

Threatened Birds of Asia:

The BirdLife International Red Data Book

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Recommended citation

BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book*. Cambridge, UK: BirdLife International.

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Internet: www.birdlife.net

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ISBN 0 946888 42 6 (Part A)

ISBN 0 946888 43 4 (Part B)

ISBN 0 946888 44 2 (Set)

British Library-in-Publication Data

A catalogue record for this book is available from the British Library

First published 2001 by BirdLife International

Designed and produced by the **Nature**Bureau, 36 Kingfisher Court, Hambridge Road, Newbury, Berkshire RG14 5SJ, United Kingdom

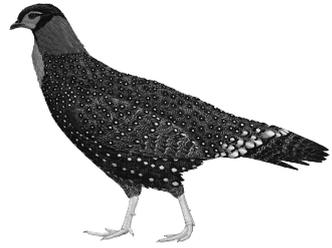
Available from the Natural History Book Service Ltd, 2–3 Wills Road, Totnes, Devon TQ9 5XN, UK. Tel: +44 1803 865913 Fax: +44 1803 865280 Email nhbs@nhbs.co.uk
Internet: www.nhbs.com/services/birdlife.html

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WESTERN TRAGOPAN

Tragopan melanocephalus

Critical —
Endangered —
Vulnerable C1; C2a



This species is classified as Vulnerable because its sparsely distributed, small population is declining and becoming increasingly fragmented in the face of continuing forest loss and degradation throughout its restricted range.

DISTRIBUTION The Western Tragopan was originally found in the Western Himalayas from the Swat catchment and Hazara in northern Pakistan through Kashmir and Himachal Pradesh to Garhwal and possibly Kumaon in Uttar Pradesh (very recently divided into two, the areas in question being in Uttaranchal), India, a swathe of mountains around 700 km in length and 50–100 km wide (Jerdon 1862–1864, Hume and Marshall 1879–1881, Ali and Ripley 1968–1998, King 1978–1979, Gaston *et al.* 1983). There are no confirmed records from China and Nepal (see Remarks 1 and 2). The range of the species has diminished considerably, with populations on several outer mountain areas having disappeared completely (Sharma 1993).

Gaston *et al.* (1983) stated that two main blocks of habitat are currently occupied: (1) the Neelum (or Kishenganga) valley and adjacent areas in Pakistan; and (2) Kishtwar National Park in the Chenab valley of Kashmir, through the Ravi and Beas catchments to the eastern side of the Sutlej valley, India. In the light of much fieldwork since 1983, it is now more appropriate to consider five separate populations: (1) Kohistan (notably Palas valley), (2) Kaghan/Neelum (Kashmir), (3) Kishtwar/Chamba (eastern Jammu and Kashmir and western Himachal Pradesh), (4) Kulu (central Himachal Pradesh including the Great Himalayan National Park) and (5) east of the Sutlej river (P. J. Garson *in litt.* 1999). The ridge between the “Kattor and Bhilling rivers” (Kathur and Bhelling or Bhilinguna, also referred to as the Bhillinganga or Bhillinguna) is supposedly its eastern limit in Garhwal, approaching the range of the Satyr Tragopan *Tragopan satyra* very closely, or possibly overlapping (Beebe 1918–1922; see Narang 1993b). In the following account, hunters’ reports are mostly accepted because of their familiarity with such a distinctive species, but a small proportion of these are likely to be inaccurate.

■ **PAKISTAN** The main breeding population is centred around Palas valley and adjoining areas in Kohistan, with further important populations in the Kaghan and Neelum valleys (Grimmett and Robson 1986, NWFP 1992). Records are from: ■ **North-West Frontier Province** Indus Kohistan (not mapped), three, undated (Cobb 1939), another, undated (see Roberts 1985b), skins from the area seized on the Karakoram Highway (Mirza 1980a), but no field observations; Hazara Kohistan (not mapped), May 1869 (Hume 1873–1875, BMNH egg data), one male, around 1919 (Baker 1921–1930); Swat river basin (not mapped), only two killed in living memory, undated (Cobb 1939); **Hunza**, small population, undated (Roberts 1970), although the likelihood of this—or of birds surviving there—now appears remote (R. Nawaz *in litt.* 2001); above **Nayabanda**, regular sightings, including two shot in 1983/1984 (Grimmett and Robson 1986); **Kayal valley**, May–November 1987 (Duke and Walton 1988), including at Sangar and Simu, February 1995 (Liley *et al.* 1995), and between Kayal and Chawa, 1983/1984 (Grimmett and Robson 1986), at Chawa and Rhunda, locally reported, May 1984 (Grimmett and Robson 1986), in the Pattan valley, May–November 1987 (Duke and Walton 1988), and Rodir and Balkund, between the Kayal valley and the main Indus gorge, reportedly in winter, also perhaps at Lotus although the habitat appeared much

disturbed, around 1984 (Grimmett and Robson 1986); **Duber valley**, spring 1938 (Cobb 1939), at Jab, on the Maidan river east bank, 2,600–2,750 m, May 1984, Maidan river west bank, 2,650 m, May 1984, 4 km upriver from Jab, Maidan river east bank, 2,770 m, May 1984, at Maidan nulla, a reported population, 1984, at Giga Nulla, a reported population, 1984, at Bandlo, c.2,300–2,750 m, May 1984, at Nalagai Nulla, a reported population, 1984, and on the eastern ridge, reportedly in cold weather, around 1984, and on the western ridge, reported in the Gut and Lung forests above Kass, 1984 (all records in Grimmett and Robson 1986), also at the latter site, May–November 1987 (Duke and Walton 1988); **Bar Palas valley** (“Palas valley”), Hazara Kohistan, with the core area being the forests of the Khajil, Khowari, Kubkot, Unsar and Diwan valleys (Bean *et al.* 1994; see Population), but with records (arranged chronologically) including Diwan forest, 1991 (Bean *et al.* 1994), Gabir, February 1995 (Liley *et al.* 1995), Shared, including Kabkot nulla, February 1995 (Liley *et al.* 1995), 2,100 m, December 1995 (Barker *et al.* 1996), Shared and Karoser, 1,800–2,400 m, December 1995 (Barker *et al.* 1996), Shambela, Loniser, Gidar, Torband, and Karoser, December 1996 (Whale 1997a); Jalkot valley (not mapped), at Dasu, 1984 (Grimmett and Robson 1986); **Allai valley**, in the Galley forest, Shamsher range, around Guntar and Shamsher, locally reported, 1984 (Grimmett and Robson 1986); Tokrat, **Kuz Palas valley**, February 1996 (Barker *et al.* 1996); **Bichla valley**, Kaghan, Hazara district, 1975 (Wayre undated), apparently trapped around 1984 (Grimmett and Robson 1986), and seen at 3,300 m, undated (Roberts 1991–1992); **Bhunja valley**, Kaghan, reported, 1975 (Wayre undated), apparently trapped around 1984 (Grimmett and Robson 1986); **Kanshian nulla**, 3,350 m, undated (Roberts 1991–1992); one for sale in Mansehra, immediately to the south-west of the Kaghan valley, 1971, but possibly from adjacent Kashmir (under Pakistani occupation) (Wayre undated), although reliable reports were given in the **Kaghan valley** at Besri and Behari, 1973 (Newlands 1974), 1991–1992 (NWFP 1992), also Shogran, 2,350 m, December 1958 (one immature in MCZ), Nila forest, adjacent to Kala Nulla, locally reported, around 1984 (Grimmett and Robson 1986), and Nuri Reserve Forest, specifically at Mir Shahi, Mashbil valley and Qadir Gali, c.3,000 m, May 1984 (Grimmett and Robson 1986), plus Sari forest resthouse area, July 1979 (Grimmett and Robson 1986), Malakandi, January 1978 (Shah 1980 in Chaudhry 1993a) and Manur, January 1978 (Shah 1980 in Chaudhry 1993a); **Galis**, late 1960s (Roberts 1991–1992); ■ **Kashmir** (“Azad Kashmir”; currently under the administration of Pakistan) **Khuttan**, May 1977 (Mirza *et al.* 1978), May 1982 (Islam undated); **Neelum valley**, undated (Islam and Crawford 1986), and Keran forest (this being on the current border with India: see Keran, India), Neelum valley, 3,050 m, one, 1971 (Wayre undated); **Salkala Wildlife Sanctuary**, Neelum valley, Kazinag range, 3,000–3,200 m, May 1977 (Mirza *et al.* 1978), 1982 (Islam undated), April–October 1983 (Islam and Crawford 1987, Roberts 1991–1992); **Machiara National Park**, Machiara valley, August 1977 (Mirza *et al.* 1978), 1982 (Islam undated), April–October 1983 (Islam and Crawford 1987); Jhelum valley, undated (Mirza 1978, Islam 1983), and at Kotli district, above **Pir Hasimar** and adjacent Pir Chinasi and, at the head of tributary valleys of the Jhelum river, around 1971 (Roberts 1991–1992); **Leepa**, reported around 1990 (Islam 1991, Chaudhry 1993a); **Kazinag Game Reserve**, reportedly around 1985 (Qayum 1986–1987); **Pir Chinari**, around 1971 (Mirza 1971, Wayre undated); **Haji Pir**, reported around 1971 (Wayre undated), around 1990 (Chaudhry 1993a); **Phala Game Reserve**, undated (Qayum 1986–1987).

Untraced localities, most of which are probably subsites of those listed above, include: Kamal Ban, four estimated, 1991–1992 (NWFP 1992 in Chaudhry 1993a; also Roberts 1991–1992); Pir Hari Mor (possibly Pir Hasimar), undated (Islam 1991); Reshnar-Bor, undated (Islam 1991); Rakh Mauji, undated (Qayum 1986–1987); Mauri Said Ali, undated (Qayum 1986–1987); Hillan, undated (Qayum 1986–1987). Unconfirmed records include: Kandia valley, reported at Mir Shahi and in the Mashbil valley, but this was disputed, 1984 (Grimmett and Robson 1986); and, in the Neelum valley, on the slopes of the Bungus in the ranges

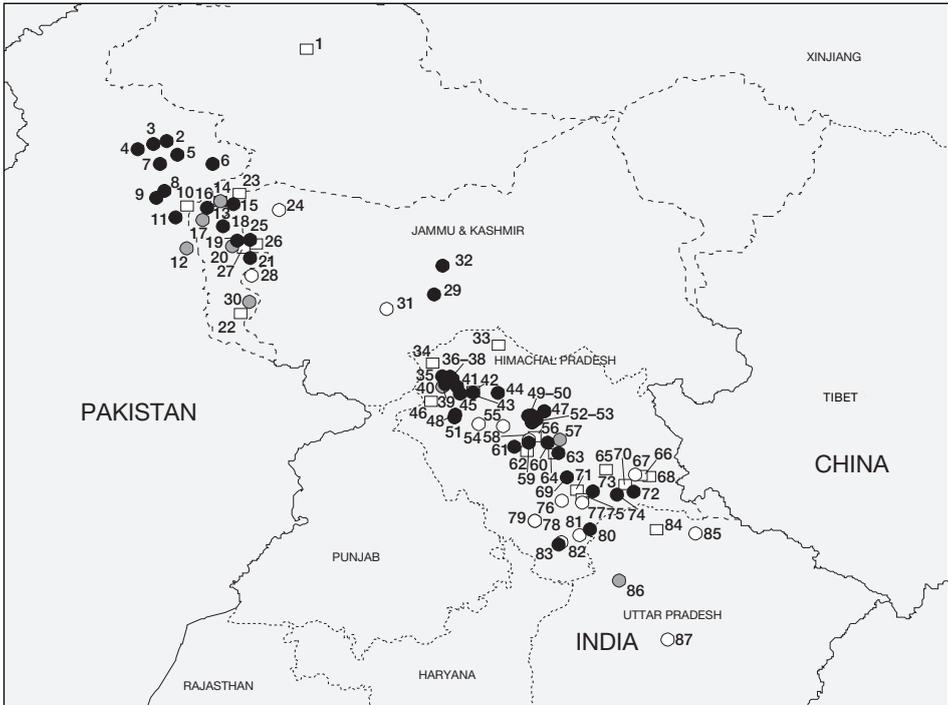
between Jagran and Bichla (Kaghan valley), Jura forest, Chijwa, Fel, Liari, Duarian, Duprupal, Sharda and the mountains near Kel, around 1971 (Mirza 1971, Wayne undated).

■ **INDIA** The Western Tragopan ranges through the Western Himalayas in the states of Jammu and Kashmir, Himachal Pradesh and the western half of Uttar Pradesh. A skin procured from Almora bazaar (Jerdon 1862–1864; see also Knox and Walters 1994) suggests that its historical range may have extended into Kumaon (i.e. the eastern half of Himalayan Uttar Pradesh), but Hume and Marshall (1879–1881), perhaps based on Jerdon's record, stated that the species occurred only as far east as the Bhillinganga (Bhillunguna) valley (above Tehri). Nonetheless, a specimen from "Garhwal" is here assumed to place the species at least as far east as 78°30'E, but this record certainly needs reevaluation and confirmation (K. Ramesh *in litt.* 2001). It has recently been reported from the Jhelum valley in Jammu and Kashmir and the Ravi, Beas and Sutlej river catchments in Himachal Pradesh. Records are from:

■ **Jammu and Kashmir** (see Remarks 3) Wular, Kashmir, March 1925 (Knox and Walters 1994; see Remarks 4); **Keran**, on the Kishenganga (Neelum), undated (Bates and Lowther 1952; see under Neelum valley, Pakistan); Hai Hama, **Lolab valley**, May 1894 (Baker 1921–1930); **Limber Wildlife Sanctuary**, 1980s–1990s (Kaul 1989, Qadri *et al.* 1990, Javed 1992, Akhtar *et al.* 1994); **Rampur**, undated (Bates and Lowther 1952); **Uri**, undated (Bates and Lowther 1952); **Poonch** (Punch), undated (Ward 1906–1908); areas now within **Kishtwar National Park**, undated (Ward 1906–1908), at Padar, high above the Chenab, April 1907 (Stockley 1923), with one male collected in 1984, but no subsequent records despite extensive searching in 1988 (Scott *et al.* 1989); head of the **Sandran river**, north slopes of the Pir Panjal range east of Banihar pass, down to the 1950s (Bates and Lowther 1952); southern slopes of **Pir Panjal range**, undated (Adams 1859), with a nest found, June 1901 (Baker 1921–1930); Buniyar (untraced), 1990s (F. Rath *in litt.* 1998);

■ **Himachal Pradesh** **Bangori Forest Reserve**, 1999 (S. Javed *in litt.* 2000); **Sechu Tuan Nala Sanctuary**, listed (Singh *et al.* 1990); **Gamgul Siahbehi Sanctuary**, listed (Singh *et al.* 1990), although probably no longer present (R. Kaul *in litt.* 1999); **Bhataal**, January 1995 (Jandrotia *et al.* 1996); **Specka**, April–June 1998 (S. Bashir *in litt.* 1999); **Sara**, at Dramini, and between Luhani da Pani and Dalli, February 1995 (Jandrotia *et al.* 1996), April–June 1998 (S. Bashir *in litt.* 1999); **Schakund**, April–June 1998 (S. Bashir *in litt.* 1999); **Saho**, May 1999 (*Tragopan* 11: 3–4); **Ravi valley**, winter 1978–1979 (Gaston *et al.* 1981b); **Panchungula**, April–June 1998 (S. Bashir *in litt.* 1999); **Tundah Sanctuary** (Tunda), listed (Singh *et al.* 1990), although probably no longer present (R. Kaul *in litt.* 1999); **Chamba district**, undated (Marshall 1884), including at Makhana Nalla (nest found), June 1908 (Baker 1921–1930), Monda Nala, 1987 (Tak 1987, Chauhan and Sharma 1991), Dalli, c.28 km north-west of Chamba, September 1987 (Narang 1993a), Ghrotu Kotha and Gharaatbada reserve forests, March 1995 (Jandrotia *et al.* 1996); **Kugti Sanctuary**, Chatri, 1978–1979 (Gaston 1979a), but no evidence in September 1987 (Narang 1993a) or December 1998 (Javed *et al.* 1999a), although subsequently listed for the site (Singh *et al.* 1990); **Tali Reserve Forest**, 1999 (S. Javed *in litt.* 2000); **Kalatop and Khajjiar Sanctuary**, listed (Singh *et al.* 1990), but no evidence of presence in September 1987 (Narang 1993a) or November–December 1998 (Javed *et al.* 1999a), and presence there appears doubtful (K. Ramesh *in litt.* 2001); **Hamta**, 1979–1980 (Gaston *et al.* 1981b); **Macleodganj** (McLeod Ganj), November 1988 (Bose *et al.* 1989); **Manali Sanctuary**, around 1950 (Wynter-Blyth 1951), at Solang Nalah, upper Beas valley, 1959 (IUCN 1978), in the Solang, Manalsu and Hamta valleys, 1979–1980 (Gaston *et al.* 1981b); **Manalsu**, 1979–1980 (Gaston *et al.* 1981b); **Dharmsala**, Dharmsala ranges, also at Daula Dhar, above Dharmsala, 1920–1924 (Whistler 1926a, Knox and Walters 1994) and in recent years (based on reliable information passed to K. Ramesh *in litt.* 2001); **Jagatsukh** valley, December 1985 (Gaston 1985b); **Solang nala**, 1979–1980 (Gaston *et al.* 1981b); Bagh nala, above **Palumpur**, Kangra, January 1922 to February 1923 (Whistler ms; also Knox and Walters 1994), and

presumably nearby at Kaseri lake, June 1923 (Whistler ms), and at an unspecified locality in Mandi district, 1923 (specimen in YPM); **Kandbari nala**, Palampur, January 1921 (Whistler ms), March 1922 (male in YPM); at Kais, undated (Knox and Walters 1994) and listed for **Kais Sanctuary** (Singh *et al.* 1990); **Pulga**, Parvati valley, May or June 1914 (Babault 1920), 1963–1964 (Chauhan and Sharma 1991); **Saraj**, Kulu, May “1928” (*sic*; presumably 1923 or 1925) (Whistler 1926b); **Kulu**, undated (Stoliczka 1868; see also Knox and Walters 1994), February 1870 (specimen in MCML), February 1923 (Knox and Walters 1994), including at Belindi, Panini, Bagar and Taralla, undated (Knox and Walters 1994), undated (Whistler 1926b), at Nagar village, November 1999 (K. Evans *in litt.* 1999); **Kanawar Sanctuary**, listed (Singh *et al.* 1990), November 1990 (Pandey 1993a); **Nargu Sanctuary**, feather found in



The distribution of Western Tragopan *Tragopan melanocephalus*: (1) Hunza; (2) Nayabanda; (3) Kayal valley; (4) Duber valley; (5) Bar Palas valley; (6) Allai valley; (7) Kuz Palas valley; (8) Bichla valley; (9) Bhunja valley; (10) Kanshian nulla; (11) Kaghan valley; (12) Galis; (13) Khuttan; (14) Neelum valley; (15) Salkala Wildlife Sanctuary; (16) Machiara National Park; (17) Pir Hasimar; (18) Leepa; (19) Kazinag Game Reserve; (20) Pir Chinari; (21) Haji Pir; (22) Phala Game Reserve; (23) Keran; (24) Lolab valley; (25) Limber Wildlife Sanctuary; (26) Rampur; (27) Uri; (28) Poonch; (29) Kishtwar National Park; (30) Sandran river; (31) Pir Panjal range; (32) Bangori Forest Reserve; (33) Sechu Tuan Nala Sanctuary; (34) Gamgul Siahbehi Sanctuary; (35) Bhataal; (36) Specka; (37) Sara; (38) Schakund; (39) Saho; (40) Ravi valley; (41) Panchungula; (42) Tundah Sanctuary; (43) Chamba district; (44) Kugti Sanctuary; (45) Tali Reserve Forest; (46) Kalatop and Khajjar Sanctuary; (47) Hamta; (48) Macleodganj; (49) Manali Sanctuary; (50) Manalsu; (51) Dharmsala; (52) Jagatsukh; (53) Solang nala; (54) Palampur; (55) Kandbari nala; (56) Kais Sanctuary; (57) Pulga; (58) Saraj; (59) Kulu; (60) Kanawar Sanctuary; (61) Nargu Sanctuary; (62) Khokan Sanctuary; (63) Great Himalayan National Park; (64) Kasha Pat; (65) Rupi Bhabba Sanctuary; (66) Lippa Sanctuary; (67) Pangri; (68) Kinnaur; (69) Tirthan Sanctuary; (70) Barua; (71) Rampur; (72) Sangla Sanctuary; (73) Daranghati Sanctuary; (74) Tharjot; (75) Moral Kanda; (76) Kotgarh; (77) Sungri; (78) Jakhu; (79) Simla; (80) Talra Sanctuary; (81) Tons river; (82) Chur mountain; (83) Churdar Wildlife Sanctuary; (84) Uttarkashi district; (85) Gangotri; (86) Mussoorie; (87) Garhwal.

○ Historical (pre-1950) ● Fairly recent (1950–1979) ● Recent (1980–present) □ Undated

northern portion, November 1990 (Pandey 1993a); **Khokan Sanctuary**, listed (Singh *et al.* 1990); **Great Himalayan National Park**, listed without date (Singh *et al.* 1990), but with records in 1980 and 1983 in the Tirthan, Sainj (including inside Sainj Wildlife Sanctuary) and Jiwa valleys (Gaston *et al.* 1993), May 1999 (*Tragopan* 11 [1999]: 3–4), and between Lopah and Shangarh, 5 km from boundary of Great Himalayan National Park, 1991 (Gaston and Garson 1992) and Basu forest within the park, May 1991 (Pandey 1993a); **Kasha Pat**, undated (Sharma and Pandey 1990); **Rupi Bhabba Sanctuary**, listed (Singh *et al.* 1990); **Lippa Sanctuary** (Lippa Asrang Sanctuary), listed (Singh *et al.* 1990); **Pangi**, undated (Marshall 1884); **Kinnaur**, Sutlej valley, undated (Hutton 1837, Islam and Crawford 1986); **Tirthan Sanctuary**, part of Great Himalayan National Park, undated (Singh *et al.* 1990), 1991 (Pandey 1993a), 1991 (Gaston and Garson 1992), **Barua**, undated (Sharma and Pandey 1990); **Rampur**, undated (Fraser 1820); **Sangla Sanctuary**, Sangla valley, at Dadarti forest, Kinnaur district, May 1988, but no field sightings (Narang 1993a); **Daranghati Sanctuary**, listed (Singh *et al.* 1990), 1989–1990 (Pandey 1994); **Tharjot**, May 1988 (Narang 1993a), undated (Sharma and Pandey 1990), 1991 (Chauhan 1991); **Moral Kanda**, undated (Sharma and Pandey 1990); **Kotgarh** (Kotegurh, Kotegar), winter, undated (von Pelzeln 1868, Stoliczka 1868, Knox and Walters 1994), April 1869, March and October 1870, 1871, 1872, January 1918 (Knox and Walters 1994), “most seasons”, 1908–1918 (Jones 1919); **Sungri**, Bushair, undated (le Messurier 1887); **Jakhu** (Jakhoo), undated (Hume and Marshall 1879–1881); **Simla** (Shimla), undated (Adams 1859), June 1866 (Beavan 1865–1868); **Talra Sanctuary**, listed (Singh *et al.* 1990), and apparently recently (S. Thakur *per* P. J. K. McGowan *in litt.* 2000); by the **Tons river** adjacent to Uttar Pradesh, 2,400–2,700 m, rare, undated (Osmaston 1935); **Chur mountain**, undated (Stoliczka 1868) Churdhar (presumably in what is now **Churdar Wildlife Sanctuary**), undated (Stoliczka 1868), and apparently recently (S. Thakur *per* P. J. K. McGowan *in litt.* 2000); Buran pass (untraced); Hatu forest (untraced), undated (Jones 1919); Salarang (untraced), undated (Sharma and Pandey 1990); Killba (untraced), Sutlej valley, February 1931 (female in BNHS);

■ **Uttar Pradesh** 25 km west of Kulni, **Uttarkashi district**, undated (Bland 1987); Banguli, **Gangotri**, skins possessed by locals, undated (Brooks 1875a); **Mussoorie**, undated (male in ZMUC), and at 2,240 m, undated (Fleming 1967 in Singh 2000), and Mussoorie-Dhanaulti, 1963–1966 (R. L. Fleming Sr. 1977a); Nila valley (untraced), west of the Baghirathi river, Garhwal (i.e. Terhi Garhwal), nest found, June 1910 (Baker 1921–1930); **Garhwal**, undated (specimen in MCML); Siul nala (untraced), 1978–1979 (Gaston 1979a); Jured Reserve Forest (unconfirmed), Juri Protected Forest, Belj Begarh Reserve Forest, Padori Reserve Forest, Karpoke Reserve Forest and Darkund Reserve Forest, by reliable local report, 1996 (Katoch *et al.* 1997); Kulni and Balcha areas (unconfirmed but with convincing local descriptions), Govind Pashu Vihar, 1999, possibly the easternmost population (S. Javed *in litt.* 1999), apparently based on the skin of a male recently obtained in the area by the Zoological Survey of India (K. Ramesh *in litt.* 2001).

POPULATION Early authors agreed that this species was scarce and local even at the start of the nineteenth century, and it is now undoubtedly the rarest of the Himalayan pheasants (Gaston *et al.* 1981b, 1983, McGowan and Garson 1995). Using the density estimates of Mirza (1980a), and a current extent of habitat of 2,000–3,000 km², Gaston *et al.* (1983) estimated that the total population stood in the range of 1,600–4,800 birds. Other assessments have been only slightly more optimistic, suggesting that 5,000 birds survive in the wild (Gaston *et al.* 1981b, McGowan and Garson 1995). There are, however, problems of extrapolation that need addressing (see Remarks 5). The overall picture to emerge from the review below is one of a series of highly fragmented and evidently often strongly declining populations, only a few of which appear to retain moderately encouraging numbers, and all of which appear to need considerable intervention to prevent further declines and local extinctions. In the

following account, the arrangement of historical and recent information on the status of the species is greatly complicated by the fact that generalised areas often overlap more specific sites, so that comparisons can be highly unreliable. Ideally, an analysis of the evidence would involve an arrangement of sites and areas by valley systems, and a broad first attempt at this has been made for Pakistan; but a detailed and comprehensive scrutiny of records and commentaries is beyond the scope of this review.

Pakistan Until recently, the species was considered “almost extinct in Pakistan except for one or two locations” (Chaudhry 1993a). However, the discovery of several significant populations in the forests of northern Pakistan (Grimmett and Robson 1986, Duke 1989a,b) means that this area is now regarded as an essential refuge for the species, with two key valley systems (Kohistan/Palas in North-West Frontier Province [NWFP] and Neelum watershed in Kashmir) plus a few other important sites (Kayal, Duber and Kaghan valleys, NWFP).

Kayal, Duber and Kaghan valleys Duke and Walton (1988) recorded 27–30 males in the upper tributaries of the Kayal, Duber and Pattan valleys, using a 50:50 sex ratio to estimate a total population of 54–60 birds; but given that the adult sex ratio is possibly skewed in favour of males, this could be an overestimate (Islam and Crawford 1993; see under Measures Proposed). In 1984 in the Duber valley, local people reported a population of 30 birds in Maidan nulla, another of 50 birds at Giga nulla, and another of 60 at Nalagai nulla (Grimmett and Robson 1986). Up to 19 calling males were heard on the western ridge of Duber valley above Kass, 1987 (Duke and Walton 1988). Up to 20 birds were reported in the early 1990s in the upper Kaghan valley (NWFP 1992). There is a growing sense that some side valleys in Kohistan may have (or, in the case of Kayal before its logging, may have had) densities approaching those found currently in Palas, and that this potential should not be ignored (R. Nawaz *in litt.* 2001).

Palas valley Surveys in 1989 revealed that c.400 individuals survived in the forests of the Khajil, Khowari, Kubkot (Kadkot, Kabkot) and Unsar tributaries (Duke 1989a,b), this figure being revised to c.500 (Duke 1993), with later work suggesting that it was probably around 650 individuals or 325–330 pairs (Bean *et al.* 1994, Whittington *et al.* 1994), and even then “very conservative” (Nawaz and Ghafoor 1999). In Kubkot forest, 100–150 individuals were estimated in 1999, with no evidence of a decline locally (Nawaz and Ghafoor 1999). A density of 20 birds per km² appears to exist (Duke 1990), although birds may be very patchy and variable in abundance (and at least in good habitat in India such a density would be extremely high: K. Ramesh *in litt.* 2001).

Neelum valley Mirza *et al.* (1978) called the species “still common” in some “pockets” of Pakistani-occupied Kashmir, with density estimates of 0.8–1.6 birds per km² for Machiara, Salkhaka and Kuttan in the Neelum valley. Qayum (1980) stated that it was “rare” in “Azad Kashmir”, later estimating 378 individuals in the region (Qayum 1986–1987). Islam (undated) estimated a population of 80 individuals in Machiara (based on encountering 14 birds in 8.8 km²), while Islam and Crawford (1987, 1993) reported 52 individuals (30 males and 22 females) in Machiara and 38 (26 males and 12 females) in Salkhala in 1983, and Roberts (1985b) reported 100 individuals in the same area (this falling to 85 individuals in Roberts 1991–1992). In 1990, S. A. Qayum (verbally to Chaudhry 1993a) estimated 100–150 birds in Machiara and 100–150 in the area encompassing Salkhala Wildlife Sanctuary, Hillan, Moji and Kazinag Game Reserve (i.e. a total of 400–600 individuals); he also reported 200 tragopans in the Leepa valley according to army personnel, although this has not been confirmed.

India The species persists in each of the three states in which it has been recorded, and although the majority of recent records come from Himachal Pradesh it is not certain that the other states do not also possess globally significant populations.

Jammu and Kashmir By 1907 the species had become “very rare in Kashmir” (Ward 1906–1908), yet Baker (1921–1930) remarked that “it is still common in many parts of Kashmir despite what Beebe says to the contrary”. Small populations persist in the Jhelum valley

(Javed 1992), and “fairly good numbers” survive at Limber Wildlife Sanctuary (Javed 1992), where five were seen in an hour’s walk in the 1980s (Kaul 1989c); a population of c.70 birds was estimated for the site (Javed 1992, S. Javed *in litt.* 2000). Local but unconfirmed reports indicate that the species survives in the Kishtwar area, and large blocks of intact forest extend from around Bhadarwar, in Kishtwar National Park, to the Ravi valley in Himachal Pradesh (Gaston *et al.* 1981b, 1983). On the south-facing slopes of the Pir Panjal range in Kashmir, Adams (1867) frequently heard the “well known” call of the species and believed that it was “much more common than is generally supposed”; alas, these slopes are now probably entirely deforested and no tragopans are likely to survive there (Gaston *et al.* 1983).

Himachal Pradesh The species remains in many sites (the main areas for which information is available are dealt with in separate paragraphs below), but it has apparently disappeared from the outer Himalayan ranges in Himachal Pradesh, such as Choor, Kufri, Hatu (where in any case it was long ago judged “uncommon”: Jones 1919) and Dharmsala, “for a variety of reasons” (Chauhan and Sharma 1991).

Evidence of its former abundance in the west of the state is found in Marshall’s (1884) description of it as “plentiful in suitable localities throughout Chamba”, reporting that, following the elimination of snaring and the restriction of shooting to November–March and to male birds only, “about 1,200 skins are collected each season”. A recent survey in contiguous forest around Sara, Punchungula, Schakund and Specka, very close to Chamba, recorded 43 individuals (Javed *et al.* 1999a). The species presumably continues to be well distributed in this area, which perhaps constitutes a hotspot second only to Palas valley in its importance for the species (P. J. Garson *in litt.* 1999a). In the Gharaatbada and Ghrotu Kotha reserve forests an estimated 30–40 birds survive, with a further 10–12 at Bhataal (Jandrotia *et al.* 1996). In the Bangori and Tali Forest Reserves, call-count surveys suggested that over 100 individuals were present in 1999; nine were found in 20 hours at Bangori (Khan *et al.* 1999). Local information suggests, nevertheless, that numbers of Western Tragopans in the area have declined markedly since the 1980s (S. Bashir *in litt.* 1999). The Ravi valley itself (in which Chamba is situated) is certainly somewhat degraded and the forest fragments are unlikely to contain large numbers of the species (Gaston *et al.* 1981b, 1983).

In the Dharmsala ranges it was not uncommon (Hingston 1921). Whistler (1926a) mentioned flushing a dozen birds in loose flocks on occasion, although it was “the scarcest and most local of the pheasants of the Dhar”, above Dharmsala, in 1920–1924. Wynter-Blyth (1951) concurred that it was “certainly very rare, if indeed it can be found at all” in this area, although it was “not so very uncommon” around Manali. No information has emerged recently from the Daula Dhar range (Dharmsala area), “but forests there are also very fragmented and if the species still exists it is probably rare” (Gaston *et al.* 1983); indeed it has been assumed to have been lost from the area (see head of this section). At Bagh Nala (near Palampur, south of Dharmsala) it was “very local”, but 10–12 birds were found in “two or three side nullahs” (Whistler ms), suggesting that populations were sometimes quite dense; but this was at least 60 years ago.

Approximately 400 km² of suitable habitat remains in the Beas catchment, possibly supporting a population approaching 1,000 birds (Gaston *et al.* 1981b), although numbers may be lower than this (K. Ramesh *in litt.* 2001). The entire Beas catchment above Mandi in Himachal Pradesh is disjunct from the Ravi valley and 20 years ago was judged to cover around 2,000 km² of potentially suitable habitat and thus support a large population of tragopans (Gaston *et al.* 1983), but although recent satellite data show 3,613 km² of forests the potential habitat for tragopans may only be half that area (K. Ramesh *in litt.* 2001).

Five birds were seen in a day at “Sainj-Tirthan National Park” this referring to the Great Himalayan National Park, Himachal Pradesh, October 1984, and there is apparently a good population there (B. F. King verbally 1998). The Great Himalayan National Park is one of only two places in India where “anything more than a remnant population of Western

Tragopan is known to survive” (Gaston and Garson 1992). Even here, however, the Tirthan valley might have no more than 20 pairs, and the whole park no more than 60–70 pairs (K. Ramesh *in litt.* 1999; also Ramesh *et al.* in press).

Although the species was described as rare in Kinnaur, Sutlej valley (Hutton 1837) and very rare in the vicinity of Rampur (Baker 1921–1930), this being on the Sutlej on the southern border of Kulu, in Kulu itself it was “tolerably common” (Stoliczka 1868). Young (in Hume and Marshall 1879–1881), referring to Kulu before 1880, stated that he had “always found this bird much easier to shoot than Monal... I have known a dozen or so fly up at a time”. In the same area three or four tragopans could be encountered in a day’s walk as recently as 1952 (I. R. Grimwood in Garson 1982a). However, in 1979 and 1980, a day’s tally never rose above two birds for the Himachal Wildlife Project members (Gaston *et al.* 1983). In over 400 group-hours spent near Manali (Solang, Manalsu and Hamta valleys), to the north of Kulu town, only four sightings were made in 1979–1980, and it was thought that the area could not support more than 50 birds (Gaston *et al.* 1981b). This evidence implies that a considerable decline has taken place in the area. Nevertheless, above Pulga, in Kulu, “fairly good numbers” were recently found in fir/oak forest (Chauhan and Sharma 1991).

In the hills north-west of Simla birds were “common” (Adams 1859), or at least “not uncommon” (Beavan 1865–1868). After his visits to the Sutlej valley in Himachal Pradesh, Stoliczka (1868) remarked that “the numbers of this beautiful pheasant are fast declining, and although it is said to have been formerly common near Simla at elevations of 5,000 and 6,000 feet (1,500–1,850 m), it is now only found in the less visited and well wooded districts above 8,000 feet (2,450 m), and even here it is comparatively rare”. A few decades later, it was thought “very rare” around Simla, with only a few shot in most seasons (Jones 1919). At Daranghati Sanctuary, Pandey (1994) estimated a population of 150–200 birds at a density of 0.5 per km², although this was based on only 18 encountered; around adjacent Tharjot perhaps 20 birds are present (Narang 1993a).

Uttar Pradesh Baker (1921–1930) remarked that “it is still common in many parts of... Native Garhwal...”, but this appears to be the only comment on its status in the state. Although the evidence under Distribution suggests that at least small populations might survive in several areas, a three-year study by the Wildlife Institute of India in the Bagrithi catchment in Garhwal did not encounter the species once (K. Ramesh *in litt.* 2001).

ECOLOGY Habitat The Western Tragopan is found in relatively open moist deciduous and/or coniferous temperate forests with a dense understorey and/or shrub-layer (Ali and Ripley 1968–1998, Gaston *et al.* 1981b, Robson and Grimmett 1986, Islam undated, Roberts 1991–1992, del Hoyo *et al.* 1994, Liley *et al.* 1995, Ramesh *et al.* 1999, D. A. Showler *in litt.* 2000). It has been thought “a shy bird apparently, of somewhat meditative, if not gloomy disposition, favouring the darkest depths of the remotest forests” (J. C. Anderson 1889). It generally frequents moist humus-rich slopes on which it digs for food items (Delacour 1977). Its apparent predilection for precipitous mountainsides with a dense shrub-layer had been speculated simply as a function of high disturbance and hunting rates on flatter or less well vegetated ground, especially as it has been seen on level undisturbed plateaus (Mirza *et al.* 1978); but further study shows that the birds occurs in extremely steep terrain even where disturbance is non-existent (R. Nawaz *in litt.* 2001). Although Hingston (1921) generally found it “close to the upper margin of the forest”, this is often not the case, and indeed in winter it tends to be near the lower fringes (Roberts 1991–1992). It appears to be quite arboreal in winter, especially through the middle of the day (Whale 1997a); it also roosts in trees (Ramesh 1995, K. Ramesh *in litt.* 2001).

In Pakistan it is associated with mixed coniferous forest in Azad Kashmir (blue pine *Pinus wallichiana* and brown or kharsu oak *Quercus semecarpifolia*) and Indus Kohistan (deodar or Himalayan cedar *Cedrus deodara* and *Q. semecarpifolia*) (Roberts 1991–1992),

although most oak in Palas is *Q. floribunda* and *Q. baloot* (R. Nawaz *in litt.* 2001). It prefers areas with thick ground cover of *Viburnum*, *Spiraea laureola* and *Berberis* (Roberts 1991–1992). Islam (undated) found the highest numbers of tragopans in forests that had relatively high diversities of trees and shrubs, while they favoured deciduous components during the breeding season, and they are usually found in coniferous forests of silver fir *Abies pindrow*, blue pine and Himalayan cedar, and in deciduous forests containing kharsu oak, walnut *Juglans regia*, cherry *Prunus* and maple *Acer caesium*, as well as mixed forests with combinations of these species (Islam 1984, Islam and Crawford 1987). In the Kaghan valley, an individual was observed in open fir forest with some deciduous trees but no oaks, broken by broad strips of shrub cover, primarily *Viburnum* (Grimmett and Robson 1986, D. A. Showler *in litt.* 2000). At Palas it occurs in woodlands with a well developed shrubby understorey and a high percentage of grassy ground cover with some associated herbs in gullies and less shaded areas, the combination of a dense shrub-layer and ground flora being thought to provide important foraging areas (Barker *et al.* 1996). In the breeding season in Palas, favoured habitat comprises a mosaic of forest, with a good mix of conifers (especially silver fir, blue pine and spruce) and broadleaved (e.g. maple, oak, birch and walnut) tree species, the former dominating ridges, the latter in gullies (Duke 1989a,b, Bean *et al.* 1994). The best areas appeared to be in mixed woodland, but these are comparatively rare (Bean *et al.* 1994); thus it breeds in relatively uniform forests, each pair tending to inhabit a ravine filled with mature birch *Betula utilis* and some spruce *Picea smithiana* and silver fir, with a dense understorey flora mainly comprising *Skimmia*, *Indigofera* and ferns (Nawaz and Ghafoor 1999). In the non-breeding season the majority of bird at Palas tend to occur at lower altitudes in forest dominated by *Quercus baloot* or *Q. floribunda*, in mixed oak/conifer forest with the dominant conifer species invariably being *Cedrus deodara*, or in more open, scrubby habitat (Bean *et al.* 1994, Whale 1997a). Gullies also appear to be favoured, either grassy (Whale 1997a) or sunlit with low snow cover (Liley *et al.* 1995).

In India, it often inhabits dense forests of *Picea smithiana*, *Abies pindrow* and *Quercus semecarpifolia* with a well developed understorey of “rue” or “rui” and ringal bamboo (Hume and Marshall 1877–1881, Whistler 1926a, Ali and Ripley 1968–1998; see Remarks 6). At Bagh Nala individuals were found mostly on steep slopes in “dark oak jungle” with “thickish cover” of rui/ringal, although a few were at higher altitude in “rhododendron jungle” (Whistler ms); these slopes were also characterised by substantial areas of snow-free ground, a presumably important prerequisite for foraging. At Dalli, the species inhabits thick forests of kharsu oak, fir, spruce, yew and patches of rhododendron, with a well developed understorey of ringal bamboo, *Rosa*, *Viburnum*, *Berberis* and other shrubs (Narang 1993a). Of 26 sightings in Himachal Pradesh in 1998–1999, over 50% occurred in *Quercus semecarpifolia* stands; Principal Component Analysis of habitat characteristics in the state revealed that the species favoured “typical high altitude moist temperate forests” with relatively low tree diversity but high litter cover, good shrub height and canopy cover as well as good shrub species diversity, richness and density (Javed *et al.* 1999a). In Himachal Pradesh it was unevenly distributed throughout several forest sites with similar tree species but differing understorey structures, suggesting that variation in the latter is of more importance in determining its distribution (Katoch *et al.* 1997). In spring in the Great Himalayan National Park birds were observed in (1) mixed conifer-broadleaf forest with *Arundinaria* undergrowth (*Abies pindrow*, *Picea smithiana* and *Acer caesium*), (2) subalpine (kharsu) oak forest, and (3) conifer-dominated mixed forest (*Abies pindrow*, *Acer caesium* and *Taxus baccata*), and was not found in lower-lying broadleaf-dominated forest, pure conifer forest, or conifer-broadleaf forest that lacked understorey (Ramesh *et al.* 1999). Indeed, areas with dense understorey appear to retain birds more than areas with sparse or cleared understorey (Grimmett and Robson 1986, Katoch *et al.* 1997).

Rui/ringal bamboo is absent in Pakistan, replaced at most occupied sites by a dense undergrowth including one or more of the following: *Viburnum*, *Skimmia laureola*, *Indigofera*

and *Lonicera* (Roberts 1970, Gaston *et al.* 1983, Grimmett and Robson 1986, Islam and Crawford 1987, Liley *et al.* 1995), *Viburnum* and *Lonicera* bearing some structural similarities to bamboo (Islam 1984). The variety of understorey flora at different sites suggests that there is no association with particular plant species, and vegetational structure is the most important factor (Islam and Crawford 1987).

Birds appear to prefer northern aspects in summer and southern aspects in winter: in summer they tend to prefer the coolest aspects of ravines where sunlight does not arrive until 10h00–11h00 (Nawaz and Ghafoor 1999; also Islam 1983, undated, Duke 1989a,b, Bean *et al.* 1994). These cooler, moister aspects tend to be more thickly forested and thus may constitute better breeding habitat (R. Kaul *in litt.* 1999; see Remarks 7). The use of south-facing slopes in winter is presumably linked to reduced snow cover, facilitating birds to find food (Roberts 1991–1992, Barker *et al.* 1996, Whale 1997a). Even so, Whistler (1926a) mentioned the fact that although the species descends in altitude in Himachal Pradesh during winter, it retains a preference for the “darkest and gloomiest patches of hillside with a northern aspect”. This entire issue is, however, dogged by uncertainties and discrepancies between studies, and further examination of the evidence is needed (K. Ramesh *in litt.* 2001).

In winter the birds tend to frequent the lower limit of snow, a zone usually located between 1,750 and 2,500 m (sometimes rising to 3,000 m—such variations directly related to local weather conditions: R. Nawaz *in litt.* 2001), while in summer they ascend to between 2,500 and 3,600 m (Whistler 1926b, Baker 1932–1935, Liley *et al.* 1995, Barker *et al.* 1996, Whale 1997a, Ramesh *et al.* 1999). In some cases 1,350 m is cited as the lower limit of their distribution in winter (Johnsgard 1986, Ali and Ripley 1968–1998), but there appear to be no published records from this altitude; in Great Himalayan National Park birds normally remain above 2,000 m although on occasion they may be pursued lower by raptors (K. Ramesh *in litt.* 2001). One radiocollared female in the park proved to occupy a home range of 32 ha in summer and autumn (K. Ramesh *in litt.* 2001). Fieldwork in Palas valley in winter (Whale 1997a, Nawaz *et al.* 2001) has shown that tragopans at this site do not winter in their breeding habitat and in fact cross the valley from south to north (see under Migration).

They tend to occur in pairs in summer and small groups in winter (Gaston 1980, Whale 1997a) and have been recorded feeding with Himalayan Monal *Lophophorus impejanus* (Grimmett and Robson 1986) and Koklass *Pucrasia macrolopha* (Narang 1993a). In a “small grassy slope in the forest from which the snow had just melted”, Stockley (1923) encountered a feeding party of pheasants including Koklass, Kalij *Lophura leucomelanos*, Cheer *Catreus wallichii* and Western Tragopan. Of 26 sightings in Himachal Pradesh, from November 1998 to December 1999, 16 involved solitary individuals, nine involved pairs and one was of a group of three (Javed *et al.* 1999a). Of 45 sightings in another study from January 1996 to March 1999, 41 were of singletons and four were of pairs (K. Ramesh *in litt.* 2001).

Food Wilson (“Mountaineer” in Hume and Marshall 1879–1881) gave the diet as primarily the leaves of trees (e.g. “box and oak”) and shrubs (e.g. bamboo “and a shrub something like a privet”, possibly *Sarcococca*), adding that “they also eat roots, flowers, grubs and insects, acorns and seeds, and berries of various kinds, but in a small proportion compared with leaves”. Whistler (ms) found the crop of two males from Kangra, Himachal Pradesh, “stuffed with pieces of green leaves of the Rhui”. Apart from young buds, leaves and bulbs, they consume berries of *Viburnum nervosum* and *Skimmia laureola*, and the acorns of *Quercus semecarpifolia*; they are thus mainly vegetarian, although at times invertebrates such as grubs and beetles are taken (Baker 1921–1930, Ali and Ripley 1968–1998, Delacour 1977, Roberts 1991–1992).

Breeding “Mating” generally takes place in the months of April–June (Baker 1932–1935), with breeding beginning in mid-May and extending to the end of June (Baker 1921–1930, Roberts 1991–1992); recent studies indicate that breeding-linked calling commences in late April and May (Duke 1990, Ramesh *et al.* 1999). A rudimentary nest is sited either on the ground or in a tree, sometimes in an elevated position, usually in the abandoned nests of other

species (Roberts 1991–1992); local people in the Kaghan valley reported that most nests are found on the ground, usually under the cover of a bush or rock, and captive birds certainly tend to place nests on the ground much more frequently than other tragopans, and do so readily even when elevated nest sites are available (Wayre undated). One ground nest was “formed of grass, small sticks and a few feathers, very carelessly built”, and situated at the side of a landslip where all the trees had been carried away, although small bushes and shrubs were regenerating (Hume 1873–1875). Nests have been located under a bush in a glade of very dense ringal bamboo and placed on a slanting wild cherry c.3 m above the ground in a hollow formed by a snapped branch (Baker 1921–1930); in Pakistan one was a “scrape on the ground” and another formed a “narrow earth ledge on a rock face” (Roberts 1991–1992). Beebe (1910, 1918–1922) found a further nest in Garhwal, Uttar Pradesh, but this was placed against the trunk of a “silver spruce” in a disused nest of another species, probably a crow; the tragopans had added a fresh lining of twigs, oak leaves and grass. Family parties observed in autumn or winter tend to number 4–6 birds, so the normal clutch is probably 2–4 eggs (Baker 1921–1930), although a nest with six eggs has been reported (Hume 1873–1875) and Roberts (1991–1992) gave the clutch-size as 3–6. It has been asserted that the species is monogamous, and the male helps care for the offspring (Baker 1921–1930).

Migration The species makes short-distance altitudinal or lateral movements, depending on meteorological conditions (Whale 1997a). Call surveys in Himachal Pradesh revealed that in mid-April males call from c.2,400 m, rising to c.3,300 m in mid-June (Javed *et al.* 1999a, Ramesh *et al.* 1999). In Palas valley most birds appear to cross the Musha’ga river from their breeding habitats on the south side (northern aspect) to wintering areas on the north side (southern aspect), presumably to receive longer hours of sunlight during winter and thus higher temperatures (Liley *et al.* 1995, Whale 1997a,b, Nawaz and Ghafoor 1999). In fact, locals report that they cross the valley at the onset of winter to high elevations and then gradually move down with increasing snowfall (Whale 1997a,b).

THREATS The Western Tragopan is one of four threatened members of the suite of 11 bird species that are entirely restricted to the “Western Himalayas Endemic Bird Area”, threats and conservation measures in which are profiled by Stattersfield *et al.* (1998). The main threat appears to be the loss of forest habitat in the Western Himalayas through commercial exploitation and human population expansion (Javed *et al.* 1999a). This threat is compounded by high hunting levels and the collection of edible mushrooms and other non-timber forest produce almost throughout its range (see below). Interference from grazing livestock (principally goats) is thought to have altered the structure of forest understoreys substantially throughout the species’s range, while men continue to hunt and trap tragopans relentlessly and steal their eggs (Wayre 1969, Roberts 1970, Littlewood 1972, King 1981). Felling operations and the collection of forest products creates or induces disturbance, encroachment, grazing and hunting, factors which would, if left uncontrolled, precipitate irreversible declines in populations of this species (Duke 1989a,b). The loss and degradation of the species’s lower-elevation winter habitat, as well as hunting, may be of particular significance (R. F. A. Grimmett *in litt.* 2001). A forthcoming threat is posed by the increasing number of roads being built throughout Himachal Pradesh: these will facilitate access to forests for timber smugglers, hunters and the harvesters of mushrooms and herbs, eliminating the remoteness which currently provides the most effective protection for the species (Javed *et al.* 1999a). The relevant issues are discussed separately below.

Habitat loss In primeval times, the extent of suitable forest at appropriate altitudes probably extended for 10,000 km², whereas all that remained 20 years ago was estimated to be only 2,000–3,000 km² (Gaston *et al.* 1983). The use of wood and vegetation for fuel, construction material, fodder and timber, and the clearance of forest for agriculture, have resulted in large losses of habitat throughout its range (Gaston *et al.* 1981a,b, Grimmett and

Robson 1986, Barker *et al.* 1996). Sustained grazing also significantly alters the structure of both the shrub-layer and ground vegetation in the species's habitat (Barker *et al.* 1996).

Pakistan At Duber valley and Maidan nulla, forestry operations were taking place in the mid-1980s and others were planned at Niligai nulla (Grimmett and Robson 1986). The immediate threat to Palas forests has been the possibility of commercial felling as a source of income for the common property owners, the Palasi tribes (Duke 1989a,b, 1993). Although the 1992 moratorium on logging in the area still stands (see Measures Taken), a great deal of illegal cutting subsequently took place in Kaghan valley; moreover, in 1998–1999 the government of NWFP permitted extraction of already-cut timber from Kohistan in recognition of the fact that the Kohistani people are largely dependent on forest resources for their income, and it is now anticipated that where local communities are willing to operate sustainable forest management practices they will be allowed to conduct small-scale commercial harvesting of dry and windfall trees (R. Nawaz *in litt.* 2001). These things are not in themselves threats, but there are reasons to suppose that the general moratorium is not watertight: first, some areas were previously sold to logging companies, and often subsequently re-sold several times over so that buying them back (for conservation purposes) is not an option; second, in a remote area it is difficult to guarantee that management stipulations will be adhered to (D. H. L. Thomas *in litt.* 2001). Local pressure on oak forest takes the form of persistent lopping of trees for firewood and fodder (Liley *et al.* 1995). Fires in the Palas area, usually started by local people both accidentally and intentionally (sometimes as a deterrent to black bears *Selenarctos thibetanus*), have caused some recent damage to habitat suitable to tragopans (Nawaz and Ghaffoor 1999). During the mid-1990s there was an advanced concept for a comprehensive hydroelectric project for the Palas valley, which would have resulted in the building of several dams with associated inundation, as well as a complex of roads for construction and servicing (EDC 1996), all of which would have had a significant impact on forest in the valley, especially at lower elevations, and would have provided access for logging operations (BirdLife International/HJP undated). The concept does not seem to have reached the stage of a full feasibility study, perhaps owing to an unwillingness to invest by the development assistance community based on the evidently detrimental environmental impact of the scheme (D. H. L. Thomas *in litt.* 2001). The Nuri Reserve Forest in the Kaghan valley was subject to a planned intensive forestry programme involving clear-felling and replanting (Grimmett and Robson 1986), and the great floods of 1992 were all the worse as a result of the general depletion of forest in this valley (Duke 1993). The Kaghan valley in general was severely over-grazed and many places had “herb and shrub layer completely lacking”, while other areas were being felled to make way for pasture and provide construction materials, such that the future of the species “would seem to be bleak” (Grimmett and Robson 1986). With the opening up of Kohistan, both deforestation and hunting are increasing (Chaudhry 1993a).

India Most forest in the original range of the Western Tragopan was badly damaged before the twentieth century began. Brooks (1875a) cited the “wanton and wholesale destruction of the timber of a fine valley” in the Mussoorie area, much of whose wood went to lay sleepers for the northern Indian railways (“Mountaineer” 1876). More recently, “uncontrolled and continuous exploitation of natural resources in Himachal Pradesh gathered momentum during the 1980s” (Jandrotia *et al.* 1996), quite probably a decade earlier (R. Kaul *in litt.* 1999). Although the effects of deforestation might partly be reversed by intelligent forestry policy, it is unlikely that extensive tracts of undisturbed forest remain, as profits and yields drive the timber industry into intensive forest management (Gaston *et al.* 1983). Felling, lopping and burning is apparently mostly done clandestinely and is difficult to control by understaffed forest departments (Javed *et al.* 1999a). Moreover, timber distribution policy in Himachal Pradesh has caused widespread loss of habitat in the range of this species; most forest had been cleared at Barua in May 1988, when cultivation extended almost to the tree-

line, and Forest Department staff themselves were recently reported felling trees in the Kugti Sanctuary and Dodra-Kwar area (Narang 1993a). Overgrazing, flagged as a threat to Western Himalayan habitats in the 1980s (Gaston *et al.* 1981a,b, Gaston *et al.* 1983, Javed *et al.* 1999a), was compounding habitat loss at the Kugti Sanctuary as “almost the whole sanctuary was occupied by Gaddis with huge flocks of goats and sheep and because tree felling was also in progress” early in the 1990s; and given the intensity of livestock grazing and timber extraction, the population of tragopans surviving in the Dadarti Forest in the Sangla valley was not thought to be viable (Narang 1993a). Other putative reasons for the decline of the species in Himachal Pradesh include “medicinal herb collection... and... the shrinking of its ringal bamboo habitat” (Chauhan and Sharma 1991).

Hunting Marshall (1884) stated that populations of this species “were being gradually exterminated by being snared and shot in the breeding season” (although he also reported that this decline was reversed through controls: see Measures Taken). However, it is in winter that it comes into direct contact with man as it moves to lower, more densely populated altitudes and becomes more easily detectable in the sparser cover (Grimmett and Robson 1986, Islam undated, Javed *et al.* 1999a). It is regularly hunted for its plumage and meat (Chauhan and Sharma 1991), and its occasional habit of perching on a branch when flushed renders it susceptible to shooting, even though “hunting pressure on pheasants does not seem to be excessive in parts of this species’ range” (Gaston *et al.* 1983).

Pakistan Islam (undated) noted that it is still “shot in small numbers due to inadequate law enforcement”, but Gaston *et al.* (1983) took a far less sanguine view, reporting that hunting is rampant in many areas of Pakistan, and the pressure on this species is especially severe because of the value of its plumage. Five hunters were encountered in Indus Kohistan who possessed trained dogs and specialised in hunting galliforms (Grimmett and Robson 1986); but such traditional practice has little impact on tragopans (R. Nawaz *in litt.* 2001). Tragopan feathers are prized as ornaments and whole skins were sold for the equivalent of US\$10–15 in the early 1980s, considerably more than the value of the meat alone (Islam undated). In 1984, however, local people reported very little trading of tragopan meat and plumage in the Duber valley, Indus Kohistan (Grimmett and Robson 1986). The presence of a large, high-density tragopan population in the Palas valley, despite high hunting pressure there, suggests that the species can accommodate this exploitation where habitat remains in excellent condition (R. F. A. Grimmett *in litt.* 2001).

India Hunting of pheasants still occurs unchecked in Himachal Pradesh, despite legislation designed to prevent this, as enforcement is absent or impossible (Garson 1982a,b, Narang 1993, Javed *et al.* 1999a). In the interior of Himachal Pradesh, Gurkha labourers are expert trappers (Garson 1983) and decimate gamebird populations (Narang 1993a, Javed *et al.* 1999a). In the Great Himalayan National Park, the prime recorded threat around 1990 was rampant hunting by local people (Singh *et al.* 1990), although in the mid-1990s the greater problem was disturbance by gatherers of forest products (K. Ramesh *in litt.* 2001; see below). In the forests of Himachal Pradesh, leg snares for trapping pheasants are laid in “very large numbers” annually, while well armed hunters with trained dogs are increasingly common and market demand for pheasant skins and meat is rising (Javed *et al.* 1999a, S. Bashir *in litt.* 1999).

Disturbance In both Pakistan and India, forests in the elevation band occupied by the species are often visited in summer by collectors of edible fungi and medicinal plants, probably causing disturbance to breeding birds (Grimmett and Robson 1986, Narang 1993a).

Pakistan Between May and October in north Pakistan, nomadic herdsman occupy high-altitude camps and there is a “strong possibility that breeding birds are disturbed” or hunted, including Western Tragopans (Islam undated). This disturbance seems to push the species to the upper limit of suitable forest above 3,000 m in summer (Grimmett and Robson 1986). In winter, disturbance was not a strong constraint in Palas valley, as many birds were located fairly close to villages (Liley *et al.* 1995, Whale 1997a). Human density in Azad Kashmir is

c.150 persons per km², high enough to disturb most habitats severely (Gaston *et al.* 1983), and it is increasing rapidly (Islam undated). Gatherers of forest products create considerable disturbance throughout tragopan areas in Pakistan (R. Nawaz *in litt.* 2001).

India Human density in Chamba district, Himachal Pradesh, is c.40 persons per km², and rising more rapidly than in most parts of India (Gaston *et al.* 1983). As many as 5,000–6,000 people are involved in herb and mushroom collection in the Great Himalayan National Park area (Pandey 1993a, K. Ramesh *in litt.* 2001). Indeed, throughout Himachal Pradesh, montane forests are disturbed in summer by large numbers of mushroom (notably *Morchella*) and herb collectors and their dogs (Javed *et al.* 1999a), and this is now thought to be a possible major cause of breeding failure in the tragopan, since numbers of such collectors have dramatically increased in recent years, and the prime targets of their activities are in the prime breeding habitats of the species, precisely at the time when they are on nests (K. Ramesh *in litt.* 2001). Both migrant and local graziers and their livestock enter all protected areas in the Beas valley (Pandey 1993a).

Poor protection Many protected areas in the Western Himalayas are regarded as too small to conserve pheasant populations effectively, and the number of large parks such as the Great Himalayan National Park are too few (Pandey 1993a)—indeed, the latter park only has 33% of its area under forest anyway (K. Ramesh *in litt.* 2001). Furthermore, in India legal protection apparently has little effect on the practices of local people and protected-area management is often impossible because of political and socio-economic issues (K. Ramesh *in litt.* 1999). Outside of the Neelum valley there are no protected areas which hold this species in Pakistan. Most of the forests in Kaghan and parts of Kohistan are, however, reserve forests, and in theory this classification still affords strict protection from cutting and removal of forest products (R. Nawaz *in litt.* 2001).

MEASURES TAKEN **Legal controls** The species is listed in Appendix I of CITES and receives full legal protection in both Pakistan and India. Thus hunting of the species, as well as possession of skins, parts or plumage and trade in live birds is fully prohibited in Pakistan (Islam undated); likewise in India (K. Ramesh *in litt.* 2001). In the Chamba region of India over a century ago Marshall (1884) reported that “all snaring has now been stopped” and shooting rights restricted, with the result that the birds “are rapidly increasing in numbers”. This happy circumstance did not, alas, last. Recent attempts have been made to control the poaching problem in protected areas and reduce hunting overall: Pandey (1993a) reported that a five-year ban on hunting was imposed by the Himachal Pradesh government and rewards were offered to villagers who helped bring offenders to justice, although K. Ramesh (*in litt.* 2001) reports that the ban was introduced in 1982, is permanent, and supplements the ban already imposed under the Indian Wildlife (Protection) Act 1972.

Protected areas It occurs in two (and perhaps three) national parks and 10 or more other protected areas (some in a bad condition), in addition to a few “unprotected” yet significant sites. **Pakistan** The species occurs in Machiara National Park, Salkhala Wildlife Sanctuary and Kazinag and Phala Game Reserves. **India** Increased surveillance and developments in infrastructure have apparently resulted in improved protection in wildlife sanctuaries in Himachal Pradesh (Pandey 1993). The Great Himalayan National Park was designated to include the Sainj, Tirthan and Jiwa valleys, all localities for this species (Gaston *et al.* 1981a), and a biodiversity conservation project has been undertaken there (Pandey and Wells 1997). Other, smaller sanctuaries, such as Daranghati, Kanawar, Rupi Bhaba, Sangla, Kugti, Tundah and Nargu, contain populations (Chaunan and Sharma 1991; see Distribution). In Jammu and Kashmir, Kishtwar National Park might hold a small population, and around 70 birds are thought to survive in the Limber Wildlife Sanctuary (Javed 1992).

Project work in Palas valley, Pakistan The discovery of a population in the Palas valley triggered a major conservation initiative, at first called the Himalayan Jungle Project (HJP),

with the Western Tragopan as its flagship species; however, Palas is biologically very rich because for the most part intact, and thus contains other significant wildlife elements including possibly the largest known naturally reproducing population of the threatened west Himalayan elm *Ulmus wallichiana* as well as a diverse assemblage of threatened mammals (Duke 1993). In September 1992 massive flooding in Pakistan brought devastation to many areas including Palas, raising public consciousness of the value of forests and causing the government to ban all logging in NWFP at least temporarily; HJP coordinated relief work and began a flood rehabilitation programme, giving it a high profile and enhancing its capacity to advocate forest conservation through local participation (Duke 1993). HJP (executed by BirdLife International in partnership with NWFP Wildlife Department, National Council for Conservation of Wildlife, WWF Pakistan and World Pheasant Association) worked to safeguard the internationally important natural heritage of Palas valley by promoting sustainable, integrated natural resource management amongst local communities (D. H. L. Thomas *in litt.* 2001). The project's goal was to safeguard the biodiversity of the Palas Valley by enabling local communities to tackle the linked causes of poverty and natural resource degradation, and the project crystallised around six main programmes: social organisation and participation; infrastructure rehabilitation (reconstruction of water mills, irrigation channels and suspension bridges); natural resource management (an agricultural development programme that focused on using improved varieties of maize, and on producing orchard fruits such as apples, plums, pears and cherries); biodiversity survey and monitoring; forest management; and environmental awareness (D. H. L. Thomas *in litt.* 2001). Although rural development was the most visible part of the project's activities, improvements to household incomes from the agriculture programme indirectly reduced the pressure on forests and biodiversity; moreover, the community trust generated from this approach has created the foundation for a greater focus on biodiversity conservation work (D. H. L. Thomas *in litt.* 2001). The project worked to strengthen social organisation and community participation in development in Palas, building on the existing *Jirga* (tribal council) system rather than creating new structures; to this end, a "Bar Palas" agreement was negotiated between the *Jirga* and the project as a framework for project implementation, combining development assistance with an agreement from the communities to conserve wildlife, including a self-regulated prohibition on hunting tragopans and large mammals (D. H. L. Thomas *in litt.* 2001). This project is now being superseded by the Palas Conservation and Development Project (PCDP; see Measures Proposed).

Education and training Leaflets containing information about tragopans were distributed in Northern Areas of Pakistan in the 1980s (Grimmett and Robson 1986). Since 1990, the Forest Training School at Chail in Himachal Pradesh, India, has run a training course for wildlife range officers and a three-month course for wildlife guards (Pandey 1993a). Education programmes in villages near protected areas in Himachal Pradesh have been initiated (Pandey 1993a). Some 3,000–3,500 people of different age-groups attended nature awareness scheme camps in the Beas valley of Himachal Pradesh in 1989–1991 (Pandey 1993a). The Pakistan Galliform Project (WPA Pakistan, UNDP/GEF and NWFP Wildlife Department) has carried out an environmental awareness programme in schools near key pheasant areas in the Western Himalayas (R. Nawaz *in litt.* 2001).

Research As part of the Himalayan Jungle Project, and also as independent initiatives, abundance estimates have been conducted at Palas valley, Pakistan, relying on call counts and dogs to flush individuals in winter (see, e.g., Bean *et al.* 1994, Liley *et al.* 1995, Barker *et al.* 1996, Whale 1997a). Two long-term research projects were recently initiated in India to study the distribution and ecology of the species in the Great Himalayan National Park (Ramesh *et al.* 1999) and Chamba (S. Bashir *in litt.* 1999). These projects have collected data on relevant threats in the national park and the latter confirmed the species's presence at many sites in the Chamba region (R. Kaul *in litt.* 1999). In May 1999, an adult female was

trapped and radio-tagged in the Great Himalayan National Park, allowing her movements to be followed throughout her breeding attempt (*Tragopan* 11 [1999]: 5), although she was not relocated in January 2000 (*Tragopan* 12 [2000]: 3). Probabilistic models using remote sensing and GIS technologies have been developed to predict the distribution of the species in Great Himalayan National Park and elsewhere (K. Ramesh *in litt.* 2001). Surveys were undertaken in reserve forests (presumably areas outside the wildlife sanctuaries associated with some of the following names) in Chamba district of Himachal Pradesh (e.g. Kalatope-Khajjiar, Kugti, Tundah, Gamgal Siyabehi and Seichu Tuan), but no direct evidence of the species's continued presence was found (Katoch *et al.* 1997). Similarly, although its presence was suspected in Nanda Devi National Park (Tak and Kumar 1987), recent surveys have not proved this to be the case (Sankaran 1995c) and any *Tragopan* in this area might equally be Satyr *T. satyra*.

MEASURES PROPOSED (See Remarks 8) **Protected areas** More, larger protected sites are required to support populations of the Western Tragopan (Pandey 1993a). **Pakistan** In the Palas valley the species breeds commonly on north-facing slopes but winters largely on south-facing slopes, so both slopes must be protected (Liley *et al.* 1995). Forests in Kayal valley must also be protected (Liley *et al.* 1995). **India** At the start of the 1980s at least three reserves were required, one in each of the main habitat blocks: the Neelum Valley in the west, the Inner Seraj in the east (previously nominated for upgrading to national park status: Gaston *et al.* 1981a,b) and Bhadarwar in the Ravi/Chenab area (Gaston *et al.* 1983); the Inner Seraj area has now indeed been upgraded into the Great Himalayan National Park (K. Ramesh *in litt.* 2001), but the extent to which the other prescriptions now require implementation and/or modification, given subsequent surveys in India, is unclear and thus this issue itself is a measure needing to be addressed. Biodiversity conservation in the Great Himalayan National Park should focus on community-level projects, with more funding going to efficient management and the provision of staff and equipment (see Pandey and Wells 1997); it should also go towards alternative livelihood schemes and public awareness work, with a sound management strategy which allows all sectoral interests to resolve their differences (K. Ramesh *in litt.* 2001). Several unprotected sites for the species in Chamba district, Himachal Pradesh, should receive formal protection (Katoch *et al.* 1997). The linking of the two halves of Daranghati Sanctuary has been proposed (Pandey 1994) but the outcome is unknown. Trends in tragopan populations within Great Himalayan National Park should be monitored along fixed transects (Gaston 1980, Gaston and Garson 1992) and at calling stations identified in recent fieldwork (Ramesh *et al.* 1999). Guards and wardens in this and other protected areas in the Himalayas need binoculars, a basic tool for patrolling and wildlife monitoring in difficult terrain (Gaston and Garson 1992). The provision of alternative livelihoods would reduce local dependence on forest products (Duke 1989a,b), which may be most appropriate for certain core areas of nature reserves.

Control of hunting Relevant legislation should be widely publicised and strictly enforced with heavy penalties to violators, with a primary aim of eliminating poaching within protected areas. Hunting needs particularly strict control in winter when tragopans are most at risk (Javed *et al.* 1999a).

Habitat management A dense understorey is apparently "crucial for the survival" of this species (Katoch *et al.* 1997), and measures should be taken to ensure shrub growth is not damaged or disturbed in protected areas holding the species. Where commercial felling is ongoing, it should not be concentrated but spread over large areas and over long periods of time to minimise degradation (Chaudhry 1993a). Sympathetic felling and recovery methods should be applied to minimise habitat disturbance (R. Nawaz *in litt.* 2001). Disturbance through the collection of mushrooms, medicinal plants and herbs should be minimised (Gaston and Garson 1992, Javed *et al.* 1999a) (negotiations are needed with the cadre of gatherers of

forest products, however, since their future no less than the tragopan's depends on the forests remaining in healthy condition). Reforestation of already cleared areas with commercially valuable timber species and fodder-producing plants would take pressure off remaining tracts of natural habitat (Grimmett and Robson 1986).

Project work in Palas valley, Pakistan The Palas Conservation and Development Project (PCDP) began in January 2001 and will enlarge the conservation and development work in Palas, building upon the achievements of the Himalayan Jungle Project. The PCDP is a four-year project to be financed by the European Community and Government of North-West Frontier Province. The PCDP will be executed by the Department of Forest, Fisheries and Wildlife, Government of NWFP, with technical assistance provided by BirdLife International. Its objectives are: (1) to catalyse and facilitate the establishment and/or strengthening of viable community organisations that sustain participation in conservation and development; (2) to safeguard biodiversity and optimise the flow of local, national and global benefits from the management and sustainable use of natural resources through conservation and environmental awareness, participatory forest management, sustainable agricultural development for improved nutrition and income generation, and improved animal husbandry and rangeland management; (3) to foster the local economy and facilitate natural resource management through the rehabilitation and development of basic infrastructure; (4) to develop and sustain improvements in health, nutrition and sanitation, particularly among women and children (R. Nawaz and D. H. L. Thomas *in litt.* 2001).

Education Public education programmes in the vicinity of protected areas and/or important tragopan populations are needed (Duke 1989a,b, Javed *et al.* 1999a). This is certainly true in Great Himalayan National Park, as part of a strategy for the containment of disturbance and proper management of the area (K. Ramesh *in litt.* 2001).

Research Populations need monitoring for trends (Jandrotia *et al.* 1996). Population surveys should make use of trained dogs to flush birds during transects, as each extra dog roughly doubles the chances of encountering the species, but to ensure comparability between surveys the number of dogs on survey teams should be standardised, and to avoid disturbance dogs should not accompany breeding season surveys (Liley *et al.* 1995). **Pakistan** Some forests in Kohistan and deep in the Neelum watershed were yet to be surveyed in the early 1990s (Chaudhry 1993a); certainly there is a sense that certain side valleys in Kohistan other than Palas may yet prove to contain significant populations of tragopans, and a new concerted initiative to determine the situation is therefore appropriate (R. Nawaz *in litt.* 2001). A study of socio-economic factors in montane habitats could point up new ways of raising local standards of living, and thereby reduce dependence on forest produce (Chaudhry 1993a). The ecology and status of the tragopans in Palas valley should continue to be studied and monitored in order to clarify their trends, requirements and threats (Whale 1997a). **India** Around 1990 a programme of surveys was planned in the Daula Dhar (Dhauladhar) ranges, Seraj, Pabar and Kinnaur (Chauhan and Sharma 1991), but the outcome is unknown. More studies to assess the status and distribution of Western Tragopan in India are required, especially from areas between the Beas valley westwards to the Jhelum valley, including areas of Chamba in Himachal Pradesh and Bhadarwar and Kishtwar and the Pirpanjal range in Jammu and Kashmir: the large blocks of intact forest from around Bhadarwar, in Kishtwar National Park, to the Ravi valley in Himachal Pradesh (Gaston *et al.* 1981b, 1983), and the entire Beas catchment above Mandi, covering around 2,000 km² of relatively heavy forest which might support a large population of tragopans (Gaston *et al.* 1983), require urgent investigation. Surveys are also needed in certain areas of Uttar Pradesh—e.g. the habitat in Uttarkashi district has been shown by remote sensing techniques to be contiguous with occupied habitat in Himachal Pradesh (Prasad 1993; see also Narang 1993b); moreover, the unconfirmed areas listed in Distribution need to be checked for birds, and a study made to determine, if possible, where precisely in Garhwal this species meets the Satyr Tragopan

(and what happens ecologically to the two species if—as seems conceivable, especially given the possible occurrence of Western in Nepal [see Remarks 2]—they overlap).

Monitoring techniques The use of repeated call counts should be encouraged, especially using tape-playback (with due caution against over-use) to elicit vocal responses or dogs to flush hidden birds, and following the recommendations of fieldworkers in Palas valley and Himachal Pradesh (Nawaz and Ghafoor 1999, Javed *et al.* 1999a). Winter surveys have been rejected as a routine monitoring procedure, but they are recommended for identifying crucial wintering sites and habitats (R. Nawaz *in litt.* 2001). Encounter rates of various types indicate abundance and trend, and allow comparisons between areas and seasons (K. Ramesh *in litt.* 2001).

REMARKS (1) The species has been listed as present along the Shiquan river (the upper Indus) in the south-west corner of Tibet (Cheng Tso-hsin 1987), albeit with “no evidence of its occurrence since the 1950s” (Li Xiangtao 1996). The details of any Chinese records have not been found, however, and the area in question lies above the known altitudinal limits of the species, so its presence in China is here considered unconfirmed. (2) There are a few indications that the species might have occurred in Nepal in the nineteenth century. An undated male specimen in FMNH is labelled Nepal, and two B. H. Hodgson specimens have at one time or another been attributed to the country (Inskipp and Inskipp 1991). (3) The species was not recorded during surveys in Dachigam, Overa and Naganari in April–May 1981 (Lamba undated). (4) This record is based on a specimen collected by R. Meinertzhagen and, as other specimens of his labelled from this locality are known to be fraudulent (P. C. Rasmussen verbally 2000), it is treated as provisional here. (5) In general an equal sex ratio has been assumed in monogamous pheasants when extrapolating population estimates from counts of calling or observed males; however, Islam and Crawford (1993) found a significant (60:40) preponderance of males, which implies that doubling counts of vocally or visually encountered males may overestimate the size of the total population. By contrast, Javed *et al.* (1999a) reported an apparently equal sex-ratio in a sample of 26 sightings from Himachal Pradesh, 1998–1999. (6) Rui is not a name recognised by workers in northern India, and it may well be an alternative name for ringal rather than a second species; at any rate, the only bamboo (at least of relevance) in the tragopan’s habitat is ringal (K. Ramesh *in litt.* 2001). (7) K. Ramesh (*in litt.* 1999) noted that most birds recorded in the Great Himalayan National Park of Himachal Pradesh were on east-, south- or south-east-facing slopes in all seasons, but at lower elevations in winter. (8) Captive breeding of the Western Tragopan is planned in Pakistan: an aviary complex at a remote site in Kund Forest, near Mansehra, is ready to receive birds which the “Westrag 2000” project (funded by the World Pheasant Association) has permission to capture in Kayal valley, Kohistan (*Tragopan* 11 [1999]: 5). First attempts to trap birds took place in July 1999 and in the 1999–2000 winter (*Tragopan* 12 [2000]: 3, Joiner 2000). However, whether this initiative will significantly advance the conservation of the Western Tragopan is unclear. Western Tragopans are not well suited to *ex-situ* programmes: according to Howman (1993), J. Delacour “believed that the comparatively dry habitat in which they lived made them a more difficult avicultural species. This, coupled with the logistical problems of trapping and transporting them from their inaccessible, high-altitude haunts without excessive stress, makes them particularly challenging to rear and breed successfully.” Indeed, such efforts might merely distract conservation agencies and governments from the more difficult but more relevant task of containing hunting pressure and protecting habitat. Capture of the species from other priority sites, such a Palas, should not be permitted since such action runs the risk of undermining *in-situ* conservation efforts there.