchat sightings ($n=36$) were in medium

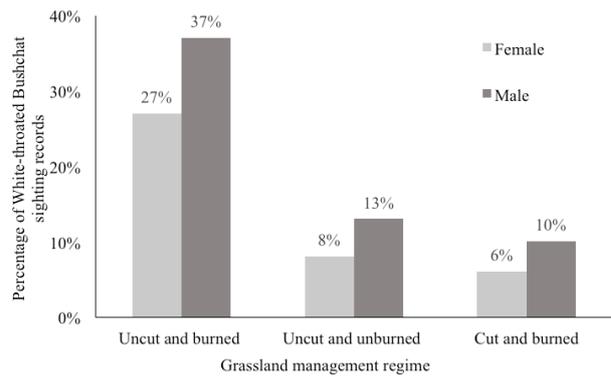


Figure 5. Percentage of White-throated Bushchat sightings within three different grassland management regimes.

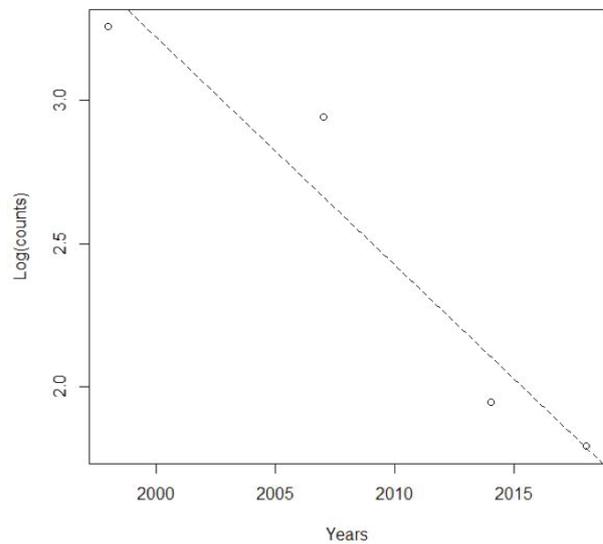


Figure 6. White-throated Bushchat population trend in Shukla Phanta based on surveys carried out over two decades.

grazed grassland patches while nearly 30% ($n=19$) were in low grazed patches and remaining 13% ($n=13$) of the sightings were in high grazed patches.

Population trend analysis based on maximum number of 26, 19, 7, 6, and 6 individuals counted during 1997–1998, 2005–2006, 2013–2014, 2016–2017, and 2017–2018 surveys revealed an average 8% ($R\text{-squared}=0.92$, $95\% \text{ CI}=-14.9\% \text{ to } -1\%$) per year decline (Fig. 6). The Bayesian analysis showed a 92% probability of a steep decline with a probability of only 7% of small decline (Fig. 7).

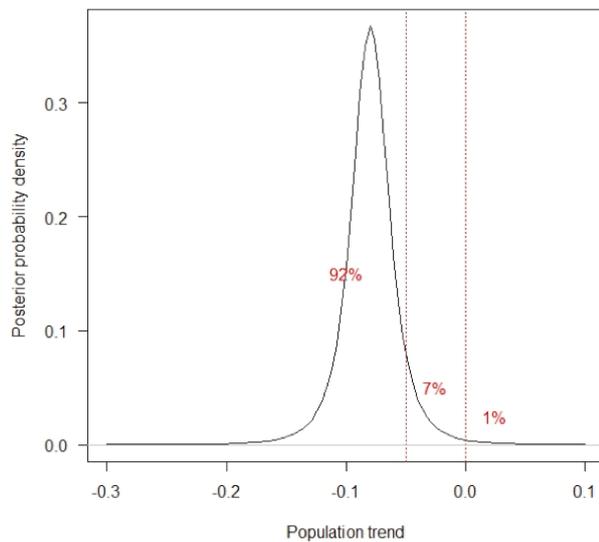


Figure 7. Probability distribution of White-throated Bushchat population decline in Shukla Phanta based on surveys carried out over two decades.

DISCUSSION

Most of the global wintering population of White-throated Bushchat occurs in northern India and southern Nepal (Ali & Ripley 1987) and along Indo-Bhutan landscape, with a single record from Bhutan (BirdLife International 2018). The species' subtropical riverine grasslands remain the most threatened habitats in the Indian subcontinent (Baral 2001; Grimmett et al. 2011; Rahmani 2012), and also one of the most threatened ecoregions of the world (Olson et al. 2001). The rapid range and population decline of this globally threatened species are of serious concern.

This study has shown that White-throated Bushchat has very specific habitat requirements in its wintering grounds. We observed that the species utilizes uncut and burned grassland more than uncut-unburned and cut-burned grasslands. We did not observe any cut but unburned grassland areas in the study site; almost always if areas are cut then they are burned. This preference for uncut and burned grassland could be due to the presence of a few unburnt reeds and some partially burnt reeds that act as perching posts, and the exposed ground patches that allow the birds to see insect movement (Baral 1998, 2001). Additionally, the clearings enable increased activity of soil arthropods due to higher heat absorption by dark ashes deposited on the ground (Baral 2001). In contrast, the least number of individuals were seen in cut and burned grasslands, possibly due to lack of suitable perches. The study has

also shown that medium-grazed grasslands support a higher number of the species, which may be due to the few open patches for the birds to see ground-dwelling insects as well as ample number of standing reeds as perches (Kleijn 2010). Very few bushchats were recorded in grasslands with high grazing intensity, possibly due to absence of suitable perches. Although illegal, livestock grazing is one of the biggest problems in Shuklaphanta National Park, the Shukla Phanta grassland is located in the core of the park and is grazed by wild herbivores only.

The study also found a strong association of species sightings with water holes and wet areas. A high percentage of individuals was recorded in close proximity to water bodies. Water and flooding are associated with the formation of early stage successional grasslands (Baral 2001). In the known wintering grounds of White-throated Bushchat in Nepal, these early stage successional grasslands usually comprise *Sachharum spontaneum* and *Imperata cylindrica* which provide high quality physical structure of habitat, such as suitable perch height and sufficient open ground. This habitat may also provide the right type of food in ample amount.

The lowland Terai grasslands are a valuable economic resource for local communities and are important for conserving biodiversity as they support a wide variety of flora and fauna (Baral 2001). Although Shukla Phanta is recognized as the stronghold for White-throated Bushchat in Nepal, the number of birds recorded has dramatically declined since systematic surveys began in 1997. Based on this decline, we have already listed the species as Endangered on the Nepal bird Red List, and a proposal has been submitted to the Government of Nepal for inclusion in the list of protected birds under National Parks and Wildlife Conservation Act (Inskipp et al. 2016).

Composition of grass species and consequently physical structure of the habitat is an important factor in the occurrence and abundance of White-throated Bushchat in its wintering range (Baral 1998, 2001). The Terai lowland grassland ecosystem is very fragile and responds to even small-scale manipulations or modifications (Baral 2001). There have been significant changes in the composition of the grasslands in lowland Nepal over the last two decades. Many shorter grassland species habitats have been either lost through development outside protected areas or through succession in protected areas. Shorter grass species such as *Imperata cylindrica* and *Saccharum spontaneum* that make up the suitable habitat for the White-throated Bushchat and several other globally

threatened species such as Bengal Florican *Houbaropsis bengalensis*, are being taken over by coarser and taller *Narenga porphyrocoma*, *Themeda arundinacea*, and *Saccharum bengalensis* (Baral 2001). Although the underlying mechanism of the habitat change is yet to be fully understood, it is likely that in addition to existing practices of grassland burning, grass collection and grazing, changes in herbivore populations in protected area and altered climate events due to global warming have contributed to the rate of succession.

White-throated Bushchat has also been recorded from outside the protected areas in lowland Nepal. These are mostly of single isolated birds, however, and it is unlikely that a large wintering population occurs outside protected areas in Nepal. Recent records from India also indicate population decline in known wintering grounds, with only a single or a few birds recorded (BirdLife International 2018). The species has been observed in several new localities in India, which might be primarily because of a larger number of people observing birds in recent years. Unlike more secretive species, White-throated Bushchat is an obvious species, further minimizing the chances of under-recording especially during targeted surveys.

The decline of the wintering population of the species is perhaps also a reflection of a declining breeding population and threats along the migration paths. Habitat loss at breeding sites and environmental conditions along migratory path (including food availability, predation and disturbance) may be contributing to the severe decline of the population within a short span of time (Gombobaatar et al. 2011; BirdLife International 2018). Impact of climate change to this species is unknown, some of its migratory patterns may have been affected by climate change.

Globally, White-throated Bushchat is classified as 'Vulnerable' on the IUCN Red List based on its restricted geographical coverage, small and declining population (BirdLife International 2018). This assessment, however, is based on an outdated global population estimate of 2,500–9,999 mature individuals compiled in 2001 by BirdLife International and other limited information available for the species (BirdLife International 2018). Clement & Rose (2015) have suggested that the global population may be well under 1,000 based on the species decline across Nepal and India.

The current observed decline of the largest wintering sub-population of the species meets the Critically Endangered Criterion A2a ($\geq 80\%$ population reduction observed/expected through direct observation in the largest wintering sub-population) and C2a (maximum

of 6 individuals observed in the largest wintering sub-population and assuming all other previously known smaller wintering sub-populations to have less than 50 individuals), along with observed declines at other sites and threats reported at breeding sites and along migratory routes. Therefore, we propose an immediate global re-assessment. Earlier literature also recommended up-listing the species global status from Vulnerable to Endangered or Critically Endangered (Baral 1998; Clement & Rose 2015).

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Nepali abstract: सेतो कण्ठे घिप्पी विश्वमै दुर्लभ र संकटको अवस्थामा रहेको लोपोन्मुख र लामो दूरीको बसाइसराई गर्ने चरा प्रजाति हो। नेपालको दक्षिणभाग तराइ मधेशका समथर भागमा रहेका घाँसेमैदानका फाँटहरूमा यो हिउँद चिताउने गर्दछ। नेपालको सबैभन्दा फराकिलो र ठूलो घाँसेमैदान शुक्लाफाँटा राष्ट्रिय निकुञ्जमा रहेको छ। यस निकुञ्जमा भारतीय उपमहाद्वीपकै सबैभन्दा बढी संख्यामा हिउँदे आगन्तुकका रूपमा यो प्रजातिको अवस्था यस शोधपत्रमा चित्रण गरिएको छ। ईस्वी संवत् १९९८ र २००७ मा गरिएका सर्वेक्षणहरू संग तुलना गर्नका लागि सोही विधि र पद्धति अनुसार ईस्वी संवत् २०१३ र २०१४, २०१६ र २०१७ र २०१७ र २०१८ का हिउँदमा यिनको संख्याको सर्वेक्षण गरियो। हाम्रो अध्ययनले वितेका दुई दशकमा यो प्रजातिको संख्यामा व्यापक गिरावट आएको (९२% को कुल गिरावट जुन औसतमा ५% को वार्षिक गिरावट) पाइयो। शुक्लाफाँटा घाँसेमैदान यो प्रजातिको लागि मनपर्ने शिखर, काँश र खडाइका घाँस प्रजातिहरूको बाहुल्यता रहेको बासस्थान हो। वन्यजन्तुबाट हुने मध्यम रूपको चरीचरन, पानी नजीकैका र नियमन गरी डढाइएका घाँसेमैदानहरू जहाँ यिनीहरूलाई आहार खोजी गर्नका लागि केही नडडैका घाँसका अरुला डण्ठीहरू हुन्छन् यस्तो बासस्थानमा यिनको उपस्थिति बाक्लो देखियो। यस प्रजातिको अहिले सम्म थाहा पाइएको विश्वकै सबभन्दा ठूलो संख्यामा आएको गिरावटका कारण यसको विश्व अवस्थामा परिमार्जित गरी आईयूसीएनको रातो सूचीमा अति संकटापन्न प्रजातिका रूपमा संलग्न गर्नुपर्ने देखिन्छ र सोही बमोजिम सुभाब प्रस्तुत गरिएको छ।

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