

ADDRESSING HUMMINGBIRD CONSERVATION NEEDS: AN INITIAL ASSESSMENT

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Abstract. Despite their diversity and extreme popularity with humans, hummingbirds have received relatively little attention from a conservation standpoint. The Hummingbird Monitoring Network (HMN) was started in 2002 to address the conservation needs of this family of birds. In this initial assessment of the conservation needs for the most threatened hummingbird species, we built a composite map of all their ranges and summarized their attributes. Forty-eight species (over 14% of the family) are vulnerable, threatened, or endangered. They live at all elevations, from sea-level to 4800 m. Most rely on forests, are range-restricted, and do not use man-made habitats, such as gardens and agricultural areas. The primary habitats with the highest number of at risk species are montane evergreen forests (18 species), tropical lowland evergreen forests (8 species), and elfin forests (6 species). Based upon the number of vulnerable, threatened, and endangered hummingbird species, the Tropical Andes and southern Mexico appear to be areas with the highest threats. This vulnerability assessment for the family of hummingbirds provides information that can help focus conservation attention in areas and habitats where the most threatened hummingbird species live.

Key Words: altitudinal migrants, assessment, conservation needs, forests, hummingbirds, range-restricted, Trochilidae.

ABORDANDO LAS NECESIDADES DE CONSERVACIÓN DEL COLIBRÍ: UNA EVALUACIÓN INICIAL

Resumen. Pese a su diversidad y su extrema popularidad entre los seres humanos, desde la perspectiva conservacionista los colibríes han recibido relativamente poca atención. La Red de Monitoreo del Colibrí -Hummingbird Monitoring Network (HMN)- se inició en el 2002 para abordar las necesidades de conservación de esta familia de aves. En esta primera evaluación de las necesidades de conservación de las especies de colibríes más amenazadas, hemos elaborado un mapa compuesto de todos sus rangos de distribución y resumido sus atributos. Cuarenta y ocho especies (más del 14% de la familia) son hoy vulnerables, amenazadas o están en peligro de extinción. Viven en toda clase de altura, desde el nivel del mar hasta los 4800 m. La mayoría depende de los bosques, están restringidos a un área y no utilizan hábitats creados por el hombre, tales como jardines y zonas agrícolas. Los hábitats primarios con el mayor número de especies en riesgo, son los bosques siempreverdes de montaña (18 especies), los bosques siempreverdes tropicales de tierras bajas (8 especies) y los bosques enanos (6 especies). Basándonos en el número de especies de colibríes vulnerables, amenazados y en peligro, los Andes Tropicales y el sur de México, parecen ser las zonas de mayores amenazas. Esta evaluación de vulnerabilidad de la familia de los colibríes, proporciona información que puede ayudar a concentrar la atención sobre su conservación en zonas y hábitats donde viven las especies de colibríes más amenazadas.

INTRODUCTION

The hummingbird family (*Trochilidae*) occurs only in the Americas, where they are the second most diverse family of birds with at least 335 species (Schuchmann 1999). Forests are the primary habitat for over 80% of these species (Stolz et al. 1996). They are specialized nectar feeders that present morphological,

ecological and physiological adaptations for this diet and serve as pollinators for a wide array of native plants (Grant and Grant 1968, Stiles 1981, Brown and Bowers 1985, Rosero 2003, Temeles and Kress 2003, Gegeer and Burns 2007). Their distribution shows a strong latitudinal gradient, with the highest numbers of species occurring in the tropics (Greenewalt 1960).

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In 1999, 25 hummingbird species were listed as threatened or endangered (Schuchmann 1999). As of the date of this paper, 48 species (over 14% of the family) were considered vulnerable to extinction (Birdlife International 2008). In Mexico, 23 of the 57 species are included in Mexican Law as threatened (NOM-ECOL-059-2001), 12 as endangered, and 11 as protected.

Seventeen species regularly occur in the US and Canada, of which thirteen species are Neotropical migrants that over-winter in Mexico (US Fish and Wildlife Service 2008). Partners in Flight (PIF) has identified three of the latter as Watch List Species—Costa's (*Calypte costae*), Calliope (*Stellula calliope*), and Rufous (*Selasphorus rufus*)—and a fourth—Lucifer (*Calothorax Lucifer*)—as a Stewardship Species (Rich et al 2004). The Rufous Hummingbird is also on the Audubon Watchlist as a "Species in Decline," with an estimated 2.7% population decline per year from 1966 to the present (National Audubon 2008).

Due to their small size, rapid movement, high-pitched vocalizations, unique flight abilities and other factors, techniques used to monitor other landbirds fail to monitor hummingbird populations adequately. Long-term population trend data is considered adequate for only 4 of the 16 species that regularly breed in the US and Canada (Rich et al. 2004). Trend data for other hummingbird species in the Western Hemisphere is insufficient or non-existent.

After the PIF conference in Asilomar, CA in 2002, the Hummingbird Monitoring Network was started to address this need in avian monitoring and conservation. The HMN now maintains over 30 study sites in Canada and the U.S. and is expanding into Mexico. It is a science-based, project-driven, nonprofit organization dedicated to the conservation of hummingbird diversity and abundance throughout the Americas. To begin assessing the conservation needs for this family, we summarize information about the distribution, habitat, and ecology of the most threatened species.

METHODS

We obtained a list of threatened and endangered hummingbird species from Birdlife International (2008), and extracted pertinent information (Table 1) from Schuchmann (1999) and Stolz et al. (1996) to determine where and what the highest threats are. We created a composite range map for these species to identify areas of range overlap. We then used occurrence, habitat, and nesting information to identify which characteristics were shared among these species at risk.

RESULTS

Table 1 summarizes the characteristics of at risk species. Forty-eight (over 14% of the family) are vulnerable, threatened or endangered and most (45 species) are range restricted. They live at a variety of elevations ranging from sea level to 4800 m and all elevation ranges have about the same number of at risk species. Over half of these species occur across a large range of elevations (>800 m) and are altitudinal migrants.

Over 70% at risk hummingbird species use forests as their primary habitat. Montane Evergreen Forests have the highest number (18) with more than twice as many at risk species than the next primary habitat, lowland tropical evergreen forests (8) and three times more species than the third primary habitat, Elfin Forests (6). Montane Evergreen Forests and lowland tropical evergreen forests that have at risk species occur in numerous locations throughout Latin America but the third highest at risk habitat, the Elfin Forest, is limited to the Andes (Table 2). Based upon the number of species at risk, the Tropical Andes and southern Mexico appear to be the areas with the highest threats (Fig. 1). The most cited threats for these at risk species is habitat destruction or land use change.

Perhaps, the most surprising results are that over 70% of these at risk species do not use man-made habitats such as gardens and agricultural fields and little is known about the natural history. For example, nests are un-described for more than 60% of these species.

DISCUSSION

This investigation is HMN's initial effort to assess the conservation needs for the most threatened members in the hummingbird family. Their conservation depends largely on the conservation of forests, where most hummingbird species live. Their tropical diversity is highest in montane/sub-montane moist forests (Schuchmann 1999) and this pattern of diversity continues northward where the highest diversity of hummingbirds in the U.S.A. occurs in southeastern Arizona in the pine/oak woodlands (Wethington et al. 2005), forests included in the montane evergreen forest classification (Stolz et al. 1996). This forest classification has the highest number of at risk hummingbird species followed by lowland tropical evergreen forests and elfin forests.

Habitat destruction and land use changes are cited as the highest threats followed by the result that most of these at risk species are range-restricted. Small ranges and lack of basic

TABLE 1. SUMMARY OF CHARACTERISTICS FOR AT-RISK HUMMINGBIRD SPECIES. BIRDLIFE STATUS CATEGORIES ARE: CR = CRITICALLY ENDANGERED, EN = ENDANGERED, NT = NEAR-THREATENED, VU = VULNERABLE. SPECIES INFORMATION WERE OBTAINED FROM (1) THE HUMMINGBIRD SECTION IN THE HANDBOOK OF THE BIRDS OF THE WORLD (SCHUCHMANN 1999) AND (2) THE ZOOGEOGRAPHICAL AND ECOLOGICAL DATABASE FROM NETROPICAL BIRDS: ECOLOGY AND CONSERVATION (SOTLZ ET AL. 1996).

Species Information	Risk Categories				Total
	CR	EN	NT	VU	
Total number of species	9	14	19	6	48
Range-restricted species ¹	7	14	18	6	45
Uses man-made habitats such as gardens and agricultural fields ¹	2	4	6	1	13
Nest undescribed ¹	7	10	8	6	31
Primary Habitat Type ²					
Unknown		1			1
Tropical Lowland evergreen forest	1	2	5		8
Mangrove	1	1			2
Secondary Forests			1		1
Montane Evergreen Forests	4	3	6	5	18
Elfin Forest	1	3	2		6
Tropical Deciduous Forest	1				1
Arid lowland Scrub			1		1
Riparian Thickets		1			1
Second-growth Scub			1	1	2
Arid Montane Scrub		1	3		4
Semi humid / humid montane scrub	1	2			3
Altitudinal Range ^{1,2}					
Low (<400 and <1200 m)	3	4	6	1	14
Mid (>400 and <2400 m)	2	3	8	4	17
High (<1200 and >2300 m)	4	7	5	1	17
Altitudinal Breadth ^{1,2}					
Narrow (<801 m)	3	8	7		18
Moderate (>800 m and <1601 m)	2	4	11	4	21
Wide (>1600 m)	2	2		2	6
Unknown	2		1		3
Primary Threat Categories ¹					
Habitat loss or change	7	5	10	3	25
Human use such as farming, mining	1	2	2	1	6
Species characteristics such as range-restricted or rare	1	7	7	2	17

TABLE 2. SUMMARIZES THE REGIONS WHERE THE PRIMARY HABITAT FOR AT-RISK HUMMINGBIRD SPECIES OCCUR. DATA FROM THE ZOOGEOGRAPHICAL AND ECOLOGICAL DATABASE FROM NETROPICAL BIRDS: ECOLOGY AND CONSERVATION (SOTLZ ET AL. 1996).

Primary habitat	Cuba	Mexico	Central America	Tropical Andes	Chile	Venezuela	Brazil	TOTAL
Unknown						1		1
Tropical Lowland evergreen forest		1		4			3	8
Mangrove			1	1				2
Secondary Forests				1				1
Montane Evergreen Forests		4	1	11		2		18
Elfin Forest				5		1		6
Tropical Deciduous Forest			1					1
Arid lowland Scrub		1						1
Riparian Thickets				1				1
Second-growth Scub	1		1					2
Arid Montane Scrub				2			2	4
Semihumid/humid montane scrub				2	1			3
TOTAL	1	6	4	27	1	4	5	48

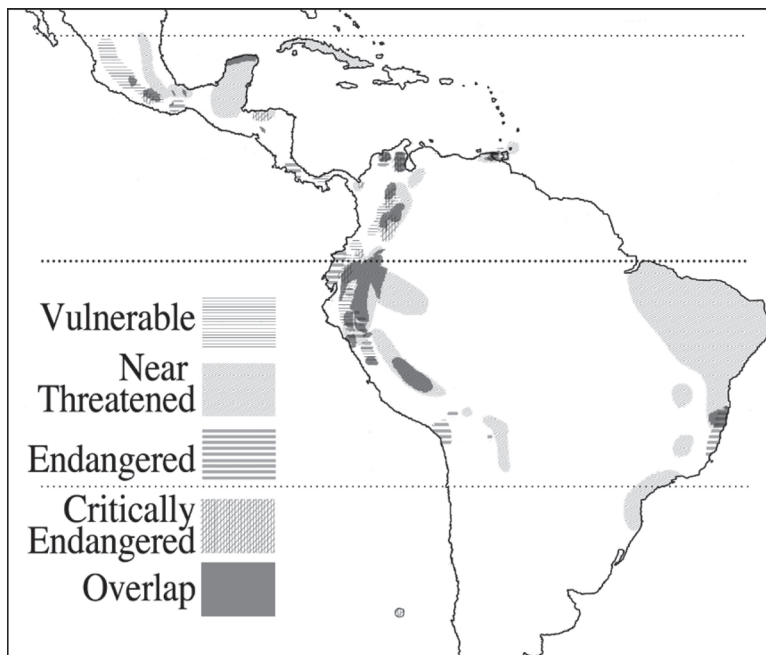


FIGURE 1. This map portrays the ranges of all hummingbird species at risk based upon Birdlife International's risk categories (2008). Areas where ranges overlap are shown in black.

life history information make addressing their conservation needs particularly challenging. This vulnerability assessment for the family of hummingbirds provides information that can help focus conservation attention in areas and habitats that are most critical for maintaining hummingbird diversity in the Americas.

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