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Conservation status of grouse worldwide: an update

Ilse Storch

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This paper provides an overview of conservation status and major threats to grouse based on information collected by the IUCN/SSC BirdLife WPA Grouse Specialist Group during 2004-2005. At the time of compiling the first Grouse Action Plan (Storch 2000b) in 1999, no grouse species were considered to be threatened following the IUCN criteria, but three species with limited geographic distribution were listed as Near Threatened (IUCN 1996): Caucasian black grouse *Tetrao mlokosiewiczi*, Chinese grouse *Bonasa sewerzowi*, and Siberian grouse *Dendragapus falcipennis*. In 2000, the newly recognised Gunnison sage-grouse *Centrocercus minimus* was listed as Endangered and the Caucasian black grouse was reclassified to Data Deficient. Shortly after, both the lesser prairie-chicken *Tympanuchus pallidinctus* and the greater prairie-chicken *T. cupido* were added to the Red List as Vulnerable owing to rapid population declines, and the greater sage-grouse *Centrocercus urophasianus* was listed as Near Threatened (IUCN 2004). At a national level, 14 of the 18 known grouse species are red-listed in at least one country. Populations at the southern edge of a species' range and in densely populated regions are most often red-listed. Based on questionnaire responses from 47 countries, habitat degradation, loss and fragmentation due to human land use activities are the major threats to grouse viability. Exploitation, predation, human disturbance and climate change were regionally believed to be critical. Integrating habitat preservation and human land use practices is concluded to be the major challenge to grouse conservationists worldwide.

Key words: conservation, grouse, Grouse Specialist Group, IUCN/SSC Action Plan, status, Tetraonidae, threats

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A series of more than 70 Action Plans has been published by the Species Survival Commission (SSC) of the World Conservation Union (IUCN) since 1987 (Giminez-Dixon & Stuart 1993, http://www.iucn.org/themes/ssc/publications/actionplans.htm). The goal of the IUCN/SSC Action Plans is to assess the nature and scale of threats, and to propose conservation actions for species of concern (McGowan et al. 1998). Action Plans are supported by up-to-date scientific information compiled by IUCN/SSC Specialist Groups and are written primarily for decision makers, agency officials, resource managers and funding organisations, but also for scientists and students. The Grouse Specialist Group (GSG), a voluntary network of grouse (Tetraonidae) professionals under the IUCN, SSC, BirdLife International and the World Pheasant Association (WPA), published the first IUCN/SSC Grouse Action Plan in 2000 (Storch 2000b). In 2005, the Action Plan information was updated for online publication. The objective of this paper is to provide a brief overview of the current status of, population trends of and threats to grouse worldwide based on data and information collected during the revision of the Action Plan.

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Material and methods

A questionnaire regarding the status, population trend of and threats to each of the 18 known grouse species was sent to researchers, state agencies and NGOs in 50 countries where grouse have been confirmed to occur. We received 168 country-by-species questionnaire responses covering 47 countries and all 18 species. The global conservation status of grouse was assessed following the IUCN Red List of Threatened Animals (IUCN 2004, http://www.iucnredlist.org) and the IUCN Red List categories (IUCN 2001, http://www.iucn.org/themes/ssc/redlists/RLcategories2000.html). Additional information and professional assessments were collected from recent literature and from colleagues involved in research and conservation of grouse worldwide.

Results and discussion

Conservation status and population trends

The conservation status of grouse is less critical than that of other galliform taxa because of their extended distribution ranges and often remote habitats. Nevertheless, their conservation status has deteriorated since publication of the first Grouse Action Plan (Storch 2000b), in which none of the grouse species was considered to be globally threatened. Today, one species is listed as Endangered, two as Vulnerable, one as Data Deficient and three as Near Threatened (IUCN 2004; Table 1). Many populations of grouse are red-listed at the national and regional levels.

Species

Gunnison sage-grouse: The Gunnison sage-grouse *Centrocercus minimus* in southwestern Colorado and southeastern Utah has been recognised as a new species separate from the greater sage-grouse *C. urophasianus* (Young et al. 2000). In 2005, there were eight distinct populations in which 2-498 males have been counted during spring lek surveys, and only one population was estimated to contain $>$ 500 individuals (Gunnison Sage-grouse Rangewide Steering Committee 2005). The Gunnison sage-grouse is listed as Endangered (IUCN 2001, 2004) because of low (i.e. $<$ 5,000 individuals) population sizes, very restricted and severely fragmented (i.e. $<$ 500 km^2) occupied range, ongoing population decline, and habitat degradation, loss and fragmentation related to livestock grazing, agriculture, housing and infrastructure development and road construction (see Connelly & Braun 1997, Gunnison Sage-grouse Rangewide Steering Committee 2005). Habitat fragmentation is of particular concern because the species requires a variety of adjacent habitats. Human disturbance (recreation, tourism and lek viewing) and recent droughts pose additional threats. Overall, populations declined during 2000-2004, and estimated population size in 2004 was 3,200 individuals. Recent lek counts suggest that only the Gunnison Basin population increased during 2005 (J.R. Young, pers. comm.). The U.S. Fish and Wildlife Service decided in 2006 that the species does not warrant protection under the Endangered Species Act at this time (http://www.r6.fws.gov/species/birds/gunnisonsagegrouse/).

Greater prairie-chicken: The greater prairie-chicken *Tympanuchus cupido* of central North America has been uplisted to Vulnerable (IUCN 2004) due to rapid declines in both population size and occupied range. It has already disappeared from many U.S. states in which it was formerly common. The subspecies *T. c. pinnatus* and Attwater's prairie-chicken *T. c. attwateri* originally occurred in eastern portions of the Great Plains from Minnesota, Wisconsin and southern Michigan through southern Texas, while *T. c. cupido* occurred in the northeastern USA including Massachusetts, Connecticut, New York, Pennsylvania, New Jersey and Maryland. *T. c. cupido* became extinct in the 1930s after many years of dramatic declines; exploitation and fire control are thought to have played an important role. Attwater's prairie-chicken has declined from 8,700 birds in 1937 (Lehmann 1941) to $\sim$50 individuals and, consequently, there is an immediate risk of extinction for Attwater's prairie-chicken. Also *T. c. pinnatus* has declined in many regions and is now restricted to Oklahoma, Kansas, Nebraska, South Dakota, North Dakota and small portions of Colorado, Minnesota, Wisconsin, Illinois, Iowa and Missouri. Total population size is estimated at about 600,000 birds. Major threats are habitat loss and degradation due to agriculture (crops, livestock and pesticides). Also legal hunting may negatively affect the species.

Lesser prairie-chicken: The lesser prairie-chicken *Tympanuchus pallidinctus* of the southwestern portions of the North American Great Plains is classified as Vulnerable owing to a rapid population decline, equivalent to 30-49% per decade during 1979-1995 (IUCN 2004; R.D. Applegate, pers. comm.). Due to habitat loss and overharvesting, occupied range and population size have decreased substantially for $>$ 100 years. Ongoing habitat loss, but also severe drought

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Table 1. Conservation status of grouse at global level according to the 2004 IUCN Red List of Threatened Species, and at the national level according to national red data books. Listing at state (USA) or province (Canada) level is noted in brackets. The lists of National Red Data books may not be complete as no information was available for a few countries.

		Conservation status	
Species		IUCN 2004	National Red Data Books
Siberian grouse	*Dendragapus falcipennis*	Near Threatened	China, Russia
Spruce grouse	*D. canadensis*	Lower Risk	Not listed (several eastern U.S. states)
Blue grouse	*D. obscurus*	Lower Risk	Not listed
Willow ptarmigan	*Lagopus lagopus*	Lower Risk	Belarus, China, Estonia, Latvia, Lithuania
Rock ptarmigan	*L. muta*	Lower Risk	China, Germany, Iceland, Italy, Japan, Portugal, Slovenia, Spain
White-tailed ptarmigan	*L. leucura*	Lower Risk	Not listed (British Columbia, Canada)
Black grouse	*Tetrao tetrix*	Lower Risk	Austria, Belgium, China, Czechia, Denmark, Estonia, Germany, Italy, Kyrgystan, Latvia, Lithuania, Netherlands, Poland, Romania, Slovakia, Slovenia, South Korea, UK
Caucasian grouse	*T. mlokosiewiczi*	Data Deficient	Armenia, Azerbaijan, Georgia, Iran, Russia, Turkey
Capercaillie	*T. urogallus*	Lower Risk	Austria, Bulgaria, Czechia, Estonia, Germany, Greece, Italy, Liechtenstein, Latvia, Lithuania, Poland, Slovakia, Slovenia, Spain, Switzerland, UK, Ukraine
Black-billed capercaillie	*T. parvirostris*	Lower Risk	China
Hazel grouse	*Bonasa bonasia*	Lower Risk	Austria, Belgium, Bulgaria, China, Czechia, Germany, Greece, Hungary, Italy, Japan, Liechtenstein, Serbia, Slovakia, Slovenia, South Korea, Spain, Switzerland
Chinese grouse	*B. sewerzowi*	Near Threatened	China
Ruffed grouse	*B. umbellus*	Lower Risk	Not listed
Greater sage-grouse	*Centrocercus urophasianus*	Near Threatened	Canada, USA (some U.S. states)
Gunnison sage-grouse	*C. minimus*	Endangered	Not listed
Sharp-tailed grouse	*Tympanuchus phasianellus*	Lower Risk	Not listed (some U.S. states and Canadian provinces)
Greater prairie-chicken	*T. cupido*	Vulnerable	Canada, *T. c. attwateri*: USA
Lesser prairie-chicken	*T. pallidicinctus*	Vulnerable	Not listed, USA candidate species, (some U.S. states)

and harvest levels, contribute to continuing declines. The species has lost most of its original range and the remaining population size is estimated at 10,000-25,000 birds. The range is highly fragmented and most populations number $<$ 1,000 individuals (M.A. Schroeder, pers. comm.). Major threats are conversion of prairie to cropland, pesticide treatment of rangeland, overgrazing by livestock, oil and gas development and overhunting. The species is a candidate for U.S. federal listing under the Endangered Species Act (http://ecos.fws.gov/docs/candforms_pdf/r2/B0AZ_V01.pdf).

Greater sage-grouse: The greater sage-grouse *Centrocercus urophasianus* originally occurred throughout the sagebrush *Artemisia* spp. range of western North America. The species nearly qualifies for listing as threatened owing to a significant reduction in population size and area of occupancy (IUCN 2004). Related to extensive conversion and degradation of habitat throughout the range, greater sage-grouse numbers have been declining during most of the 20th century. The most recent declines have been attributed to habitat loss and degradation by oil and gas development, management for livestock and big game, as well as unusually dry weather conditions. Greater sage-grouse are currently estimated to number 140,000-300,000 individuals (C.E. Braun, pers. comm.). Sage-grouse populations are estimated to have declined by, on average, 3.5% per year during 1965-1985. During 1985-2003, the decline continued at a range-wide average of 0.37% annually (http://www.r6.fws.gov/species/birds/sagegrouse/). Major threats are habitat loss, degradation and fragmentation due to agriculture (crops, livestock and land

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pollution), as well as harvesting and human disturbance. In recent years, industrial oil and gas drilling development has accelerated the loss of useable habitat (M.A. Schroeder, pers. comm.). Recent petitions for federal listing of the species were rejected by the U.S. Fish and Wildlife Service, who concluded that the greater sage-grouse does not warrant protection under the Endangered Species Act at this time (http://www.r6.fws.gov/species/birds/sagegrouse/).

Chinese grouse: The Chinese grouse *Bonasa sewerzowi*, a forest-dwelling species endemic to central China, nearly qualifies for listing as threatened because of ongoing significant reductions in population size and area of occupancy (IUCN 2004). Major threats are habitat loss due to clearcutting and illegal hunting for food. The range of the Chinese grouse is restricted, contracting and highly fragmented. The population is declining and is currently estimated at ~10,000 birds (Y-H. Sun, pers. comm.). The first studies of the species' population biology (Sun et al. 2003), population genetics (Larsson et al. 2003), and landscape ecology (Sun et al. 2003) were presented in 2003. Recently, the Chinese government stopped logging the natural forest within the Gansu and Sichuan provinces. This may have helped to at least locally stabilise Chinese grouse population trends. However, studies have been restricted to minor parts of the distribution range, and more surveys are needed to clarify the species' rangewide status. Most probably, ongoing deforestation, fragmentation and erosion continue to affect the species in large parts of the range. Rates of habitat loss and of population decline need to be clarified.

Siberian grouse: The Siberian grouse *Dendragapus falcipennis* occurs in a restricted range of far eastern Russia (Martens et al. 2003). It nearly qualifies to be listed as threatened (IUCN 2004) due to 1) ongoing declines in occupied range and population related to habitat loss and exploitation, and 2) the restricted total population size and fragmentation of the occupied range. The species probably has been declining since the 1970s, and the Russian Red Data Book of 2000 (Nachev 2000) reports ongoing population declines. The rate of decline, however, is unknown. In 2005, the population was estimated at ~ 275,000 birds (A.V. Andreev, pers. comm.). The major cause of decline is forest exploitation, particularly large-scale clearcutting for timber, and forest fires. Because the species disappears from areas with clearings and exclusively deciduous secondary growth (Hafner & Andreev 1998), the rate of habitat loss could be inferred from satellite imagery. Besides the threats to its habitat, illegal hunting for food has become a common practice, and the species may disappear rapidly from colonised areas (A.V. Andreev, pers. comm.).

Caucasian black grouse: The Caucasian black grouse *Tetrao mlokosiewiczi* has the smallest distribution of all Eurasian grouse and is endemic to the Caucasus region. The species has probably been declining at least since the 1980s and it has disappeared from some mountains at the limits of its range, which is highly fragmented. Political unrest and poor economies throughout much of the range have limited studies of the species. Its status is not clear and the species is listed as Data Deficient (IUCN 2004). In recent years, surveys and population studies have been initiated in Georgia, Turkey and Azerbaijan. Current population estimates assume 40,000-50,000 birds in Georgia, 25,000-30,000 in Russia, 7,500 in Turkey, 1,500-3,500 in Azerbaijan, 300 in Armenia, and 100 in Iran, resulting in an estimated total population of 80,000-90,000 birds. Habitat loss and deterioration, particularly from intensive grazing of subalpine meadows, are likely to be the major threats. Predation by feral dogs and sheepdogs and illegal sport hunting are believed to pose threats to the species (Gokhelashvili et al. 2003; V. Ananian, pers. comm., S. Baskaya, pers. comm., R. Gokhelashvili, pers. comm., S. Khosravifard, pers. comm., S. Klaus, pers. comm., R. Potapov, pers. comm., A. Solokha, pers. comm., E. Sultanov, pers. comm. and G. Welch, pers. comm.).

Subspecies

Subspecies are generally not considered in the IUCN Red List of Threatened Species, although the IUCN red list categories, and criteria can be applied to any taxonomic unit at or below species level (IUCN 2001). Using these criteria, at least two subspecies of grouse qualify to be classified as globally threatened: Attwater's prairie-chicken and the Cantabrian capercaillie *Tetrao urogallus cantabricus*.

Attwater's prairie-chicken: The Attwater's prairie-chicken, a subspecies of the greater prairie-chicken, qualifies to be listed as critically endangered according to the IUCN Red List Categories (www.redlist.org/info/categories_criteria2001) under criteria D (wild population numbers < 50 mature individuals) and E (50% extinction risk within 10 years or three generations). Numbers declined from 8,700 birds in 1937 (Lehmann 1941) to 1,584 birds in 1980 (Lawrence & Silvy 1995,

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Morrow et al. 1996, Silvy et al. 1999). The total population remaining in the wild numbers ~ 50 birds occurring in two isolated populations in Texas that are largely supported by releases of captive-reared birds (N.J. Silvy, pers. comm.). Attwater's prairie-chicken is protected as endangered under the U.S. Endangered Species Act (http://www.fws.gov/endangered/). There is a recovery plan that specifies priority conservation measures (http://ecos.fws.gov/docs/recovery_plans/1993/930208a.pdf). An intensive captive breeding programme is currently underway at several locations in Texas. These birds are then released into two managed areas - the Texas City Preserve and the Attwater Prairie-Chicken National Wildlife Refuge (http://www.fws.gov/southwest/refuges/texas/attwater/), the only areas with remnant populations.

Cantabrian capercaillie: An assessment of the Cantabrian Capercaillie against the IUCN Red List categories and criteria (www.redlist.org/info/categories_criteria2001; Storch et al. 2006) indicates that this subspecies qualifies as Endangered under criteria EN C1 (population of < 2,500 individuals and decline of > 20% in two generations, i.e. eight years using a generation length of four years, following the standards of BirdLife International and C2a(i) (population of < 2,500 individuals and continuing decline and highly fragmented range with no subpopulation of > 250 birds; S. Butchart, BirdLife International, pers. comm.). At present, the subspecies inhabits an area of 1,700 km^2 in the Cantabrian Mountains of northern Spain. Compared to a historic range of 3,500 km^2, the area of occupancy has declined by > 50% (Quevedo et al. 2006). Its range is severely fragmented and it is separated from its nearest neighbouring population in the Pyrenees (*T. u. aquitanus*) by a distance of > 300 km. A 60-70% decline in the number of males at leks since 1981 has been estimated (Pollo et al. 2003), equivalent to an average decline of 3% per year. The current population probably numbers < 1,000 or even < 500 birds, although reliable estimates are lacking. The negative trend appears to continue, as indicated by a 30% decline in lek occupancy from 2000 to 2005 (N = 164 leks; M. Quevedo, R. Rodríguez-Munoz & M.J. Banuelos, pers. comm.).

Populations

Many populations of grouse are declining and threatened with extinction at local, regional and national scales. This is particularly true along the southern edges of grouse distribution, and of grouse inhabiting regions densely populated by humans; e.g. western and central Europe, eastern and central North America, and parts of eastern Asia. Of the 18 known species of grouse, 11 (61%) are included in the national red-data books of at least one country (see Table 1). Only two of the 18 species, i.e. the blue grouse *Dendragapus obscurus* and the ruffed grouse *Bonasa umbellus*, are not red-listed at either the global, national or state/provincial level.

Based on the questionnaire and published information, assumed population trends of grouse were distinguished as increasing, stable, declining or unknown by country and species. Among a total of 168 national populations (by country and species), only four were reported to increase: black grouse *Tetrao tetrix* in Latvia, Liechtenstein and Romania, and hazel grouse *Bonasa bonasia* in Serbia-Herzegovina; for hazel grouse in Italy and Liechtenstein stable to increasing trends were reported. Of the national populations, 49 were considered to be stable or cyclic. Stable to declining trends were reported for 20 and clearly negative trends for 55 populations. Trends were unknown for 38 national populations.

The tundra grouse, i.e. white-tailed *Lagopus leucura*, rock *L. muta*, and willow *L. lagopus* ptarmigan (Potapov & Flint 1989, Braun et al. 1994, Holder & Montgomerie 1993, Hannon et al. 1998), still occupy most of their original ranges, and they are the best protected species because of their often remote habitats. While in the late 1990s, all national *Lagopus* populations were believed to be stable or fluctuating, or trends were unknown (Storch 2000a,b), there is now growing concern as ~ 25% of all populations are reported as declining (Fig. 1). For the forest edge, i.e. black and Caucasian black grouse (Klaus et al. 1990), and the forest grouse, i.e. capercaillie *Tetrao urogallus*, black-billed capercaillie *T. parvirostris* (Klaus et al. 1989), Chinese and hazel grouse (Bergmann et al. 1996), ruffed (Atwater & Schnell 1989, Rusch et al. 2000), blue (Zwickel 1992, Zwickel & Bendell 2004), Siberian (Hafner & Andreev 1998) and spruce grouse *Dendragapus canadensis* (Boag & Schroeder 1992), many more national populations have been reported to be declining than stable or increasing. This is related to the ongoing changes in forest habitats worldwide. Among the prairie grouse (see Fig. 1), population trends have at least locally stabilised in recent years, so that overall negative trends were reported for only 40% of the national populations. However, the prairie grouse have lost major parts of their original ranges in the

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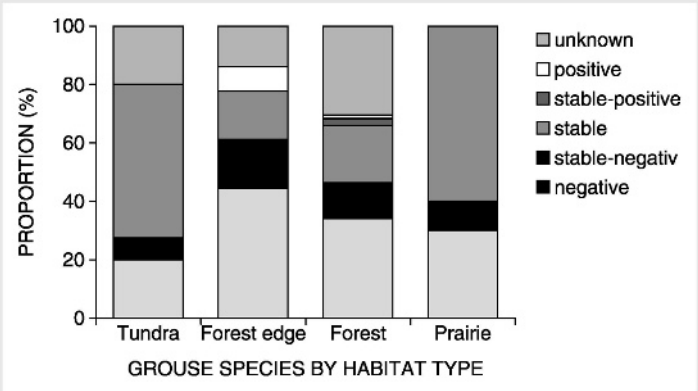


Figure 1. Assumed current population trends of grouse based on 168 country-by-species questionnaires from 47 countries and published information. Classified as increasing (positive, stable-positive), stable or cyclic (stable), declining (stable-negative, negative), or unclear (unknown) by country and species. The information is summarised by habitat type showing the proportion (in %) of national populations in the trend classes 1) tundra grouse (N = 40 national populations including white-tailed, rock and willow ptarmigan); 2) forest edge species (N = 36 including black and Caucasian black grouse); 3) forest species (N = 82 including black-billed capercaillie, capercaillie, blue, Chinese, hazel, ruffed, Siberian and spruce grouse); and 4) prairie grouse (N = 10 including Gunnison and greater sage-grouse, sharp-tailed grouse, greater and lesser prairie-chicken).

past (e.g. Schroeder & Robb 1993, Braun et al. 1994, Connelly et al. 1998, Giesen 1998), and four of the five species are globally threatened or near threatened.

Threats

Numerous factors may influence the population dynamics of grouse and threaten their survival. Their relevance for grouse has been previously outlined (Storch 2000a,b). Here, the most important threats are described based on the results of 133 questionnaires (per species and country) that reported on threats to grouse at a national level; all 18 species were represented (Fig. 2). As reported by Storch (2000a,b), the most frequently named threat categories world-wide were habitat degradation (77% of the questionnaires; reported from at least one country for all 18 species) and habitat loss and fragmentation (64%; for 17 species). Small population size was named by 47% of the correspondents (for 16 species). Predation (43%; for 10 species), direct exploitation (30%; for 10 species), and human disturbance (38%; for eight species) were less commonly named, but may be critical regionally. Climate change, that was suspected in only a few cases as a potential threat to grouse in the previous assessment (Storch 2000a,b), is now considered a threat in 25% of the countries and for eight species. Most commonly named are changes in rainfall amounts and patterns that may negatively affect grouse chick survival in forest grouse and prairie grouse, and changes in vegetation and food availability for tundra grouse.

Implications for conservation

Self-sustaining, viable grouse populations require large interconnected areas of natural or semi-natural habitat. Human land use has been identified as the major threat to grouse worldwide, and has resulted in the greatest range contractions of grouse in the past (Storch 2000a,b). Grouse conservation therefore competes with the demands of increasing human populations and their economic development. From a global perspective, preservation and restoration of grouse habitats by integrating grouse habitat requirements with human land use practices are the major tasks for grouse conservationists. Securing viable populations of all species and subspecies of grouse in the wild is the major goal of the work of the Grouse Specialist Group. Consequently, global priorities for grouse conservation result from the conservation status of grouse species and subspecies. The global priorities for grouse conservation are to:

- prevent further loss and degradation of North American prairie grasslands and restore habitats favourable for the Endangered Gunnison sage-grouse and the Vulnerable lesser and greater prairie-chickens, and the Near-Threatened greater sage-grouse;
- clarify the conservation status of the Data-Deficient Caucasian black grouse;
- assess the rate of loss and fragmentation of the habitats of the Near-Threatened Siberian grouse and the Near-threatened Chinese grouse and reassess the conservation status of these species;
- support ongoing conservation efforts for the critically endangered subspecies Attwater's prairie chicken; and
- support ongoing research on the Endangered Cantabrian capercaillie subspecies and advocate for unified, range-wide conservation efforts.

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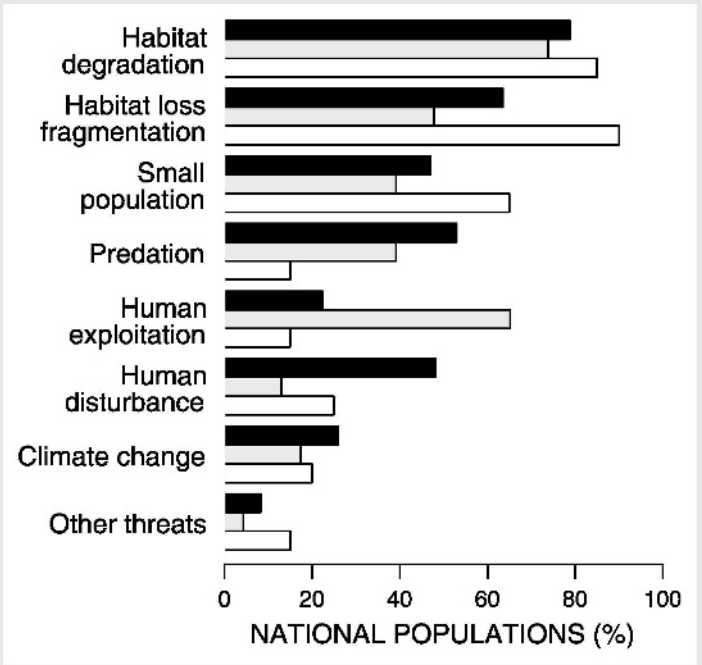


Figure 2. Relative importance of threats to grouse populations by continent (■: Europe; ▒: Asia; and □: North America), based on 133 questionnaire responses covering 18 species per country and species.

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