DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R9–IA–2009–0028; 96100–1671–0000–B6]

RIN 1018–AV74

Endangered and Threatened Wildlife and Plants; Listing Seven Brazilian Bird Species as Endangered Throughout Their Range

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the following seven Brazilian bird species and subspecies (collectively referred to as ''species'' for purposes of this proposed rule) as endangered under the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*): black-hooded antwren (*Formicivora erythronotos*), Brazilian merganser (*Mergus octosetaceus*), cherry-throated tanager (*Nemosia rourei*), fringe-backed fire-eye (*Pyriglena atra*), Kaempfer's tody-tyrant (*Hemitriccus kaempferi*), Margaretta's hermit (*Phaethornis malaris margarettae*), and southeastern rufous-vented ground-cuckoo (*Neomorphus geoffroyi dulcis*). This proposal, if made final, would extend the Act's protection to these species. The Service seeks data and comments from the public on this proposed rule.

DATES: We will accept comments received or postmarked on or before October 13, 2009. We must receive requests for public hearings, in writing, at the address shown in the **FOR FURTHER INFORMATION CONTACT** section by September 28, 2009.

ADDRESSES: You may submit comments by one of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov*. Follow the instructions for submitting comments.
- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: FWS–R9–IA–2009–0028; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, Suite 222; Arlington, VA 22203.

We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us (see the Public Comments section below for more information).

FOR FURTHER INFORMATION CONTACT: Douglas Krofta, Chief, Branch of Listing, Endangered Species Program, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 420, Arlington, VA 22203; telephone 703–358–2105; facsimile 703–358–1735. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Public Comments

We intend that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, we request comments or suggestions on this proposed rule. We particularly seek comments concerning:

(1) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species and regulations that may be addressing those threats.

(2) Additional information concerning the taxonomy, range, distribution, and population size of these species, including the locations of any additional populations of these species.

(3) Any information on the biological or ecological requirements of these species.

(4) Current or planned activities in the areas occupied by these species and possible impacts of these activities on these species.

(5) Any information concerning the effects of climate change on these species or their habitats.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. We will not consider comments sent by e-mail or fax or to an address not listed in the **ADDRESSES** section.

If you submit a comment via *http://www.regulations.gov,* your entire comment—including any personal identifying information—will be posted on the Web site. If you submit a hardcopy comment that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy comments on *http://www.regulations.gov*.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Endangered Species Program, 4401 N. Fairfax Drive, Room 420, Arlington, VA 22203; telephone 703–358–2171.

Background

Section 4(b)(3)(A) of the Act requires us to make a finding (known as a ''90-day finding'') on whether a petition to add a species to, remove a species from, or reclassify a species on the Federal Lists of Endangered and Threatened Wildlife and Plants has presented substantial information indicating that the requested action may be warranted. To the maximum extent practicable, the finding must be made within 90 days following receipt of the petition and must be published promptly in the **Federal Register**. If we find that the petition has presented substantial information indicating that the requested action may be warranted (a positive finding), section 4(b)(3)(A) of the Act requires us to commence a status review of the species if one has not already been initiated under our internal candidate assessment process. In addition, section 4(b)(3)(B) of the Act requires us to make a finding within 12 months following receipt of the petition (''12-month finding'') on whether the requested action is warranted, not warranted, or warranted but precluded by higher priority listing. Section 4(b)(3)(C) of the Act requires that a finding of warranted but precluded for petitioned species should be treated as having been resubmitted on the date of the warranted but precluded finding, and is, therefore, subject to a new finding within 1 year and subsequently thereafter until we publish a proposal to list or a finding that the petitioned action is not warranted. The Service publishes an annual notice of resubmitted petition findings (annual notice) for all foreign species for which listings were previously found to be warranted but precluded.

The following seven Brazilian bird species are addressed in this proposed rule: Black-hooded antwren (*Formicivora erythronotos*), previously recognized under the genus *Myrmotherula*; Brazilian merganser (*Mergus octosetaceus*); cherry-throated tanager (*Nemosia rourei*); fringe-backed fire-eye (*Pyriglena atra*), previously referred to as Swainson's fire-eye; Kaempfer's tody-tyrant (*Hemitriccus kaempferi*), previously recognized under the genus *Idioptilon*; Margaretta's hermit (*Phaethornis malaris margarettae*), previously referred to as the Klabin Farm long-tailed hermit and recognized at the species level as *P. margarettae*; and southeastern rufous-vented ground-cuckoo (*Neomorphus geoffroyi dulcis*). All of the above species are found in the Atlantic Forest and neighboring regions of southeastern Brazil.

We are addressing the seven Brazilian bird species identified above under a single proposed rule primarily for three reasons. First, all of these species are found in the Atlantic Forest and neighboring regions of southeastern Brazil, thus addressing them together makes sense from a regional conservation perspective. Second, these seven species are subject to similar threats of comparable magnitude, primarily the loss and degradation of habitat due to deforestation and other ongoing development practices affecting southeastern Brazil, as well as concomitant threats due to severely restricted distributions and small population sizes (such as potential loss of genetic viability). Combining species that face similar threats within the same general geographic area into one proposed rule allows us to maximize our limited staff resources, thus increasing our ability to complete the listing process for warranted-but-precluded species.

Previous Federal Actions

On November 28, 1980, we received a petition (the 1980 petition) from Dr. Warren B. King, Chairman, United States Section of the International Council for Bird Preservation (ICBP), to add 60 foreign bird species to the List of Endangered and Threatened Wildlife (50 CFR 17.11(h)), including 5 of the 7 Brazilian bird species (black-hooded antwren, cherry-throated tanager, fringe-backed fire-eye, Margaretta's hermit, and southeastern rufous-vented ground-cuckoo) that are the subject of this proposed rule. Two of the foreign species identified in the petition were already listed under the Act; therefore, in response to the 1980 petition, we published a substantial 90-day finding on May 12, 1981 (46 FR 26464), for 58 foreign species and initiated a status review. On January 20, 1984 (49 FR 2485), we published a 12-month finding within an annual review on pending petitions and description of progress on all pending petition findings. In that notice, we found that all 58 foreign bird species from the 1980 petition were warranted but precluded by higher priority listing actions. On May 10, 1985, we published the first annual notice (50 FR 19761) in which we continued to find that listing all 58 foreign bird species from the 1980 petition was warranted but precluded. We published additional annual notices on the 58 species included in the 1980 petition on January 9, 1986 (51 FR 996), July 7, 1988 (53 FR 25511), December 29, 1988 (53 FR 52746), April 25, 1990 (55 FR 17475), November 21, 1991 (56 FR 58664), and May 21, 2004 (69 FR 29354). These notices indicated that the black-hooded antwren, cherry-throated tanager, fringe-backed fire-eye, Margaretta's hermit, and southeastern rufous-vented ground-cuckoo, along with the remaining species in the 1980 petition, continued to be warranted but precluded.

On May 6, 1991, we received a second petition (the 1991 petition) from ICBP to add an additional 53 foreign bird species to the List of Endangered and Threatened Wildlife, including the 2 remaining Brazilian bird species (Brazilian merganser and Kaempfer's tody-tyrant) that are the subject of this proposed rule. In response to the 1991 petition, we published a substantial 90-day finding on December 16, 1991 (56 FR 65207), for all 53 species and initiated a status review. On March 28, 1994 (59 FR 14496), we published a 12-month finding on the 1991 petition, along with a proposed rule to list 30 African birds under the Act (15 each from the 1980 petition and 1991 petition). In that document, we announced our finding that listing the remaining 38 species from the 1991 petition, including the Brazilian merganser and Kaempfer's tody-tyrant, was warranted but precluded by higher priority listing actions. We made a subsequent warranted-but-precluded finding for all outstanding foreign species from the 1980 and 1991 petitions, including the seven Brazilian bird species that are the subject of this proposed rule, as published in our annual notice of review (ANOR) on May 21, 2004 (69 FR 29354).

Per the Service's listing priority guidelines (September 21, 1983; 48 FR 43098), our 2007 ANOR identified the listing priority numbers (LPNs) (ranging from 1 to 12) for all outstanding foreign species. The LPNs for the seven Brazilian bird species that are the subject of this proposed rule are as follows: The black-hooded antwren, Brazilian merganser, cherry-throated tanager, fringe-backed fire-eye, and Kaempfer's tody-tyrant (LPN 2); and the Margaretta's hermit and southeastern rufous-vented ground-cuckoo (LPN 3). Listing priorities of 2 and 3 indicate that the subject species and subspecies, respectively, face imminent threats of high magnitude. With the exception of listing priority ranking of 1, which addresses monotypic genera that face imminent threats of high magnitude, categories 2 and 3 represent the Service's highest priorities.

On July 29, 2008 (73 FR 44062), we published in the **Federal Register** a notice announcing our annual petition findings for foreign species. In that notice, we announced listing to be warranted for 30 foreign bird species, including the seven Brazilian bird species which are the subject of this proposed rule, and stated that we would "promptly publish proposals to list these 30 taxa."

On September 8, 2008, the Service received a 60-day notice of intent to sue from the Center for Biological Diversity (CBD) over violations of section 4 of the Act for the Service's failure to promptly publish listing proposals for the 30 "warranted" species identified in our 2008 ANOR. Under a settlement agreement approved by the U.S. District Court for the Northern District of California on June 15, 2009, (*CDB* v. *Salazar,* 09–cv–02578–CRB), the Service must submit to the **Federal Register** proposed listing rules for the black-hooded antwren, Brazilian merganser, cherry-throated tanager, fringe-backed fire-eye, Kaempfer's tody-tyrant, Margaretta's hermit, and southeastern rufous-vented ground-cuckoo by July 31, 2009.

Species Information and Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act. The five factors are: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

If we consider that wildlife habitat is not only defined by substrates (vegetation, soil, water), but also atmospheric conditions, then changes in air temperature and moisture can effectively change a species' habitat. Climate change is characterized by variations in the earth's temperature and precipitation causing changes in atmospheric, oceanic, and terrestrial conditions (Parmesan and Mathews 2005, p. 334). Global climate change and other periodic climatic patterns (*e.g.*, El Niño and La Niña) can cause or exacerbate such negative impacts on a broad range of terrestrial ecosystems and neotropical bird populations (Crick 2004, p. 1; England 2000, p. 86;

Holmgren *et al.* 2001, p. 89; Plumart 2007, pp. 1–2). For example, trees cool their area of influence through high rates of evapotranspiration, or water loss to the atmosphere from their leaves (Parmesan and Mathews 2005, p. 337). Areas where trees have been replaced with pastures have lower evapotranspiration rates, thus causing local areas to be warmer (Parmesan and Mathews 2005, p. 337). According to the Intergovernmental Panel on Climate Change (IPCC), climate change can contribute to modifications of Amazonian rainforest habitats that are affected by deforestation (IPCC 1997, p. 11). Parmesan and Mathews (2005, p. 373) suggest that climate change is more likely to cause range reductions rather than range shifts. This may be due to the lack of areas where a species could shift to or the spaces between habitat patches are too large for individuals to reach. This suggests that climate change could be an agent of habitat loss or modification.

Despite the fact that global climate changes are occurring and affecting habitat, the climate change models that are currently available are not yet able to make meaningful predictions of climate change for specific, local areas (Parmesan and Matthews 2005, p. 354), such as the Atlantic Forest and Cerrado (savanna) bioregions. In addition, we do not have models to predict how the climate in the range of these Brazilian bird species will change, and we do not know how any change that may occur, would affect these species. We also do not have information on past and future weather patterns within the specific range of these species. Therefore, based on the current lack of information and data, we did not evaluate climate change as a threat to these species. We are, however, seeking additional information on this subject (see Public Comments) that can be used in preparing the final rule.

Below is a species-by-species analysis of the five factors. The species are considered in alphabetical order, beginning with the black-hooded antwren, followed by the Brazilian merganser, cherry-throated tanager, fringe-backed fire-eye, Kaempfer's tody-tyrant, Margaretta's hermit, and the southeastern rufous-vented ground-cuckoo.

I. Black-hooded Antwren (Formicivora erythronotos)

Species Description

The black-hooded antwren measures 10.5 to 11.5 centimeters (cm) (4 to 4.5 inches (in)) (BirdLife International (BLI) 2007d, p. 1; Sisk 1993, p. 414). Males are black with a reddish-brown back. They have a black narrow bill and a long tail. There are three thin white stripes on the wings. Females have similar coloring, except they have brown-olive feathers where black feathers appear on males (BLI 2007d, p. 1).

Taxonomy

The black-hooded antwren is a small member of the diverse ''antbird'' family (Thamnophilidae). The species was previously recognized under the genus *Myrmotherula* (BLI 2007d, p. 1; Collar *et al.* 1992, p. 667; Sick 1993, p. 414).

Habitat and Life History

The Atlantic Forest biome encompasses a region of tropical and subtropical moist forests, tropical dry forests, and mangrove forests, that extend along the Atlantic coast of Brazil from Rio Grande do Norte in the north to Rio Grande do Sul in the south, and inland as far as Paraguay and Misiones Province of northeastern Argentina (Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, pp. 786–787). The black-hooded antwren inhabits lush understories of remnant old-growth and early successional secondary-growth coastal forests, and it may also occur in dense understories of modified ''restinga,'' (''restinga'' is a Brazilian term that describes a patchwork of vegetation types consisting of beach vegetation, open shrubby vegetation, and dry and swamp forests distributed over coastal plains from northeastern to southeastern Brazil (McGinley 2007, pp. 1–2)), swampy woodlands, abandoned banana plantations, and eucalyptus stands (BLI 2007d, p. 1; Tobias and Williams 1996, p. 64).

Although the specific habitat requirements of the black-hooded antwren are still unclear, the species is not considered a tropical forest specialist. The black-hooded antwren typically forages in pairs or small family groups and consumes various insects, spiders, and small frogs (Collar *et al.* 1992, p. 667; del Hoyo 2003, p. 616; Sick 1993, p. 405; Tobias and Williams 1996, p. 65). Black-hooded antwrens usually forage in dense vegetation within approximately 3 meters (m) (10 feet (ft)) of the ground, but they are also known to feed higher up (ca. 7 m (23 ft)).

Females typically lay two eggs in fragile nests resembling small cups made of plant material (*e.g.*, rootlets, stems, moss) that are attached to horizontal branches within roughly 1 m (3.3 ft) of the ground (Collar *et al.* 1992, p. 667; Sick 1993, p. 405). Both sexes help to build the nests, brood clutches, and attend their young.

Range and Distribution

The black-hooded antwren is endemic to the Atlantic Forest biome in the southeast of the state of Rio de Janeiro (BLI 2007d, p. 1; Collar *et al.* 1992, p. 667). Currently, the only confirmed population is believed to be restricted to remnant patches of forest habitat along roughly 30 kilometers (km) (19 miles (mi)) of coast in southern Rio de Janeiro, near the border with São Paulo (Browne 2005, p. 95; Tobias and Williams 1996, p. 64). However, there have also been recent unconfirmed reports that the species may occur at the state Ecological Reserve of Jacarepiá, located roughly 75 km (47 mi) northeast of the city of Rio de Janeiro (ADEJA 2007, p. 3; WorldTwitch 2007, p. 12).

Population Estimates

The black-hooded antwren was known from 20 specimens that were purportedly collected in the 1800s in montane forest habitats of central Rio de Janeiro, Brazil. The species had not been reported since that collection until it was rediscovered in 1987 in the Atlantic forest in south Rio de Janeiro (BLI 2007d, p. 1).

The extant population is estimated to be between 1,000 and 2,499 birds, and is fragmented among seven occupied sites, including Bracuí, Frade, São Gonçalo, Taquari and Barra Grande, Ariró, and Vale do Mambucaba. Vale do Mambucaba has the highest known density of pairs (156 pairs per square kilometer (km^2)), followed by Mambucaba (densities of 89 pairs/km^2). There are no known estimates for the other locations, but it is believed that the numbers are few (BLI 2007d, p. 1). At least one of the fragmented populations is believed to be reproductively isolated. The population, as a whole, is also believed to be declining rapidly due to continued loss of habitat (BLI 2007d, pp. 1–3).

Conservation Status

The IUCN considers the black-hooded antwren to be ''Endangered'' because ''it has a very small and severely fragmented range that is likely to be declining rapidly in response to habitat loss'' (BLI 2007d, p. 3). The species is also protected by Brazilian law and occurs in the buffer area of Serra da Bocaína National Park (BLI 2007d, p. 2).

Summary of Factors Affecting the Black-hooded Antwren

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Butler 2007, p. 2; Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). In addition to the overall loss and degradation of native habitats within this biome, the remaining tracts of habitat are severely fragmented. The current rate of habitat decline is unknown.

The region has the two largest cities in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.*, soy beans, sugarcane, corn), plantations (*e.g.*, eucalyptus, pine, coffee, cocoa, rubber, bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.*, charcoal production, steel plants, hydropower reservoirs). Forestry practices (*e.g.*, commercial logging, subsistence activities, fuelwood collection) and changes in fire frequencies (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118; World Wildlife Fund 2007, pp. 3–51) also contribute to the degradation of native habitat.

The black-hooded antwren is not strictly tied to primary forest habitats and can make use of secondary-growth forests or other disturbed areas, such as modified ''restinga,'' eucalyptus stands, abandoned banana plantations, and recently burned sites (BLI 2007d, p. 1; Tobias and Williams 1996, p. 64). However, this does not necessarily lessen the threat to the species from the effects of deforestation and habitat degradation. Atlantic Forest birds, such as the black-hooded antwren, which are tolerant of secondary-growth forests or other disturbed sites, are also rare or have severely restricted ranges (*i.e.*, less than 21,000 km^2 (8,100 square miles (mi^2))). Thus habitat degradation can adversely impact such species, just as equally as it impacts primary forest-obligate species (Harris and Pimm 2004, pp. 1612–1613). While the black-hooded antwren is relatively abundant locally, the entire range of the species encompasses only about 130 km^2 (50 mi^2), with only 45 percent of this area considered occupied (BLI 2007d, pp. 3–4).

The susceptibility to habitat destruction of limited-range species that are tolerant of secondary-growth forests or other disturbed sites can occur for a variety of reasons, such as when a species' remaining population is already too small or its distribution too fragmented such that it may not be demographically or genetically viable (Harris and Pimm 2004, pp. 1612–1613). In addition, while the black-hooded antwren may be tolerant of secondary-growth forests or other disturbed sites, these areas may not represent optimal conditions for the species, which would include dense understories and abundant prey species. For example, management of plantations often involves intensive control of the site's understory vegetation and long-term use of pesticides, which eventually results in severely diminished understory cover and potential prey species (Rolim and Chiarello 2004, pp. 2687–2691; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118). Such management activities make these sites unsuitable for the black-hooded antwren (BLI 2007d, p. 2).

Impacts associated with the destruction of native habitat by human activities within the Atlantic Forest biome include extensive fragmentation of the remaining tracts of forested habitat potentially used by the black-hooded antwren (see Factor E). As a secondary impact, habitat destruction of these remaining tracts increases the potential introduction of disease vectors or exotic predators within the species' historic range (see Factor C). Furthermore, even when potentially occupied sites may be formally protected, such as the state Ecological Reserve of Jacarepiá (see Factor D), the remaining fragments of forested habitat will likely undergo further degradation due to their altered dynamics and isolation (ADEJA 2007, pp. 1–2; Tabanez and Viana 2000, pp. 929–932). Altered dynamics and isolation are characterized by a decrease in gene flow and inbreeding, which decrease the fitness of forest species (Tabanez and Viana 2000, pp. 929–932). In addition, fragmented Atlantic forests of Brazil are observed to be overtaken by lianas (long-stemmed woody vines), which cause tree falls and gaps in the forest structure. These gaps in the forest encourage gap-opportunistic vegetation to grow. Hence, a decrease in gene flow, and increases in inbreeding, liana density, and presence of gap-opportunistic species change the character and dynamics of the Atlantic Forest biome and isolate fragmented habitat patches (Tabanez and Viana 2000, pp. 930–931). These changes may result in the loss of important species that comprise the black-hooded antwren habitat. As a result of these secondary impacts, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Therefore, even without further habitat loss or degradation, the black-hooded antwren remains at risk from past impacts to its suitable habitats.

The black-hooded antwren occurs in one of the most densely populated regions of Brazil, and most of the tropical forest habitats believed to have been used historically by the species have been converted or are severely degraded due to the wide range of human activities identified above (BLI 2003a, p. 4; BLI 2007d, p. 2; Collar *et al.* 1992, p. 667; Conservation International 2007a, p. 1; del Hoyo 2003, p. 616; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; World Wildlife Fund 2007, pp. 3–51). In addition, the remaining tracts of suitable habitat in Rio de Janeiro and São Paulo are threatened by ongoing development of coastal areas, primarily for tourism enterprises (*e.g.*, large hotel complexes, beachside housing) and associated infrastructure support, as well as widespread clearing for expansion of livestock pastures and plantations, primarily for *Euterpe* palms (BLI 2003a, p. 4; BLI 2007d, p. 2; Collar *et al.* 1992, p. 667; del Hoyo 2003, p. 616; World Wildlife Fund 2007, pp. 7 and 36–37). These impacts have recently reduced suitable habitats at various key sites known to be occupied by the black-hooded antwren such as Vale do Mambucaba and Ariró, and the remaining occupied habitats at these sites are subject to ongoing human disturbances, such as off-road vehicle use, burning, and recreational activities (BLI 2007d, p. 2; Collar *et al.* 1994, p. 134; del Hoyo 2003, p. 616).

Summary of Factor A

A significant portion of Atlantic Forest habitats have been, and continue to be, lost and degraded by various ongoing human activities, including logging, establishment and expansion of plantations and livestock pastures, urban and industrial developments (including many new hydroelectric dams), slash-and-burn clearing, intentional and accidental ignition of fires, and establishment of invasive species (CEPF 2001, pp. 9–15). Even with the recent passage of a national forest policy and in light of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout the Atlantic Forest biome has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270), and native habitats at many of the remaining sites may be lost over the next several years (Rocha *et al.* 2005, p. 263). Furthermore, because the black-hooded antwren's extant population is already small, highly fragmented, and believed to be declining (BLI 2007d, pp. 1–3), any further loss or degradation of its remaining suitable habitat represents a significant threat to the species (see Factor E). Therefore, we find that destruction and modification of habitat are threats to the continued existence of the black-hooded antwren throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The extant population of the black-hooded antwren is considered to be small, fragmented, and declining. The species was deliberately not collected when it was rediscovered in 1987 (Collar *et al.* 1992, p. 667). This is because the removal or dispersal of just a few individuals from any of the black-hooded antwren's subpopulations or even a slight decline in their fitness due to intentional or inadvertent hunting, specimen collection, or other human disturbances (*e.g.*, scientific research, birding) could represent significant risks to the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any other information currently available that indicates the use of this species for any commercial, recreational, scientific, or educational purpose. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the black-hooded antwren.

C. Disease or Predation

Large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges. However, the extant population of the black-hooded antwren is considered to be small, fragmented, and declining. In addition, extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.*, West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1). Extensive human activity in previously undisturbed or isolated areas can also result in altered predator populations and the introduction of various exotic predator species, some of which (*e.g.*, feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257). Any additive mortality to the black-hooded antwren's subpopulations or a decrease in their fitness due to an increase in the incidence of disease or predation could represent significant threats to the species' overall viability (see Factor E).

Although disease and predation may be a concern for future management of the black-hooded antwren, we are not aware of any species-specific information currently available that indicates that disease or predation poses a threat to the species. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the black-hooded antwren.

D. The Inadequacy of Existing Regulatory Mechanisms

The black-hooded antwren is formally recognized as ''endangered'' in Brazil (Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (BLI 2007d, p. 2; Collar *et al.* 1992, p. 667; ECOLEX 2007, pp. 1–2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.*, Decree No. 76.623, Order No. 419–P), hunting (*e.g.*, Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.*, Decree No. 3.179). In addition, there are a wide range of regulatory mechanisms in Brazil that indirectly protect the black-hooded antwren through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.*, Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.*, Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.*, Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.*, Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.*, Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

There are also various regulatory mechanisms in Brazil that govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, state, and privately owned lands (*e.g.*, Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.*, National Parks versus Biological Reserves); and based on those categories, they allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

The black-hooded antwren occurs in the buffer zone around Serra da Bocaina National Park and, possibly, within Tamoios Environmental Protection Area and the Ecological Reserve of Jacarepiá (BLI 2007d, p. 2; del Hoyo 2003, p. 616; WorldTwitch 2007, p. 12). It has been recommended that some of these sites should be expanded and other sites designated to ensure the species' currently occupied range is encompassed within protected areas. However, for various reasons (*e.g.*, lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (ADEJA 2007, pp. 1–2; Bruner *et al.* 2001, p. 125; Costa 2007, p. 7; IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9). Therefore, even with the expansion or further designation of protected areas, it is likely that not all of the identified resource concerns for the black-hooded antwren (*e.g.*, residential and agricultural encroachment, resource extraction, unregulated tourism, grazing) would be sufficiently addressed at these sites.

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil, which helped facilitate the large-scale habitat conversions that have occurred throughout the Atlantic Forest biome (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45). Despite these efforts, pressures to develop coastal areas containing black-hooded antwren habitat for tourism (*e.g.*, large hotel complexes, beachside housing) and plantation agriculture continue to be a threat to the species (ADEJA 2007, pp. 1–2; BLI 2007d, p. 2; Tobias and Williams 1996, p. 65).

Summary of Factor D

Brazil's wide variety of laws requiring resource protection that would ultimately benefit the black-hooded antwren are tested by the intense development pressure that exists in coastal areas south of Rio de Janeiro. Despite the existence of these regulatory mechanisms, habitat loss throughout the Atlantic Forest biome has increased for more than a decade. The existing regulatory mechanisms have proven difficult to enforce (BLI 2003a, p. 4; Conservation International 2007c, p. 1; Costa 2007, p. 7; The Nature Conservancy 2007, p. 2; Neotropical News 1997b, p. 11; Peixoto and Silva 2007, p. 5; Scott and Brooke 1985, pp. 118, 130). As a result, threats to the black-hooded antwren's remaining habitat are ongoing (see Factor A) due to the challenges that Brazil faces to balance its competing development and environmental priorities. Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the black-hooded antwren throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the black-hooded antwren. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.*, inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance, or observable structure, function, or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire) (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). Each risk will be analyzed specifically for the black-hooded antwren.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.*, inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

There is very little information available regarding the historic distribution and abundance of the black-hooded antwren. However, the species' historic population was likely larger and more widely distributed than today, and it must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vilà *et al.* 2002, p. 91; Wang 2004, p. 332). The available information indicates that suitable habitats currently occupied by the black-hooded antwren are highly fragmented and that the species' extant population is small and declining (BLI 2007d, pp. 1–3). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the species' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, like the black-hooded antwren, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118).

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the black-hooded antwren (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the black-hooded antwren will have disproportionately greater impacts on the species due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986,

p. 31). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the black-hooded antwren's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of the populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the black-hooded antwren, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the black-hooded antwren's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the species susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the black-hooded antwren throughout its range.

Status Determination for the Black-hooded Antwren

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the black-hooded antwren. The species is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and demographic, genetic, and environmental stochastic events associated with the species' high level of population fragmentation (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the species.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the black-hooded antwren throughout its entire range, as described above, we determine that the black-hooded antwren is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the black-hooded antwren as an endangered species throughout all of its range.

II. Brazilian Merganser (Mergus Octosetaceus)

Species Description

The 49–56 cm (19–22 in) (BLI 2007a, p. 1) Brazilian merganser is described as resembling a cormorant (Sisk 1993, p. 163). The bird has a white wing speculum and red feet. The breast is pale grey with dark markings, and there is dark grey coloring in the upper breast (BLI 2007a, p. 1). The species has a distinctive green crest that extends over the nape of the neck (more developed in the male) (Sisk 1993, p. 163).

Taxonomy

The Brazilian merganser was first described by Vieillot in 1817 (Partridge 1956, p. 473). The species belongs in the family Anatidae (BLI 2007a, p. 1).

Habitat and Life History

The Brazilian merganser is highly adapted to shallow, rapid, clear-water streams and rivers, typically bordered by dense, tropical forest (Bruno *et al.* 2006, p. 26; Collar *et al.* 1992, pp. 80–86; Ducks Unlimited 2007, p. 1; Hughes *et al.* 2006, p. 23; Partridge 1956, pp. 478–480; Sibley and Monroe 1990, p. 41). Where suitable riverine conditions exist, the Brazilian merganser also occurs in the Cerrado biome, which is characterized by open tropical savannah and comparatively sparse ''gallery'' forest at the river margins, indicating that the species is not strictly tied to tropical forest habitats (Bianchi *et al.* 2005, p. 73; Braz *et al.* 2003, p. 70).

Brazilian mergansers are strong swimmers and divers. They typically feed in river rapids or in pools adjacent to waterfalls, whereas they rest and perch in more slack water areas or at the river edges (Braz *et al.* 2003, p. 70; Hughes *et al.* 2006, p. 21; Partridge 1956, pp. 481–482). Brazilian mergansers feed primarily on a variety of fish species, with sizes up to approximately 19 cm (7.5 in), and occasionally on insects, snails, and other aquatic macro-invertebrates (Hughes *et al.* 2006, p. 32; Partridge 1956, p. 483).

Brazilian mergansers are believed to be monogamous and sedentary. Breeding pairs appear to maintain their territories along a stretch of river (up to ca. 12 km (7.5 mi)) throughout the year (Braz *et al.* 2003, p. 70; Ducks Unlimited 2007, p. 1; Hughes *et al.* 2006, pp. 23, 33; Partridge 1956, p. 477). The breeding season begins in June and young hatch around August (Partridge 1956, p. 487). Females establish their nests relatively high up (25 m (82 ft)) in the cavities of tall trees that overlook the river and incubate their eggs alone, although males are attentive and remain nearby feeding and perching at the river shoreline (Bruno *et al.* 2006, p. 29; Lamas and Santos 2004, p. 38; Partridge 1956, pp. 484–485). Females may also locate their nests lower down (10 m (33 ft)) in the cavities of cliffs or rocky outcrops near preferred riverine habitat in areas where suitable nesting trees are absent (Lamas and Santos 2004, pp. 38–39).

Range and Distribution

The Brazilian merganser occurs in a few fragmented locations in south-central Brazil, including the upper-tributaries of rivers within the Atlantic Forest biome and to the east in the Cerrado (savanna) biome (BLI 2007a, p. 1). The species is a diving duck that occurred historically in riverine habitats throughout southeastern Brazil, northeastern Argentina, and eastern Paraguay (Hughes *et al.* 2006, p. 24). Currently, the species is found in extremely low numbers at six highly disjunct localities, of which five are in southeastern Brazil and one is in northeastern Argentina and, possibly, extreme eastern Paraguay (BLI 2007a, pp. 1–5; Hughes *et al.* 2006, pp. 28–31). The vast majority of the species' extant population and remaining suitable habitats occur in Brazil, including its largest subpopulation that is estimated to contain fewer than 50 individuals (BLI 2007a, p. 5).

The Brazilian merganser is thought to have been extirpated from Mato Grosso do Sul, São Paolo, Rio de Janeiro, and Santa Catarina (BLI 2007a, pp. 1–2). There is only a single recent record of the Brazilian merganser (ca. 2002) in the province of Misiones, Argentina, while the last confirmed sighting of the species in Paraguay is from 1984 (BLI 2007a, p. 2; Hughes *et al.* 2006, p. 31). For purposes of this proposed rule, our analysis will focus on the most current estimates of the species, which are based in Brazil.

The species likely still occurs in the Brazilian states of Tocantins, Bahia, Goiás, Minas Gerais, and Paraná (Hughes *et al.* 2006, pp. 51–52). Along with other recent sightings of the species in previously undocumented areas of Brazil (Bianchi *et al.* 2005, p. 72; Pineschi 1999, p. 1), this information indicates that the Brazilian merganser may be more abundant and widespread than previously considered.

Population Estimates

The extant population is estimated to be between 50 and 249 individuals and is presumed to be declining, as evidenced by the species' recent history of extirpation from major portions of its historic range (BLI 2007a, p. 1).

Conservation Status

IUCN considers the Brazilian merganser to be ''Critically Endangered'' because ''although recent records from Brazil, and particularly a recent northerly range extension, indicate that this species' status is better than previously thought, the remaining population is still extremely small and severely fragmented, and the perturbation and pollution of rivers continues to cause declines'' (BLI 2007a, p. 1). In addition, the species occurs in three parks in Brazil and in the Uruguaí Provincial Park in Argentina (BLI 2007a, p. 1).

Summary of Factors Affecting the Brazilian Merganser

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). The Cerrado biome has also been heavily impacted by human activities, and current estimates indicate that between 67 and 80 percent of the tropical savannah habitat historically comprising this biome has been converted or severely degraded (Butler 2007, p. 1; Conservation International 2007b, p. 1; Mantovani and Pereira 1998, p. 1455; Myers *et al.* 2000, p. 854; World Wildlife Fund 2007, p. 50). In addition to the overall loss and degradation of native habitat within these biomes, the remaining tracts of habitat are severely fragmented. The current rate of habitat loss in the Atlantic Forest and Cerrado biomes is unknown.

The region has the two largest cities in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within these biomes include extensive establishment of agricultural fields (*e.g.,* soy beans, sugarcane, and corn), plantations (*e.g.,* eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.,* diamond mining, hydropower reservoirs, and charcoal production). Forestry practices (*e.g.,* commercial logging), subsistence activities (*e.g.,* collection of fuelwood), and changes in fire frequencies also contribute to the degradation of native habitat (BLI 2003a, p. 4; BLI 2003b, pp. 1–2; Butler 2007, p. 1; Hughes *et al.* 2006, pp. 37–48; Júnior *et al.* 1995, p. 147; Nunes and Kraas 2000, p. 44; Pivello 2007, pp. 1–2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, pp. 868–869; World Food Prize 2007, pp. 1–5; World Wildlife Fund 2007, pp. 3–51).

The Brazilian merganser is extremely susceptible to habitat loss and degradation, habitat fragmentation, and hydrological changes from human activity (Collar *et al.* 1992, pp. 83–84; Hughes *et al.* 2006, pp. 36–41; Silveira 1998, p. 58). The loss of appropriate aquatic and terrestrial habitats throughout the historic range of the Brazilian merganser due to the above human activities is believed to have drastically reduced the species' abundance and extent of occupied range, and these activities currently represent a significant risk to the species' continued existence because populations are being limited to highly fragmented patches of habitat (Benstead 1994, p. 8; Benstead *et al.* 1994, p. 36; BLI 2007a, pp. 1–6; Collar and Andrew 1988, p. 21; Collar *et al.* 1992, pp. 83–84; Collar *et al.* 1994, p. 51; Hughes *et al.* 2006, pp. 37–48; Silveira 1998, pp. 57–58).

The species is highly adapted to shallow, rapid-flowing riverine conditions and, therefore, can not occupy the lacustrine conditions of reservoirs that result from dam building activities within their occupied range (Hughes *et al.* 2006, pp. 23, 41). The loss of the species' terrestrial habitat has occurred due to the removal of forest cover and suitable nesting trees adjacent to occupied river corridors.

A variety of secondary impacts that degrade suitable habitats have also resulted from the above activities and represent significant risks to the Brazilian merganser. These secondary impacts include increased runoff and severe siltation from agricultural fields, livestock pastures, deforestation, diamond mining, and population centers; changes in hydrologic conditions and local water tables as a result of dam operations (*e.g.,* flood control, power generation) and excessive pumping for irrigation or domestic and industrial water use; and increases in water pollutants due to agricultural, industrial, and domestic waste products (Benstead 1994, p. 8; Bianchi *et al.* 2005, p. 73; BLI 2007a, pp. 1–6; Braz *et al.* 2003, p. 70; Collar *et al.* 1994, p. 51; del Hoyo *et al.* 1992, p. 625; Ducks Unlimited 2007, p. 1; Hughes *et al.* 2006, pp. 40–48; Lamas and Santos 2004, p. 40; Pineschi 1999, p. 1). These secondary impacts negatively affect the Brazilian merganser by reducing water clarity, altering water depths and flow patterns, removing or limiting populations of preferred prey species; introducing toxic compounds; and creating barriers to movements and producing hazardous conditions along river corridors that limit interchange between the species' remaining subpopulations (see Factor E). These secondary impacts also increase the risk of introducing disease vectors and expanding populations of potential predator and competitor species into areas occupied by the Brazilian merganser (see Factor C).

Summary of Factor A

The above mentioned human activities and their secondary impacts have significantly reduced the amount of suitable habitat for the Brazilian merganser (Benstead 1994, p. 8;

Benstead *et al.* 1994, p. 36; BLI 2007a, pp. 1–6; Collar and Andrew 1988, p. 21; Collar *et al.* 1992, pp. 83–84; Collar *et al.* 1994, p. 51; Hughes *et al.* 2006, pp. 37–48; Silveira 1998, pp. 57–58), and the remaining areas of occupied habitat are highly fragmented (see Factor E). In addition, these activities are ongoing and continue to adversely impact all of the remaining suitable habitat within the Atlantic Forest and Cerrado biomes that may still harbor the Brazilian merganser (BLI 2003a, p. 4; BLI 2003b, pp. 1–2; BLI 2007a, pp. 1–7; Brannstrom 2000, p. 326; Ducks Unlimited 2007, p. 1; Harris and Pimm 2004, p. 1610; Hughes *et al.* 2006, pp. 37–48; Morellato and Haddad 2000, p. 786; Saatchi *et al.* 2001, pp. 868–873; Tabanez and Viana 2000, pp. 929–932). Even with the recent passage of national forest policy and in light of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout southeastern Brazil has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270). Furthermore, because the Brazilian merganser's extant population is already extremely small, highly fragmented, and believed to be declining (BLI 2007a, pp. 1–4), any further loss or degradation of its remaining suitable habitat will severely impact the species (see Factor E). Therefore, we find that destruction and modification of habitat are threats to the continued existence of the Brazilian merganser throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Historically, there was likely little range-wide hunting pressure on the Brazilian merganser, presumably due to the species' secretive nature, naturally low densities in relatively inaccessible areas, and poor palatability (Partridge 1956, p. 478). However, low levels of subsistence hunting of some local populations still occurs, most notably in Argentina (Benstead 1994, p. 8; del Hoyo *et al.* 1992, p. 625; Hughes *et al.* 2006, p. 48).

Since the first formal description of the species in the early 1800s, the Brazilian merganser has also been collected for scientific study and museum exhibition (BLI 2007a, p. 2; Hughes *et al.* 2006, p. 46). Past hunting and specimen collection may have contributed to the species' decline in some areas (Hughes *et al.* 2006, p. 46). These activities continue today, although presumably at low levels (Benstead 1994, p. 8; Hughes *et al.* 2006, p. 48; Lamas and Santos 2004, p. 39).

Summary of Factor B

Species collection for scientific study and museum exhibition, and hunting, are believed to affect the population of the Brazilian merganser. Considering the extremely small size and level of fragmentation of the extant Brazilian merganser population, the removal or dispersal of any individuals from a local area, or even a slight decline in the population's fitness, represent significant risks to the species' overall viability (see Factor E). However, we do not have information on the extent of species collection or hunting to determine whether these activities are a threat to the continued existence of the species. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the Brazilian merganser.

C. Disease or Predation

Extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.,* West Nile virus) can negatively impact endemic bird populations (Neotropical News 2003, p. 1; Naugle *et al.* 2004, p. 704). In addition, there are a number of suspected predators of the Brazilian merganser (Hughes *et al.* 2006, p. 44; Lamas and Santos 2004, p. 39; Partridge 1956, p. 486). Partridge (1956, p. 480) hypothesized that the species' distribution may be naturally limited to upper river tributaries above waterfalls due to predation of their young by large predatory fish, such as the dourado (*Salminus brasiliensis,* syn. *maxillosus*). Finally, extensive human activity in previously undisturbed or isolated areas can result in altered predator or competitor (*e.g.,* cormorant (*Phalacrocorax* sp.)) populations and the introduction of various exotic predator species, such as feral dogs (*Canis familiaris*) and game fish like largemouth bass (*Micropterus salmoides*) (Hughes *et al.* 2006, pp. 44–45).

The available information indicates that there is a greatly expanded human population within the Brazilian merganser's historic range and that the species' extant population is extremely small, highly fragmented, and likely declining. Although large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges, any additive mortality to the Brazilian merganser population or a decrease in its fitness due to an increase in the incidence of disease or predation could adversely impact the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any information currently available that specifically indicates the occurrence of disease in the Brazilian merganser, or that documents actual predation levels incurred by any of the species' local subpopulations. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the Brazilian merganser.

D. The Inadequacy of Existing Regulatory Mechanisms

The Brazilian merganser is legally protected by national legislation promulgated by the governments in all three countries where it historically occurred (Hughes *et al.* 2006, pp. 50–57). In Brazil, where the vast majority of the species' extant population and remaining suitable habitats occur (BLI 2007a, pp. 1–2; Hughes *et al.* 2006, pp. 28–31), the Brazilian merganser is formally recognized as ''endangered'' (Order No. 1.522), and there are regulatory mechanisms that require direct protection of the species (ECOLEX 2007, pp. 1–2). These include measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.,* Decree No. 76.623, Order No. 419–P), hunting (*e.g.,* Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.,* Decree No. 3.179).

There are also a wide range of regulatory mechanisms in Brazil that indirectly protect the Brazilian merganser through measures that protect its remaining suitable habitats (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome and gallery forests adjacent to river corridors (*e.g.,* Decree No. 750, Resolution No. 10, Act No. 7.754); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.,* Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.,* Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.,* Normative Instruction No. 65, Law No. 11.116). Measures also exist (*e.g.,* Law No. 11.516, Act No. 7.735, Decree No.

78, Order No. 1, Act No. 6.938) that direct Federal and State agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

Regulatory mechanisms in Brazil govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, State, and privately owned lands (*e.g.,* Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.,* National Parks versus Biological Reserves) and, based on those categories, allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19). Four of Brazil's protected areas represent the major sites where the Brazilian merganser still occurs (Hughes *et al.* 2006, pp. 53–54). These areas are considered critical for protecting some of the species' key remaining subpopulations (Bianchi *et al.* 2005, pp. 72–74; BLI 2007a, pp. 1–2; Braz *et al.* 2003, pp. 68–71; Bruno *et al.* 2006, p. 30; Collar *et al.* 1992, pp. 84–85; del Hoyo *et al.* 1992, p. 625; Lamas and Santos 2004, pp. 39–40; Silveira 1998, pp. 57–58). Notable among these areas are the Serra da Canastra National Park in Minas Gerais, which currently encompasses a portion of the species' largest known subpopulation (Bruno *et al.* 2006, p. 25), and the Chapada dos Veadeiros National Park in Goiás (Bianchi *et al.* 2005, pp. 72–73). The Service recently provided funding for a project to develop and strengthen conservation partnerships with local agricultural producers in the Serra da Canastra region, which could benefit the Brazilian merganser (USFWS 2006, p. 3).

Although four categories of protected areas under Brazilian law include important sites where the species occurs, unregulated tourism, resource extraction, and livestock grazing continue in these areas and pose threats to the Brazilian merganser. In addition, not all of the remaining Brazilian mergansers occur in these protected areas. Some key areas where the species occurs are currently not formally protected and are subject to ongoing threats, such as proposed hydropower projects, logging, and continuing development.

Due to various reasons (*e.g.,* lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without current capacity to achieve their stated natural resource objectives (IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9; Costa 2007, p. 7). For example, the Worldwide Fund for Nature found in its study that 47 of 86 protected areas were found to be below the minimum level of implementation of Federal requirements, with only 7 considered to be fully implemented (Neotropical News 1999, p. 9).

Despite the existence of these regulatory mechanisms, habitat loss throughout the Atlantic Forest biome has increased for more than a decade (BLI 2003a, p. 4; BLI 2003b, pp. 1–2; Braz *et al.* 2003, p. 70; Collar *et al.* 1992, p. 84; Hughes *et al.* 2006, p. 61; Lamas and Santos 2004, p. 40; The Nature Conservancy 2007, p. 2; Neotropical News 1997b, p. 11; Scott and Brooke 1985, p. 118). Illegal or unauthorized activities that continue to impact the Brazilian merganser include logging of gallery forests within riverine buffer areas; encroachment of logging, livestock grazing, and subsistence activities within protected primary and secondary forests; hunting; intentional burning; and collection of eggs and adult birds from the wild (BLI 2003b, p. 1; Hughes *et al.* 2006, p. 61; The Nature Conservancy 2007, p. 2).

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil, which helped facilitate the large-scale conversions that have occurred in the Atlantic Forest and Cerrado biomes (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). Some of these projects, if developed, would impact important sites for the Brazilian merganser and would affect habitat within and adjacent to established protection areas. These projects include further development of dams for hydroelectric power, irrigation, or municipal water supplies; expansion of agricultural practices, primarily for soybean production; and increasing tourism enterprises (Braz *et al.* 2003, p. 70; Hughes *et al.* 2006, pp. 51–56).

Summary of Factor D

Brazil's wide variety of laws requiring resource protection would ultimately benefit the Brazilian merganser, but they are tested by the intense development pressure that exists within the species' range. Government-sponsored measures in Brazil continue to facilitate development projects, however regulatory mechanisms also exist that require protection of the Brazilian merganser and its habitat. Despite the existence of these regulatory mechanisms, there are a few challenges, including the fact that protected areas do not address all the threats to the Brazilian merganser, protected areas do not encompass all occupied habitat of the species, there are government sponsored programs that encourage development within the range of the species, and protections that would benefit the species are not adequately enforced. As a result, threats to the species' remaining habitat are ongoing (see Factor A). Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the Brazilian merganser throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the Brazilian merganser. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.,* inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related ''catastrophic'' events (*e.g.,* severe storms, prolonged drought, extreme cold spells, wildfire)

(Young 1994, pp. 410–412; Mangel and Tier 1994, p. 612; Dunham *et al.* 1999, p. 9). Each risk will be analyzed specifically for the Brazilian merganser.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.,* inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

The Brazilian merganser has likely always been a rare species, with small local populations occupying the naturally restricted sites of suitable habitat within the upper-tributaries of river systems in east-central South America (Lamas and Santos 2004, pp. 38–39; Partridge 1956, pp. 477–478). In addition, while there is no direct evidence currently available, Yamashita (in Hughes *et al.* 2006, p. 43) speculated that the species has likely always had a naturally low level of genetic variability as a result of its life history strategy.

It was further speculated that inbreeding in the Brazilian merganser has not significantly affected the species, presumably due to the species' natural tolerance for low genetic variability (Hughes *et al.* 2006, p. 43). However, relatively low levels of genetic interchange between local subpopulations can act to maintain the genetic viability of a metapopulation (Vilà *et al.* 2002, p. 91; Wang 2004, p. 332) and, historically, it seems likely that the Brazilian merganser maintained such minimum levels of interchange across its occupied range in order for its subpopulations to have persisted (Middleton and Nisbet 1997, p. 107).

In the absence of more species-specific life history data, a general approximation of a minimum viable population size is referred to as the 50/500 rule (Franklin 1980, p. 147). This rule states that an effective population (N_e) of 50 individuals is the minimum size required to avoid imminent risks from inbreeding. N_e represents the number of animals in a population that actually contribute to reproduction, and is often much smaller than the total number of individuals in the population (N). For example, not all individuals reproduce. Furthermore, the rule states that the long-term fitness of a population requires an N_e of at least 500 individuals so that it will not lose its genetic diversity over time and will maintain an enhanced capacity to adapt to changing conditions.

The available information indicates that the extant Brazilian merganser population is extremely small (*i.e.,* between 50 and 249 individuals) and highly fragmented. The lower limit of the population (50 individuals) teeters on the edge of the minimum number of individuals required to avoid imminent risks from inbreeding (N_e = 50). The current maximum estimate of 249 individuals for the entire population (BLI 2007a, p. 1) is only half of the upper threshold (N_e = 500) required to maintain genetic diversity over time and to maintain an enhanced capacity to adapt to changing conditions. Furthermore, these small, fragmented populations are likely reproductively isolated due to extensive habitat modifications that have taken place throughout the species' historic distribution (see Factor A). As such, we currently consider the Brazilian merganser to be at risk due to its lack of near- and long-term genetic viability.

Available information indicates that the Brazilian merganser is still subject to low levels of hunting, specimen collection, and other human disturbances (see Factors E and D). For species with large and/or well-interconnected subpopulations, low levels of the above influences would normally be of little consequence. However, considering the extremely small size and likely isolation of the species' extant subpopulations, and the likelihood of continued fragmentation of its occupied habitats, the removal or dispersal of any individuals from a local area, or even a slight decline in the individual or population fitness of these birds, represent significant risks to the continued existence of the Brazilian merganser.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the Brazilian merganser (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the Brazilian merganser will have disproportionately greater impacts on the species due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the species' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the Brazilian merganser's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the Brazilian merganser, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.,* severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

In addition to these stochastic threats, the Brazilian merganser is sensitive to human disturbance activities. Each breeding pair of the Brazilian merganser requires relatively long segments of river (up to *ca.* 12 km (7.5 mi)) (Braz *et al.* 2003, p. 70; Bruno *et al.* 2006, p. 30; Silvera 1998, pp. 57–58). Breeding success and recruitment of young in a local area is believed to be negatively affected by human disturbance. Sources of human disturbance include various ongoing activities associated with a vastly expanded human population within the species' occupied range, including tourism (*e.g.,* birding, river rafting, trekking, off-road vehicle use) and scientific research programs (Braz *et al.* 2003, p. 70; Bruno *et al.* 2006, p. 30; Silvera 1998, pp. 57–58).

Summary of Factor E

The small and declining numbers that make up the Brazilian merganser's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the species susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the Brazilian merganser throughout its range.

Status Determination for the Brazilian merganser

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the Brazilian merganser. Activities associated with a vastly expanded human population within the species' occupied range, including tourism (*e.g.,* birding, river rafting, trekking, off-road vehicle use), scientific research programs, livestock grazing, and infrastructure development, all represent multiple sources of additional disturbance to the Brazilian merganser. The species is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of near- and long-term genetic viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the species.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the Brazilian merganser throughout its entire range, as described above, we determine that the Brazilian merganser is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the Brazilian merganser as an endangered species throughout all of its range.

III. Cherry-throated Tanager (Nemosia rourei)

Species Description

The cherry-throated tanager has distinctive black plumage on its head with a white crown, black coloring on the back and wings, white feathers on its undersides, and red coloring on its throat and upper chest (BLI 2007g, p. 1).

Taxonomy

The cherry-throated tanager is a member of the Thraupidae family. It was first described by Cabanis in 1870 (BLI 2007g, p. 1).

Habitat and Life History

The cherry-throated tanager is endemic to the Atlantic Forest biome and inhabits the upper canopies of trees within humid, montane, primary forests (Bauer *et al.* 2000, pp. 97–104; BLI 2007g, pp. 1–2; Venturini *et al.* 2005, pp. 60–64). The cherry-throated tanager is a primary forest-obligate species that typically forages within the interior crowns of tall, epiphyte-laden trees and occasionally within lower levels (ca. 2 m (6.6 ft)) at the forest edge. The species' diet includes caterpillars, butterflies, ants, and various other arthropods (Bauer *et al.* 2000, BLI 2007g, p. 1; p. 104; Venturini *et al.* 2005, p. 65). Cherry-throated tanagers can be found in mixed-species flocks and appear to require relatively large territories (ca. 3.99 km^2 (1.544 mi^2)) (Venturini *et al.* 2005, p. 66). Within its current distribution, the species makes sporadic use of coffee (*Coffea* spp.), pine (*Pinus* spp.), and eucalyptus (*Eucalyptus* spp.) plantations, presumably as travel corridors between remaining patches of primary forest (Venturini *et al.* 2005, p. 66).

Little is known about the breeding behavior of the cherry-throated tanager. However, a single field observation indicates that perhaps both sexes help build nests (Venturini *et al.* 2002, pp. 43–44). An observed nest was constructed of moss, and possibly thin twigs, and the material was placed in natural depressions of branches near the trunk within the mid-canopy (Venturini *et al.* 2002, pp. 43–44).

Range and Distribution

The cherry-throated tanager is found in primary forest habitats in Espírito Santo and, possibly, Minas Gerais and Rio de Janeiro, Brazil (BLI 2007g, p. 1). Since 1998, the cherry-throated tanager has been documented at two sites of remnant primary forest in south-central Espírito Santo. One site is located in Fazenda Pindobas IV in the municipality of Conceição; the other is found in Caetés, in the Vargem Alta municipality in southern Espírito Santo (30 km (18.6 mi) southeast of Pindobas) (Venturini *et al.* 2005, p. 61).

Population Estimates

The cherry-throated tanager was presumed to be extinct because the species was only known from a single specimen collected in the 1800s and a reliable sighting of eight individuals from 1941 (Collar *et al.* 1992, p. 896; Ridgely and Tudor 1989, p. 34; Scott and Brooke 1985, p. 126). However, the species was rediscovered in 1998 (Bauer *et al.* 2000, p. 97; Venturini *et al.* 2005, p. 60). IUCN estimates the population to range from 50 to 249 individuals, and it is believed to be declining (BLI 2007g, p. 1). However, Venturini *et al.* (2005, p. 66) speculate that the IUCN population estimate is too high, considering that the maximum number of individuals recently recorded was 14, including 6 birds in Pindobas and 8 birds in Caetés.

Conservation Status

IUCN considers the cherry-throated tanager to be ''Critically Endangered'' because its extant population is extremely small (estimated to be between 50 and 249 individuals), highly fragmented, and presumed to be declining (BLI 2007g, p. 1).

Summary of Factors Affecting the Cherry-Throated Tanager

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of human activities (Butler 2007, p. 2; Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). In addition to the overall loss and degradation of native habitat within this biome, the remaining tracts of habitat are severely fragmented. The current rate of habitat decline within the Atlantic Forest is unknown.

The region has the two largest cites in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.,* soy beans, sugarcane, and corn), plantations (*e.g.,* eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.,* charcoal production, steel plants, and hydropower reservoirs). Forestry practices (*e.g.,* commercial logging), subsistence activities (*e.g.,* fuelwood collection), and changes in fire frequencies also contribute to the degradation of native habitat (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118; World Wildlife Fund 2007, pp. 3–51).

Most of the tropical forest habitats believed to have been used historically by the cherry-throated tanager have been converted or are severely degraded due to the above human activities (Bauer *et al.* 2000, pp. 98–105; BLI 2007, p. 2; Ridgely and Tudor 1989, p. 34; Venturini *et al.* 2005, p. 68). Degraded and fragmented forests experience a decrease in gene flow, which may cause inbreeding and decreased fitness of forest species (Tabanez and Viana 2000, pp. 929–932). In addition, increased liana density has been observed in degraded and fragmented Atlantic forests of Brazil. Liana infestation of these forest fragments cause tree falls and encourage gap-opportunistic species to take over (Tabanez and Viana 2000, pp. 929–932), thus altering the old forest structure and the cherry-throated tanager's habitat.

Secondary impacts that are associated with forest fragmentation and degradation include the potential introduction of disease vectors or exotic predators within the species' historic range (see Factor C). As a result of these secondary impacts, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Therefore, even without further habitat loss or degradation, the cherry-throated tanager remains at risk from past impacts to its primary forest habitats.

Summary of Factor A

The above human activities and their secondary impacts continue to threaten the last known tracts of habitat within the Atlantic Forest biome that may still harbor the cherry-throated tanager (BLI 2003a, p. 4; BLI 2007g, p. 5; Conservation International 2007a, p. 1; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; Venturini *et al.* 2005, p. 68; World Wildlife Fund 2007, pp. 3–51). Because the species' extant population is extremely small, highly fragmented, and believed to be declining (BLI 2007g, p. 1), any further loss or degradation of its remaining suitable habitat will adversely impact the cherry-throated tanager. Therefore, we find that past and ongoing destruction and modification of the cherry-throated tanager's habitat are threats to the continued existence of the species throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The extant population of the cherry-throated tanager is considered to be extremely small, highly fragmented, and declining (BLI 2007g, p. 1; Venturini *et al.* 2005, p. 66). Because of the cherry-throated tanager's rarity, it has been recommended that no further specimen collection of the species occur (Collar *et al.* 1992, p. 896). However we do not have specific information as to the level of specimen collection, scientific research, or birding that occurs. Although the removal or dispersal of any individuals or even a slight decline in the species' fitness due to any intentional or inadvertent disturbances would represent significant risks to the cherry-throated tanager's overall viability (see Factor E), we are not aware of any information currently available that indicates overutilization of the cherry-throated tanager for commercial, recreational, scientific, or educational purposes is occurring. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the cherry-throated tanager.

C. Disease or Predation

Large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges. However, the extant population of the cherry-throated tanager is considered to be extremely small, highly fragmented, and declining, making it particularly vulnerable to slight levels of disease and predation.

Extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.,* West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1). It can also result in altered predator populations and the introduction of exotic predator species, some of which (*e.g.,* feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257). Any additive mortality to the cherry-throated tanager population or a decrease in its fitness due to an increase in the incidence of disease or predation would represent significant risks to the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any information currently available that indicates the occurrence of disease in the cherry-throated tanager, or that documents any predation incurred by the species. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the cherry-throated tanager.

D. The Inadequacy of Existing Regulatory Mechanisms

The cherry-throated tanager is formally recognized as ''endangered'' in Brazil (Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (BLI 2007, p. 2; Collar *et al.* 1992, p. 896; ECOLEX 2007, pp. 1–2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.,* Decree No.

76.623, Order No. 419–P), hunting (*e.g.,* Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.,* Decree No. 3.179).

In addition, there are a wide range of regulatory mechanisms in Brazil that indirectly protect the cherry-throated tanager through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.,* Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.,* Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.,* Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.,* Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.,* Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

There are also various regulatory mechanisms in Brazil that govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, state, and privately owned lands (*e.g.*, Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.*, National Parks versus Biological Reserves) and, based on those categories, allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

Few sites have recent confirmed observations of the cherry-throated tanager. There have been possible sightings of the cherry-throated tanager in the Augusto Ruschi Biological Reserve (also known as Nova Lombardia Biological Reserve), which comprises approximately 5,000 hectares (ha) (12,355 acres (ac)) in Espiritu Santo; however, there is doubt that the species occupies the reserve due to a lack of records by ornithologists, since the 1970s, of birds that frequent the area (BLI 2007, p. 2; Bauer *et al.* 2000, p. 106; Scott 1997, p. 62). One of the key sites still occupied by the species is the Pindobas IV Farm. It has been recommended that the farm be formally designated as a protected area to help ensure the species' future protection, and the owners of this farm have expressed interest in this recommendation (Bauer *et al.* 2000, p. 106; BLI 2007g, p. 2). Under Brazilian law, the remaining native forest on the owner's land could be designated as a Private Natural Heritage Reserve.

For various reasons (*e.g.*, lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (ADEJA 2007, pp. 1–2; Bruner *et al.* 2001, p. 125; Costa 2007, p. 7; IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9). Enforcement has been a challenge to implement. Therefore, even with the further designation of protected areas, it is unlikely that all of the identified resource concerns for the cherry-throated tanager (*e.g.*, residential and agricultural encroachment, resource extraction, unregulated tourism, and grazing) would be sufficiently addressed at these sites.

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45; Venturini *et al.* 2005, p. 68). Despite these efforts, pressures to develop areas containing cherry-throated tanager habitat continue (ADEJA 2007, pp. 1–2; BLI 2007d, p. 2; Tobias and Williams 1996, p. 65).

Summary of Factor D

Brazil is faced with competing priorities of encouraging development for economic growth and resource protection. Although there are various government-sponsored measures that remain in place in Brazil that continue to facilitate development projects, there are also a wide variety of regulatory mechanisms in Brazil that require protection of the cherry-throated tanager and its habitat throughout the species' potentially occupied range. Due to competing priorities, threats to the species' remaining habitat are ongoing (see Factor A). Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the cherry-throated tanager throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the cherry-throated tanager. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.*, inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire) (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). Each risk will be analyzed specifically for the cherry-throated tanager.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: Natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.*, inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

The cherry-throated tanager is believed to have been rare historically with a naturally patchy, low density distribution, as indicated by the paucity of confirmed sightings of this colorful bird in areas that have been heavily visited by experienced birders (Bauer *et al.* 2000, p. 98; Collar *et al.* 1994, p. 190; Venturini *et al.* 2005, pp. 63–64; BLI 2007g, p. 1). However, the species must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vilà *et al.* 2002, p. 91; Wang 2004, p. 332).

In the absence of more species-specific life history data, a general approximation of a minimum viable population size is referred to as the 50/500 rule (Franklin 1980, p. 147), as described under Factor E of the Brazilian merganser. Currently, the cherry-throated tanager is only known from two occupied sites where an approximate total of 14 birds have been observed since 1998 (Venturini *et al.* 2005, p. 66). Given this information, current population estimates are 50 to 249 individuals, or below (BLI 2007g, p. 1; Venturini *et al.* 2005, p. 66). The lower limit of the population is at or below the minimum number of individuals required to avoid imminent risks from inbreeding ($N_e = 50$). The current maximum estimate of 249 individuals for the entire population is only half of the upper threshold ($N_e = 500$) required to maintain genetic diversity over time and to maintain an enhanced capacity to adapt to changing conditions. As such, we currently consider the species to be at risk due to its lack of near- and long-term genetic viability.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the cherry-throated tanager (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the cherry-throated tanager will have disproportionately greater impacts on the species due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the species' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the cherry-throated tanager's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the cherry-throated tanager, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the cherry-throated tanager's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the species susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the cherry-throated tanager throughout its range.

Status Determination for the Cherry-throated Tanager

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the cherry-throated tanager. The species is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of near- and long-term genetic viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the cherry-throated tanager.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the cherry-throated tanager throughout its entire range, as described above, we determine that the cherry-throated tanager is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the cherry-throated tanager as an endangered species throughout all of its range.

IV. Fringe-backed Fire-eye (Pyriglena atra)

Species Description

The fringe-backed fire-eye has distinctive red eyes and measures approximately 17.5 cm (7 in). Males are black with a small patch on their backs of black feathers lined with white edges. Females are more of a reddish-brown color, with a black tail, brown underparts and a whitish throat (BLI 2007e, p. 1).

Taxonomy

The fringe-backed fire-eye belongs in the ''antbird'' family Thamnophilidae, and was first described by Swainson in 1825 (BLI 2007e, p. 1). Sick (1991, p. 416) describes this species to be similar to the white-backed fire-eye (*Pyriglena leuconota*). The fringe-backed fire-eye was previously referred to as Swainson's fire-eye, and is also called ''Alapi noir'' in French, ''Fleckenmantel-Feuerauge'' in German, and ''Ojodefuego de Bahía'' in Spanish (del Hoyo 2003, p. 637).

Habitat and Life History

The fringe-backed fire-eye is endemic to the Atlantic Forest biome and typically inhabits dense understories at the edges of lowland primary tropical forests (BLI 2007e, p. 2; Collar *et al.* 1992, p. 677; del Hoyo *et al.* 2003, p. 637). The species has also been found to occupy degraded forests and dense understories of secondary-growth forest stands. It can also occupy early-successional forest stands, but avoids any areas with open understories (*e.g.*, sunny openings, interior forest) (del Hoyo *et al.* 2003, p. 637).

The fringe-backed fire-eye forages in dense, tangled vegetation with numerous horizontal perches within approximately 3 m (10 ft) of the ground, although it occasionally feeds higher up (ca. 10 m (33 ft)) (Collar *et al.* 1992, p. 677; del Hoyo *et al.* 2003, p. 637). The species typically occurs as individual birds, in closely associated pairs, or in small family groups. The bird often relies on army ant (*Eciton* sp.) swarms to flush their prey, which may include cockroaches (superfamily Blattoidea), grasshoppers (family Acrididae), winged ants (class Chilopoda), caterpillars (order Lepidoptera), and geckos (family Gekkonidae) (del Hoyo *et al.* 2003, pp. 637–638; Sick 1993, pp. 403–404).

Limited specific information is known about the species' breeding behavior (del Hoyo *et al.* 2003, p. 638). However, females of this genus typically lay two eggs in spherical nests that are approximately 10 cm (4 in) in diameter, have a side entrance, and are attached to vegetation within roughly 1 m (3.3 ft) of ground (Sick 1993, pp. 405–406). In addition, both sexes in this genus typically help to build nests, brood clutches, and attend their young (Sick 1993, pp. 405–406).

Range and Distribution

The fringe-backed fire-eye occurs along a narrow belt of coastal forest habitats from southern Sergipe to northeastern Bahia, Brazil (BLI 2007e, p. 1; Collar *et al.* 1992, p. 677; del Hoyo *et al.* 2003, p. 637; Sick 1993, p. 416). The species' entire population was previously believed to be restricted to a few sites of remnant primary forest, totaling roughly 9 km^2 (3.5 mi^2) in northeastern Bahia. In 2002, approximately 18 individuals were observed in a forested site in Sergipe (del Hoyo *et al.* 2003, p. 638). This discovery extended the species' known range to the north by approximately 175 km (109 mi) (del Hoyo *et al.* 2003, p. 638). However, the fringe-backed fire-eye has not been located at several sites from where it was previously known in Bahia (del Hoyo *et al.* 2003, p. 638).

Population Estimates

The fringe-backed fire-eye's extant population is estimated to be between 1,000 and 2,499 individuals. The available information indicates that the species' population is fragmented among 6 to 10 occupied areas, with the largest subpopulation between 50 and 249 individuals (BLI 2007e, p. 3). Its population, along with the extent and quality of its habitat, continues to decline (BLI 2007e, p. 1).

Conservation Status

IUCN considers the fringe-backed fire-eye to be ''Endangered'' because it has ''a very small fragmented range, within which the extent and quality of its habitat are continuing to decline and where it is only known from a few localities'' (BLI 2007e, p. 1). In addition, the species is protected under Brazilian law (Collar *et al.* 1992, p. 678).

Summary of Factors Affecting the Fringe-backed Fire-eye

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

The fringe-backed fire-eye occurs in one of the most densely populated regions of Brazil, and most of the tropical forest habitats believed to have been used historically by the species have been converted or are severely degraded due to the wide range of human activities (BLI 2003a, p. 4; BLI 2007e, p. 2; Collar and Andrew 1988, p. 102; Collar *et al.* 1992, p. 678; Collar *et al.* 1994, p. 135; Conservation International 2007a, p. 1; del Hoyo *et al.* 2003, p. 638; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; Sick 1993, p. 407; World Wildlife Fund 2007, pp. 3–51). Based on a number of recent estimates, 92 to 95 percent of the area (over 1,250,000 km^2 (482,628 mi^2)) historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Butler 2007, p. 2; Conservation International 2007a, p. 1; Höfling 2007, p. 1; IUCN 1999; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). The current rate of habitat decline within the Atlantic Forest biome is unknown.

In addition to the overall loss and degradation of native habitat within this biome, the remaining tracts of habitat are severely fragmented. The region has the two largest cites in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.*, soy beans, sugarcane, and corn), plantations (*e.g.*, eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.*, charcoal production, steel plants, and hydropower reservoirs). Forestry practices (*e.g.*, commercial logging), subsistence activities (*e.g.*, fuelwood collection), and changes in fire frequencies also contribute to the degradation of the native habitat (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985,

p. 118; World Wildlife Fund 2007, pp. 3–51).

The fringe-backed fire-eye is not strictly tied to primary forest habitats and can make use of early-successional, secondary-growth forests with dense understory vegetation (BLI 2007e, p. 2; Collar *et al.* 1992, p. 677; del Hoyo *et al.* 2003, p. 637). However, this does not necessarily lessen the risk to the species from the effects of deforestation and habitat degradation. Atlantic Forest birds, such as the fringe-backed fire-eye, which are tolerant of secondary-growth forests, are also rare or have severely restricted ranges (*i.e.*, less than 21,000 km^2 (8,100 mi^2)). Thus habitat degradation can adversely impact such species as equally as it impacts primary forest-obligate species (Harris and Pimm 2004, pp. 1612–1613). The entire range of the fringe-backed fire-eye encompasses approximately 4,990 km^2 (1,924 mi^2), with only 20 percent of this area considered occupied (BLI 2007e, pp. 1–4).

The susceptibility to extirpation of limited-range species that are tolerant of secondary-growth forests or other disturbed sites can occur for a variety of reasons, such as when a species' remaining population is already too small or its distribution too fragmented such that it may not be demographically or genetically viable (Harris and Pimm 2004, pp. 1612–1613). In addition, while the fringe-backed fire-eye may be tolerant of secondary-growth forests or other disturbed sites, these areas may not represent optimal conditions for the species, which would include dense understories and abundant prey species. For example, management of plantations often involves intensive control of the site's understory vegetation and long-term use of pesticides, which eventually result in severely diminished understory cover and potential prey species (Rolim and Chiarello 2004, pp. 2687–2691; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118). Such management practices eventually result in the loss of native understory plant species, creating relatively open understories, which the fringe-backed fire-eye avoids (BLI 2007e, p. 2; Collar *et al.* 1992, p. 677; del Hoyo *et al.* 2003, p. 637).

Secondary impacts that are associated with the above human activities that fragment the remaining tracks of Atlantic forest used by the fringe-backed fire-eye include the potential introduction of disease vectors or exotic predators within the species' historic range (see Factor C). As a result of these secondary impacts, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Even when potentially occupied sites may be formally protected (see Factor D), the remaining fragments of forested habitat will likely undergo further degradation due to their altered dynamics and isolation (through infestation of gap-opportunistic species, which alter forest structure, and decrease in gene flow between species) (Tabanez and Viana 2000, pp. 929–932). Therefore, even without further habitat loss or degradation, the fringe-backed fire-eye remains at risk from past impacts to its suitable habitats.

Summary of Factor A

Most of the tropical forest habitats believed to have been used historically by the fringe-backed fire-eye have been converted or are severely degraded due to the above human activities (BLI 2003a, p. 4; BLI 2007e, p. 2; Collar and Andrew 1988, p. 102; Collar *et al.* 1992, p. 678; Collar *et al.* 1994, p. 135; Conservation International 2007a, p. 1; del Hoyo *et al.* 2003, p. 638; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; Sick 1993, p. 407; World Wildlife Fund 2007, pp. 3–51). In addition, the remaining tracts of suitable habitat potentially used by the species, including many secondary-growth forests, are subject to ongoing clearing for agriculture fields and plantations (*e.g.*, sugar cane and oil palm), livestock pastures, and industrial and residential developments (Collar and Andrew 1988, p. 102; Collar *et al.* 1992, p. 678).

Even with the recent passage of national forest policy and in the face of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout the Atlantic Forest biome has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270), and native habitats at many of the remaining sites may be lost over the next several years (Rocha *et al.* 2005, p. 263). Furthermore, because the species' extant population is already small, highly fragmented, and believed to be declining (BLI 2007e, p. 1), any further loss or degradation of its remaining suitable habitat represent significant threat to the species (see Factor E). Therefore, we find that destruction and modification of habitat are threats to the continued existence of the fringe-backed fire-eye throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The extant population of the fringe-backed fire-eye is considered to be small, fragmented, and declining. Therefore, the removal or dispersal of just a few individuals from any of the species' subpopulations or even a slight decline in their fitness due to intentional or inadvertent hunting or specimen collection could represent a significant threat to the fringe-backed fire-eye's overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any information currently available that indicates that this species is being used for any commercial, recreational, scientific, or educational purpose. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the fringe-backed fire-eye.

C. Disease or Predation

Extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.*, West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1). It can also result in altered predator populations and the introduction of exotic predator species, some of which (*e.g.*, feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257).

Although large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges, the extant population of the fringe-backed fire-eye is considered to be small, fragmented, and declining (BLI 2007e, p. 1). Any additive mortality to the fringe-backed fire-eye's subpopulations or a decrease in their fitness due to an increase in the incidence of disease or predation could adversely impact the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any information currently available that specifically indicates the occurrence of disease in the fringe-backed fire-eye, or that documents any predation incurred by the species. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the fringe-backed fire-eye.

D. The Inadequacy of Existing Regulatory Mechanisms

The fringe-backed fire-eye is formally recognized as ''endangered'' in Brazil

(Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (BLI 2007e, p. 2; Collar *et al.* 1992, p. 678; ECOLEX 2007, pp. 1–2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: Export and international trade (*e.g.*, Decree No. 76.623, Order No. 419–P), hunting (*e.g.*, Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.*, Decree No. 3.179). In addition, there are a wide range of regulatory mechanisms in Brazil that indirectly protect the fringe-backed fire-eye through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.*, Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.*, Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.*, Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.*, Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.*, Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

There are also various regulatory mechanisms in Brazil that govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, State, and privately owned lands (*e.g.*, Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.*, National Parks versus Biological Reserves), and based on those categories they allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

Currently, the fringe-backed fire-eye does not occur within any protected areas, although it has been recommended that some of the key sites it still occupies should be formally designated as protected areas to help ensure the species' future protection (BLI 2007e, p. 2; Collar *et al.* 1992, p. 678; del Hoyo *et al.* 2003, p. 638). However, for various reasons (*e.g.*, lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (Bruner *et al.* 2001, p. 125; Costa 2007, p. 7; IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9). Therefore, even with any future designation of protected areas, it is unlikely that all of the identified resource concerns for the fringe-backed fire-eye (*e.g.*, residential and agricultural encroachment, resource extraction, unregulated tourism, and grazing) would be sufficiently addressed at these sites.

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45). Despite these efforts, development projects continue to degrade and clear potentially occupied habitat for plantations within the Atlantic Forest biome (Butler 2007, p. 3; Collar *et al.* 1992, p. 678; Neotropical News 1998a, p. 10; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874).

Summary of Factor D

Brazil is faced with competing priorities of encouraging development for economic growth and resource protection. Although there are various government-sponsored measures that remain in place in Brazil that continue to facilitate potentially harmful development projects, there are also a wide variety of regulatory mechanisms in Brazil that require protection of the fringe-backed fire-eye and its habitat throughout the species' potentially occupied range. Due to competing priorities, significant threats to the species' remaining habitat are ongoing (see Factor A). Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the fringe-backed fire-eye throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the fringe-backed fire-eye. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.*, inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related "catastrophic" events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire) (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). Each risk will be analyzed specifically for the fringe-backed fire-eye.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: Natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.*, inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

There is very little information available regarding the historic abundance and distribution of the fringe-backed fire-eye. However, the species' historic population was likely larger and more widely distributed than today (BLI 2007e, p. 1), and it must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vila *et al.* 2002, p. 91; Wang 2004, p. 332).

In the absence of more species-specific life history data, the 50/500 rule (as explained under Factor E for the Brazilian merganser) may be used to approximate minimum viable population size (Franklin 1980, p. 147). The available information indicates that the fringe-backed fire-eye population is fragmented among 6 to 10 occupied areas, with little likelihood for interchange of individuals among the species' subpopulations (BLI 2007e, p. 3–4). The largest subpopulation is estimated between 50 and 249 individuals, and therefore, it is at or just below the minimum number of individuals required to avoid imminent risks from inbreeding (N_e = 50). The current maximum estimate of 249 individuals for the largest subpopulation (BLI 2007e, p. 3) is only half of the upper threshold (N_e = 500) required to maintain genetic diversity over time and to maintain an enhanced capacity to adapt to changing conditions. As such, we currently consider the species to be at risk due to its lack of near- and long-term genetic viability.

Available information also indicates that suitable habitats currently occupied by the fringe-backed fire-eye are highly fragmented and that the species' extant population is small and declining. In addition, the fringe-backed fire-eye has not been located at several sites from where it was previously known in Bahia, and the subpopulation recently discovered in Sergipe only included approximately 18 individuals (del Hoyo *et al.* 2003, p. 638). Continued loss of suitable habitats (see Factor A) will exacerbate fragmentation of the remaining occupied patches and will act to further isolate the species' subpopulations.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the fringe-backed fire-eye (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the fringe-backed fire-eye will have disproportionately greater impacts on the species due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the species' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, such as the fringe-backed fire-eye, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the fringe-backed fire-eye's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the fringe-backed fire eye, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the fringe-backed fire-eye's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the species susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the fringe-backed fire-eye throughout its range.

Status Determination for the Fringe-Backed Fire-Eye

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the fringe-backed fire-eye. The species is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of near- and long-term genetic viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms

(Factor D) are not adequate to ameliorate the current threats to the species.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the fringe-backed fire-eye throughout its entire range, as described above, we determine that the fringe-backed fire-eye is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the fringe-backed fire-eye as an endangered species throughout all of its range.

V. Kaempfer's Tody-tyrant (Hemitriccus kaempferi)

Species Description

The Kaempfer's tody-tyrant is an olive-green bird measuring 10 cm (4 in) (BLI 2007f, p. 1). The head and face have olive-brown coloring, while the upper parts and breast are a dull olive-green, the underparts are a pale greenish-yellow, and the throat is a pale yellow color. The primary wings are dark and the secondary wings have greenish-yellow borders. Each eye has a pale ring (BLI 2007f, p. 1).

Taxonomy

The Kaempfer's tody-tyrant is a member of the flycatcher family (Tyrannidae) (BLI 2007f, p. 1). The species was previously recognized under the genus *Idioptilon*, and was first described by Zimmer in 1953 (BLI 2007f, p. 1).

Habitat and Life History

The Kaempfer's tody-tyrant is endemic to the Atlantic Forest biome and inhabits well shaded edges of medium-height (ca. 12 to 15 m (39 to 49 ft)) primary- and secondary-growth forests that are typically in close proximity to rivers. The species appears to avoid tall, mature, primary forest habitats (Barnett *et al.* 2000, pp. 372–373; BLI 2007f, pp. 1–2; Collar *et al.* 1992, p. 776). The Kaempfer's tody-tyrant feeds predominantly in the outer canopies of trees within roughly 1 to 3 m (3.3 to 10 ft) of the ground, but may also feed higher up (ca. 6 m (20 ft)).

There is little information available describing the diet of the Kaempfer's tody-tyrant; however, similar species within the Tyrannidae family feed on a variety of insects, which they often catch while in flight (Sick 1993, pp. 452–453). Breeding pairs typically forage together and appear to maintain small, well-defined, permanent territories (Barnett *et al.* 2000, p. 373; BLI 2007f, p. 2).

Both sexes help to build their nests, which can be located up to approximately 6 m (20 ft) above the ground and 2–3 m (6.6–10 ft) within the primary forest margin. Nests resemble elongated cups that can be up to 45 cm (18 in) long and are made of live mosses, grass, and dead leaves wrapped around a horizontal branch near the main trunk (Barnett *et al.* 2000, p. 373).

Range and Distribution

The Kaempfer's tody-tyrant inhabits humid, lowland forests in northeastern Santa Catarina, Brazil (Barnett *et al.* 2000, p. 371; BLI 2007f, p. 1; Collar *et al.* 1992, p. 776; Collar *et al.* 1994, p. 139). The Kaempfer's tody-tyrant is only known with certainty from three localities in the state of Santa Catarina: Brusque, Itapoá, and Vila Nova and nearby areas. The last record for Brusque is from 1950, and the area has not been resurveyed since that time. The species has not been located at Vila Nova since 1991, despite repeated searches (BLI 2007f, pp. 1–2). The species was reported in 1998 and in 2000 in a reserve called Reserva Particular do Patrimonio Natural de Ponta Velha in Itapoá. This reserve is close to the state border with Paraná; thus it is possible that the species may be found in similar habitat in Paraná; however, surveys have not been conducted (Barnett *et al.* 2000, p. 378).

Population Estimates

There is very little information currently available that specifically addresses the Kaempfer's tody-tyrant's abundance; however, its extant population is estimated to be between 1,000 and 2,499 individuals and is believed to be declining. The largest subpopulation of the species is estimated to be between 250 and 1,000 individuals (BLI 2007f, pp. 1–3).

Conservation Status

IUCN considers the Kaempfer's tody-tyrant to be ''Critically Endangered'' because ''it is estimated to have an extremely small and severely fragmented range, with recent records from only two locations, and ongoing deforestation in the vicinity of these sites'' (BLI 2007f, p. 1).

Summary of Factors Affecting the Kaempfer's Tody-tyrant

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Butler 2007, p. 2; Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). In addition to the overall loss and degradation of native habitat within this biome, the remaining tracts of habitat are severely fragmented. The current rate of deforestation of Brazil's Atlantic Forest is unknown.

The region has the two largest cites in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.*, soy beans, sugarcane, and corn), plantations (*e.g.*, eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.,* charcoal production, steel plants, and hydropower reservoirs). Forestry practices (*e.g.*, commercial logging), subsistence activities (*e.g.*, fuelwood collection), and changes in fire frequencies also contribute to the degradation of the native habitat (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118; World Wildlife Fund 2007, pp. 3–51).

The Kaempfer's tody-tyrant is not strictly tied to primary forest habitats and can inhabit secondary-growth forests (Barnett *et al.* 2000, pp. 372–373; BLI 2007f, pp. 1–2; Collar *et al.* 1992, p. 776). However, this does not lessen the threat to the species from the effects of ongoing deforestation and habitat degradation. Atlantic Forest birds, such as the Kaempfer's tody-tyrant, which are tolerant of secondary-growth forests, are also rare or have restricted ranges (*i.e.*, less than 21,000 km^2 (8,100 mi^2)). Thus, habitat degradation can adversely impact such species just as equally as it impacts primary forest-obligate species (Harris and Pimm 2004, pp. 1612–1613). Currently, the entire known range of the Kaempfer's tody-tyrant is restricted to only 19 km² (7.3 mi²) (BLI 2007f, p. 3).

The susceptibility to extirpation of rare, limited-range species that are tolerant of secondary-growth forests occurs for a variety of reasons such as when a species' remaining population is already too small or its distribution too fragmented such that it may not be demographically or genetically viable (Harris and Pimm 2004, pp. 1612–1613). In addition, while the Kaempfer's tody-tyrant may be tolerant of secondary-growth forests or other disturbed sites, these areas may not represent optimal conditions for the species. For example, management of plantations often involves intensive control of the site's understory vegetation and long-term use of pesticides, which eventually result in severely diminished understory cover and potential prey species (Rolim and Chiarello 2004, pp. 2687–2691; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118). Such management practices eventually result in the loss of native understory plant species and relatively open understories. Insectivorous birds that feed in the understory, including those in the genus *Hemitriccus*, are especially vulnerable to such habitat modifications (Goerck 1997, p. 117), and the Kaempfer's tody-tyrant does not occupy these types of altered sites (Barnett *et al.* 2000, p. 377).

Even when potentially occupied sites may be formally protected (see Factor D), the remaining fragments of forested habitat will likely undergo further degradation due to their altered dynamics and isolation as defined by decreased gene flow, increase in inbreeding, decrease in species fitness, increase in liana infestation, and dominance of gap-obligate species (Tabanez and Viana 2000, pp. 929–932). Moreover, secondary impacts that are associated with human activities that degrade and remove native habitats within the Atlantic Forest biome include the potential introduction of disease vectors or exotic predators within the species' historic range (see Factor C). As a result of these secondary impacts, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Therefore, even without further habitat loss or degradation, the Kaempfer's tody-tyrant remains at risk from past impacts to its suitable forested habitats.

Summary of Factor A

The Kaempfer's tody-tyrant occurs in one of the most densely populated regions of Brazil, and most of the tropical forest habitats believed to have been used historically by the species have been converted or are severely degraded due to the wide range of human activities identified above (Barnett *et al.* 2000, pp. 377–378; BLI 2003a, p. 4; BLI 2007f, p. 2; Collar *et al.* 1992, p. 776; Collar *et al.* 1994, p. 139; Conservation International 2007a, p. 1; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; World Wildlife Fund 2007, pp. 3–51). In addition, the remaining tracts of suitable habitat potentially used by the species, including many secondary-growth forests, are subject to ongoing clearing for agricultural fields, plantations (*e.g.*, banana, palmetto, and rice), logging, livestock pastures, and industrial and residential developments (Barnett *et al.* 2000, pp. 377–378; BLI 2007f, p. 4; Collar *et al.* 1992, p. 776).

Even with the recent passage of national forest policy and in light of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout the Atlantic Forest biome has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270), and native habitats at many of the remaining sites may be lost over the next several years (Rocha *et al.* 2005, p. 263). In addition, because the extant population of the Kaempfer's tody-tyrant is already small, highly fragmented, and believed to be declining (BLI 2007f, pp. 1–3), any further loss or degradation of its remaining suitable habitat will adversely impact the species. Therefore, we find that destruction and modification of habitat are threats to the continued existence of the Kaempfer's tody-tyrant throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The extant population of the Kaempfer's tody-tyrant is considered to be small, fragmented, and declining. Therefore, the removal or dispersal of just a few individuals from any of the species' subpopulations or even a slight decline in their fitness due to intentional or inadvertent hunting, specimen collection, or other human disturbances (*e.g.,* scientific research, birding) could represent a significant threat to the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the Kaempfer's tody-tyrant, we are not aware of any information currently available that indicates the use of this species for any commercial, recreational, scientific, or educational purpose. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the Kaempfer's tody-tyrant.

C. Disease or Predation

Extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.,* West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1). It can also result in altered predator populations and the introduction of various exotic predator species, some of which (*e.g.,* feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257). Although large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges, the extant population of the Kaempfer's tody-tyrant is considered to be small, fragmented, and declining (BLI 2007f, pp. 1–3). In addition, extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.,* West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1).

Any additive mortality to the subpopulations of the Kaempfer's tody-tyrant or a decrease in their fitness due to an increase in the incidence of disease or predation could severely impact the species' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the species, we are not aware of any information currently available that indicates the occurrence of disease in the Kaempfer's tody-tyrant, or that documents any predation incurred by the species. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the Kaempfer's tody-tyrant.

D. The Inadequacy of Existing Regulatory Mechanisms

The Kaempfer's tody-tyrant is formally recognized as ''endangered'' in Brazil (Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (Barnett *et al.* 2000, p. 377; BLI 2007f, p. 2; Collar *et al.* 1992, p. 776; ECOLEX 2007, pp. 1–2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.,* Decree No. 76.623, Order No. 419–P), hunting (*e.g.,* Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.,* Decree No. 3.179). In addition, there are a wide range of regulatory mechanisms in Brazil that indirectly protect the Kaempfer's tody-tyrant through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.,* Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.,* Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.,* Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.,* Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.,* Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

Various regulatory mechanisms in Brazil govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, state, and privately owned lands (*e.g.,* Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.,* National Parks versus Biological Reserves) and, based on those categories, they allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

Currently, the Kaempfer's tody-tyrant is known to occur within one 15 km² (6 mi²) protected area, the privately owned Volta Velha Natural Heritage Reserve (Barnett *et al.* 2000, pp. 377–378; BLI 2007f, p. 3; Collar *et al.* 1992, p. 776). In addition, the species is known to occur in forested habitat adjacent to another 4 km² (1.5 mi²) protected area, the Bracinho State Ecological Station, which was established as a water-catchment buffer zone for a hydroelectric plant. It has been recommended that both of these sites should be expanded to ensure that the species' currently occupied range and other potentially suitable habitats are encompassed within protected areas (Barnett *et al.* 2000, pp. 377–378; BLI 2007f, p. 3; Collar *et al.* 1992, p. 776). However, for various reasons (*e.g.,* lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (ADEJA 2007, pp. 1–2; Bruner *et al.* 2001, p. 125; Costa 2007, p. 7; IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9). Therefore, even with the expansion or further designation of protected areas, it is unlikely that all of the identified impacts to the Kaempfer's tody-tyrant (*e.g.,* residential and agricultural encroachment, resource extraction, unregulated tourism, and grazing) would be sufficiently addressed at these sites.

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45). However, there are still various government-sponsored measures in place, both at the national and state levels, that help facilitate development projects (Barnett *et al.* 2000, pp. 377–378; Butler 2007, p. 3; Collar *et al.* 1992, p. 776; Neotropical News 1998a, p. 10; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874) some of which, such as continued logging, housing and tourism developments, and expansion of plantations, could impact potentially important sites for the Kaempfer's tody-tyrant (Barnett *et al.* 2000, p. 377–378; Collar *et al.* 1992, p. 776).

Summary of Factor D

Although there are government-sponsored measures that remain in place in Brazil that continue to facilitate development projects, there are also a wide variety of regulatory mechanisms in Brazil that require protection of the Kaempfer's tody-tyrant and its habitat throughout the species' potentially occupied range. However, the existing regulatory mechanisms that apply to the species have proven difficult to enforce (BLI 2003a, p. 4; Conservation International 2007c, p. 1; Costa 2007, p. 7; The Nature Conservancy 2007, p. 2; Neotropical News 1997b, p. 11; Peixoto and Silva 2007, p. 5; Scott and Brooke 1985, pp. 118, 130). As a result, significant threats to the species' remaining habitats are ongoing (see Factor A) due to competing priorities. Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the Kaempfer's tody-tyrant throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the Kaempfer's tody-tyrant. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.,* inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981,

p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related ''catastrophic'' events (*e.g.,* severe storms, prolonged drought, extreme cold spells, wildfire) (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). Each risk will be analyzed specifically for the Kaempfer's tody-tyrant.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: Natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.,* inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

There is very little information available regarding the historic distribution and abundance of the Kaempfer's tody-tyrant. However, the species' historic population was likely larger and more widely distributed than today, and it must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vilà *et al.* 2002, p. 91; Wang 2004, p. 332).

In the absence of more species-specific life history data, a general approximation of a minimum viable population size is referred to as the 50/500 rule (Franklin 1980, p. 147), as described under Factor E for the Brazilian merganser. The extant population of the Kaempfer's tody-tyrant is estimated to be between 1,000 and 2,499 individuals that are fragmented among several potentially occupied sites, with the largest subpopulation estimated to be between 250 and 1,000 individuals (BLI 2007f, p. 3). The other subpopulations are even smaller in size, and there is currently little likelihood for interchange of individuals among them. The largest subpopulation exceeds the minimum number of individuals required to avoid imminent risks from inbreeding (N_e = 50), but may be only half of the upper threshold (N_e = 500) required to maintain genetic diversity and the capacity to adapt to changing conditions over time. Continued loss of suitable habitats (see Factor A) will exacerbate fragmentation of the remaining occupied patches and will act to further isolate the species' subpopulations. As such, we currently consider the species to be at risk due to its lack of long-term genetic viability.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the Kaempfer's tody-tyrant (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the Kaempfer's tody-tyrant will have disproportionately greater impacts on the species due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the species' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, like the Kaempfer's tody-tyrant, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the Kaempfer's tody-tyrant's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the Kaempfer's tody-tyrant, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.,* severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the Kaempfer's tody-tyrant's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the species susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the Kaempfer's tody-tyrant throughout its range.

Status Determination for the Kaempfer's Tody-tyrant

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the Kaempfer's tody-tyrant. The species is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of long-term genetic viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the Kaempfer's tody-tyrant.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the Kaempfer's tody-tyrant throughout its entire range, as described above, we determine that the Kaempfer's tody-tyrant is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the Kaempfer's tody-tyrant as an endangered species throughout all of its range.

VI. Margaretta's Hermit (Phaethornis malaris margarettae)

Species Description

The Margaretta's hermit is a long-billed hummingbird. The average bill length is 37 millimeters (mm) (1.5 in) and the average tail length is 42 mm (1.7 in) (Hinkelmann 1996, pp. 122–123). Hinkelmann (1996, p. 147) describes the species to be morphologically similar to *Phaethornis margarettae bolvianus* with a paler underside.

Taxonomy

The Margaretta's hermit is in the hummingbird family, Trochilidae. Margaretta's hermit was first described as a new species in 1972 by A. Ruschi (Sibley and Monroe 1990). This bird has variously been considered a full species (*Phaethornis margarettae*) and placed as a subspecies with the long-billed hermit (*P. superciliosus*). However, the available information indicates that it is most appropriately considered to be a subspecies of the great-billed hermit (*P. malaris*) (del Hoyo *et al.* 1999, p. 543; Dickinson 2003, p. 256; Hinkelmann 1996, pp. 125–135; Howard and Moore 1980, p. 205; ICBP 1981, p. 2; Sibley and Monroe 1990, p. 143; Sick 1993, p. 341; Stiles 2005, pp. 1–5).

Habitat and Life History

The Margaretta's hermit is endemic to the Atlantic Forest biome and is found in shrubby understories of primary- and secondary-growth tropical, lowland rainforest (del Hoyo *et al.* 1999, p. 543; ICBP 1981, p. 2; Hinkelmann 1996, pp. 133–140; Sibley and Monroe 1990, p. 143). Hummingbirds feed on the nectar of a variety of plant species, especially bromeliads, and often have a symbiotic relationship with specific plants for which they function as pollinators (Buzato *et al.* 2000, p. 824; del Hoyo *et al.* 1999, p. 543; Sick 1993, pp. 324–326). They also feed on a variety of small arthropods, which are an especially important source of protein for raising their young.

Females typically lay two eggs and are solely responsible for tending their young. Hummingbird nests are usually constructed on vegetation of items such as detritus, webs, leaves, and animal hair cemented together with regurgitated nectar and saliva (Sick 1993, pp. 330–331). Little is known of the subspecies' seasonal movements, but its daily movements within a local area are likely associated with the timing of flowering plants that are used for feeding (del Hoyo *et al.* 1999, p. 543; Sick 1993, pp. 324–336).

Range and Distribution

The Margaretta's hermit historically occurred in coastal forested habitats from Penambuco to Espírito Santo, Brazil (del Hoyo *et al.* 1999, p. 543; Hinkelmann 1996, pp. 132–135; Sibley and Monroe 1990, p. 143). The last confirmed occurrence of the Margaretta's hermit is from a relatively old (ca. 1978) sighting of the subspecies on a privately-owned, remnant forest called Klabin Farm, which is located in Espírito Santo which presently includes 40 km^2 (15.46 mi^2) of land (ICBP 1981, p. 2). A portion of this area (ca. 15 km^2 (5.79 mi^2)) was designated as the Córrego Grande Biological Reserve in 1989 (Costa 2007, p. 20; Willis and Oniki 2002, p. 21). Margaretta's hermit likely also occurred at the Sooretama Biological Reserve in Espírito Santo until around 1977 (ICBP 1981, p. 2).

Population Estimates

Unknown, although likely to be small in light of the very limited area the subspecies may occupy (ICBP 1981, p. 2).

Conservation Status

IUCN considers the Margaretta's hermit to be ''Endangered'' because its extant population is believed to have an extremely restricted distribution and it is likely very small, if it survives at all (ICBP 1981, p. 2). The species, as a whole, is listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (UNEP–World Conservation Monitoring Centre (WCMC) 2009b). Appendix II includes species that are not necessarily threatened with extinction, but may become so unless trade is subject to strict regulation to avoid utilization becoming incompatible with the species' survival.

Summary of Factors Affecting the Margaretta's Hermit

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; Saatchi *et al.* 2001, p. 868; Conservation International 2007a, p. 1; The Nature Conservancy 2007, p. 1; World Wildlife Fund 2007, pp. 2–41; Höfling 2007, p. 1; Butler 2007, p. 2). In addition to the overall loss and degradation of native habitat within this biome, the remaining tracts of habitat are severely fragmented. The current rate of habitat loss in the Atlantic Forest biome is unknown.

The region has the two largest cites in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.*, soy beans, sugarcane, and corn), plantations (*e.g.*, eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.*, charcoal production, steel plants, and hydropower reservoirs). Forestry practices (*e.g.*, commercial logging), subsistence activities (*e.g.*, fuelwood collection), and changes in fire frequencies also contribute to the degradation of native habitat (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118; World Wildlife Fund 2007, pp. 3–51).

Most of the tropical forest habitats believed to have been used historically by the Margaretta's hermit have been converted or are severely degraded due to the above human activities, and the subspecies can not occupy these extensively altered areas (del Hoyo *et al.* 1999, p. 543; ICBP 1981, p. 2; Scott and

Brooke 1985, p. 118; Sick 1993, p. 338). While the Margaretta's hermit is not strictly tied to primary forest habitats and can make use of secondary-growth forests, this does not lessen the threat to the subspecies from the effects of deforestation and habitat degradation. Atlantic Forest birds, such as Margaretta's hermit, which are tolerant of secondary-growth forests, are also rare or have restricted ranges (*i.e.*, less than 21,000 km^2 (8,100 mi^2)). Thus, habitat degradation can adversely impact such species just as equally as it impacts primary forest obligate species (Harris and Pimm 2004, pp. 1612–1613). The last site known to be occupied by the Margaretta's hermit totaled only about 40 km^2 (15 mi^2) (ICBP 1981, p. 2).

The susceptibility to extirpation of rare, limited-range species that are tolerant of secondary-growth forests occurs for a variety of reasons such as when a species' remaining population is already too small or its distribution too fragmented such that it may not be demographically or genetically viable (Harris and Pimm 2004, pp. 1612–1613). In addition, while the Margaretta's hermit may be tolerant of secondary-growth forests, these areas may not represent optimal conditions for the species. For example, many hummingbird species are susceptible to excessive sun and readily abandon their nests at altered forested sites with too much exposure (Sick 1993, p. 331), as can occur with various human activities that result in partial clearing (*e.g.*, selective logging). In addition, management of plantations often involves intensive control of the site's understory vegetation, which eventually results in severely diminished understory cover (Rolim and Chiarello 2004, pp. 2679–2680; Saatchi *et al.* 2001, pp. 868–869). Even if the forest canopy structure remains largely intact, such management practices eventually result in loss of native understory plant species and severely altered understory structure and dynamics, which can be especially detrimental to pollinator species such as the Margaretta's hermit.

Even when forested lands are formally protected (see Factor D), the remaining fragments of habitat where the subspecies may still occur will likely continue to undergo degradation due to their altered dynamics and isolation (Tabanez and Viana 2000, pp. 929–932). Moreover, secondary impacts that are associated with human activities that degrade the remaining tracts of forested habitat potentially used by the subspecies include the potential introduction of disease vectors or exotic predators within the subspecies' historic range (see Factor C). As a result of these secondary impacts, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Therefore, even without further habitat loss or degradation, the Margaretta's hermit remains at risk from past impacts to its suitable forested habitats.

Summary of Factor A

The Margaretta's hermit occurs in one of the most densely populated regions of Brazil, and human activities and their secondary impacts identified above continue to threaten the last known tracts of habitat within the Atlantic Forest biome that may still harbor the Margaretta's hermit (BLI 2003a, p. 4; Conservation International 2007a, p. 1; del Hoyo *et al.* 1999, p. 543; Höfling 2007, p. 1; ICBP 1981, p. 2; The Nature Conservancy 2007, p. 1; Sick 1993, p. 338; World Wildlife Fund 2007, pp. 3–51). Even with the recent passage of national forest policy and in light of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout the Atlantic Forest biome has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270), and native habitats at many of the remaining sites may be lost over the next several years (Rocha *et al.* 2005, p. 263). The Margaretta's hermit has already been reduced to such an extent that it is now only known from a relatively old (ca. 1978) sighting (ICBP 1981, p. 2; Willis and Oniki 2002, p. 21) and any further loss or degradation of its remaining suitable habitat could cause the extinction of this subspecies. Therefore, we find that destruction and modification of habitat are threats to the continued existence of the Margaretta's hermit throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

In the past, many species of hummingbirds that occur in southeastern Brazil were collected for use in the fashion industry due to their colorful plumage, and populations of some species have been extirpated or remain severely diminished as a result (Sick 1993, pp. 337–338). Due to concerns about hummingbirds in international trade, in 1987, the entire family, Trochilidae, was listed in Appendix II of CITES (UNEP–WCMC 2009b), a treaty that regulates international trade in certain protected animal and plant species.

Appendix II of CITES includes species that, although not necessarily threatened presently with extinction, may become so unless the trade in specimens is strictly controlled. International trade in specimens of Appendix-II species is authorized through permits or certificates, once the granting authorities have ascertained certain factors, including that trade will not be detrimental to the survival of the species in the wild and that the specimen was legally acquired (UNEP–WCMC 2009b).

Since the listing of the family under CITES in 1987, there have been eight CITES-permitted international transactions in specimens of the species *Phaethornis malaris;* however, no trade has been reported at the subspecies level, *Phaethornis malaris margarettae* (John Caldwell, UNEP–WCMC, pers. comm., May 13, 2008). According to WCMC, the eight transactions involved a total of 30 specimens of *Phaethornis malaris*, which were imported into the United States from the United Kingdom, Peru and Suriname; the two latter countries are within the species' range (John Caldwell, UNEP–WCMC, pers. comm., May 12, 2008). Due to the suspected small population size and restricted range of the Margaretta's hermit, we believe that the 30 specimens reported in trade were of the species and not the subspecies. Furthermore, we are unaware of any unreported CITES trade or illegal international trade in specimens of Margaretta's hermit. Therefore, we believe that international trade is not a factor influencing the subspecies' status in the wild.

Local hummingbird populations may also be impacted by collection for various uses, including scientific research, preparation of ''novelty'' exhibits, consumption in local dishes, and for the zoo or pet trade (Rolim and Chiarello 2004, pp. 2679–2680; Scott and Brooke 1985, p. 118; Sick 1993, pp. 337–338).

If it exists at all, the extant population of the Margaretta's hermit is likely extremely small and occurs within a severely restricted range. Due to its rarity, the removal or dispersal of any individuals of this subspecies or even a slight decline in the population's fitness due to any intentional or inadvertent hunting and specimen collection would adversely impact the subspecies' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the Margaretta's hermit, we are not aware of any information currently available that specifically indicates the use of this subspecies for any commercial, recreational, scientific, or educational purpose. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the Margaretta's hermit.

C. Disease or Predation

Young hummingbirds are sometimes severely affected by botflies (*Philornis* sp.) (Sick 1993, pp. 336–337). In addition, extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.*, West Nile virus) can negatively impact endemic bird populations (Naugle *et al.* 2004, p. 704; Neotropical News 2003, p. 1). With regard to predation, a variety of reptiles (*e.g.*, snakes, lizards) and predatory birds (*e.g.*, owls, hawks) are known to prey on hummingbirds (Sick 1993, pp. 336–337). Furthermore, nestling hummingbirds can be killed by raiding army ants (*Eciton* sp.), while some hornets and bees are potential competitors for flower nectar and have been known to lethally sting adult hummingbirds. In addition, extensive human activity in previously undisturbed or isolated areas can result in altered predator populations and the introduction of various exotic predator species, some of which (*e.g.*, feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257).

Large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges. However, the extant population of the Margaretta's hermit is considered to be extremely small and occurs within a severely restricted range, if it currently exists at all, and there is a greatly expanded human population within the subspecies' historic distribution. Any additive mortality to the Margaretta's hermit population or a decrease in its fitness due to an increase in the incidence of disease or predation would severely impact the subspecies' overall viability (see Factor E). Nevertheless, while these potential influences remain a concern for future management of the subspecies, we are not aware of any information currently available that indicates the occurrence of disease in the Margaretta's hermit, or that documents any predation incurred by this subspecies. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the Margaretta's hermit.

D. The Inadequacy of Existing Regulatory Mechanisms

The Margaretta's hermit is formally recognized as ''endangered'' in Brazil (Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (ECOLEX 2007, pp. 1–2; ICBP 1981, p. 2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.*, Decree No. 76.623, Order No. 419–P), hunting (*e.g.*, Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.*, Decree No. 3.179).

The Margaretta's hermit is listed in Appendix II of CITES (UNEP–WCMC 2009b). CITES is an international treaty among 173 nations, including Brazil and the United States, that entered into force in 1975 (UNEP–WCMC 2009a). In the United States, CITES is implemented through the U.S. Endangered Species Act (Act). The Act designates the Secretary of the Interior as the Scientific and Management Authorities to implement the treaty with all functions carried out by the Service. Under this treaty, countries work together to ensure that international trade in animal and plant species is not detrimental to the survival of wild populations by regulating the import, export, re-export, and introduction from the sea of CITES-listed animal and plant species (USFWS 2009). As discussed under Factor B, we do not consider international trade to be a threat to the Margaretta's hermit. Therefore, this international treaty does not reduce any current threats to the subspecies. Any international trade that occurs in the future would be effectively regulated under CITES.

There are also a wide range of regulatory mechanisms in Brazil that indirectly protect the Margaretta's hermit through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.*, Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.*, Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.*, Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.*, Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.*, Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

Various regulatory mechanisms exist in Brazil that govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, state, and privately owned lands (*e.g.*, Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.*, National Parks versus Biological Reserves), and based on those categories they allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

Successful efforts to protect the last site known to harbor the Margaretta's hermit from further development occurred in the mid-1980s (Pereira 2007, p. 2), and a portion of this area was designated as the Córrego Grande Biological Reserve in 1989 (Costa 2007, p. 20). However, nearly the entire site burned in 1986, and the subspecies has not been recorded there since that time (Willis and Oniki 2002, p. 21). The Margaretta's hermit likely also occurred at the Sooretama Biological Reserve in Espírito Santo in 1977 (ICBP 1981, p. 2).

For various reasons (*e.g.*, lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (Bruner *et al.* 2001, p. 125; Costa 2007, p. 7; IUCN 1999, pp. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9; Peixoto and Silva 2007, p. 5; World Wildlife Fund 2007, pp. 3–51). For example, according to a World Wide Fund for Nature report, 47 of 86 management plans for protected areas that have been assessed are considered to remain below their minimum level of implementation of Federal requirements, with only 7 considered to be fully implemented (Neotropical News 1999, p. 9). Therefore, even with formal designation of protected areas, it is unlikely that all of the identified threats to the Margaretta's hermit (*e.g.*, residential and agricultural encroachment, resource extraction, unregulated tourism, grazing, and fire) are sufficiently addressed at these sites.

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil, which helped facilitate the large-scale habitat conversions that have occurred throughout the Atlantic Forest biome (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45). However, due to competing priorities, these regulatory mechanisms have proven difficult to enforce.

Summary of Factor D

Although there are government-sponsored measures that remain in place in Brazil that continue to facilitate potentially harmful development projects, there are also a wide variety of regulatory mechanisms in Brazil that require protection of the Margaretta's hermit and its habitat throughout the subspecies' potentially occupied range. The existing regulatory mechanisms that apply to the Margaretta's hermit have been difficult to enforce (BLI 2003a, p. 4; Conservation International 2007c, p. 1; Costa 2007, p. 7; The Nature Conservancy 2007, p. 2; Neotropical News 1997b, p. 11; Peixoto and Silva 2007, p. 5; Scott and Brooke 1985, pp. 118, 130). As a result, significant threats to the subspecies' remaining habitats are ongoing (see Factor A). Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the Margaretta's hermit throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the Margaretta's hermit. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.*, inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related "catastrophic" events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire) (Young 1994, pp. 410–412; Mangel and Tier 1994, p. 612; Dunham *et al.* 1999, p. 9). Each risk will be analyzed specifically for the Margaretta's hermit.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.*, inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

Historically, the Margaretta's hermit population was more abundant and widespread throughout its range (ICBP 1981, p. 2), and the subspecies must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vilà *et al.* 2002, p. 91; Wang 2004, p. 332). In the absence of more species-specific life history data, the 50/500 rule (as explained under Factor E for the Brazilian merganser) may be used to approximate minimum viable population size (Franklin 1980, p. 147). There are no specific past or present abundance estimates for the Margaretta's hermit. However, the available information indicates that its extant population, if it still exists, is likely well below both of the thresholds (N_e = 50 and N_e = 500) for an effective population size because of the very limited area that it is known to occupy (see Factor A) (ICBP 1981, p. 2). This means that the subspecies' population likely does not have enough individuals to avoid risks from inbreeding or the ability to maintain genetic diversity and adapt to changing conditions over time. Furthermore, if the subspecies does still exist, continued loss of suitable habitats (see Factor A) is likely to further exacerbate fragmentation of any remaining occupied patches. As such, we currently consider the subspecies to be at risk due to its lack of near- and long-term genetic viability.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the Margaretta's hermit (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the Margaretta's hermit will have disproportionately greater impacts on the subspecies due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the subspecies' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, like the Margaretta's hermit, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the Margaretta's hermit's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the subspecies' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the Margaretta's hermit, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the Margaretta's hermit's population make it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the subspecies susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the Margaretta's hermit throughout its range.

Status Determination for the Margaretta's Hermit

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the Margaretta's hermit. The subspecies is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of near- and long-term genetic viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the Margaretta's hermit.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the Margaretta's hermit throughout its entire range, as described above, we determine that the Margaretta's hermit is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the Margaretta's hermit as an endangered species throughout all of its range.

VII. Southeastern Rufous-vented Ground-cuckoo (Neomorphus geoffroyi dulcis)

Species Description

The southeastern rufous-vented ground-cuckoo is a large-sized terrestrial bird. The cuckoo has a distinctive flat frontal crest, a long tail and long legs, and a yellow-green curved bill (Payne 2005, p. 206; Roth 1981, p. 388). The species is blackish-brown or reddish black in color, and has brown scale-like coloring on the breast with a black breast band and a reddish belly. It has a bare face with gray to blue coloring (Payne 2005, p. 206).

Taxonomy

The southeastern rufous-vented ground-cuckoo is one of seven subspecies of the rufous-vented ground-cuckoo (*Neomorphus geoffroyi*) that occur at several disjunct localities from Nicaragua to central South America (del Hoyo *et al.* 1997, pp. 606–607; Howard and Moore 1980, p. 178; Payne 2005, pp. 204–207; Sibley and Monroe 1990, p. 107).

Habitat and Life History

The southeastern rufous-vented ground-cuckoo is an extremely shy, ground-foraging bird that requires large blocks of mature, undisturbed, tropical lowland forest within the Atlantic Forest biome (del Hoyo *et al.* 1997, pp. 606–607; ICBP 1981, p. 1; Sick 1993, p. 286; Payne 2005, pp. 204–207). This species is unable to sustain flight for long distances, and major rivers and other extensive areas of non-habitat are thought to impede their movements.

Southeastern rufous-vented ground-cuckoos feed on large insects, scorpions, centipedes, spiders, small frogs, lizards, and occasionally on seeds and fruit. The species is agile when on the ground and highly adept at running and jumping through branches in pursuit of prey (Sick 1993, p. 278). The species is often associated with army ant (*Eciton* sp.) and red ant (*Solenopsis* sp.) colonies, whose foraying columns they use as ''beaters'' to flush their prey (Sick 1993, p. 286). They are also known to forage for flushed prey behind other species, such as the white-lipped peccary (*Tayassu pecari*) (Sick 1993, p. 286).

Unlike some other species of cuckoos, southeastern rufous-vented ground-cuckoos are not believed to be parasitic nesters and build their own nests approximately 2.5 m (8 ft) up in the branches of swampy vegetation (Roth 1981, p. 388; Sick 1993, p. 286). The species' nest resembles a shallow bowl, roughly 25 cm (10 in) across, made of sticks and lined with leaves. Once the young are fledged, the adults care for them away from the nest site (del Hoyo *et al.* 1997, pp. 606–607).

Range and Distribution

Although the southeastern rufous-vented ground-cuckoo had a widespread distribution historically, it has likely always been locally rare (ICBP 1981, p. 1). Historic distributions included the Brazilian cities of Bahia, Minas Gerais, Espírito Santo, and, possibly, Rio de Janeiro (ICBP 1981, p. 1; Payne 2005, p. 207). The last confirmed sighting of this subspecies was from Sooretama Biological Reserve north of the Doce River in Espírito Santo in 1977, and it may now be extinct (Payne 2005, p. 207; Roth 1981, p. 388; Scott and Brooke 1985, pp. 125–126). However, a recent photographic record (ca. 2004) indicates that the subspecies may still occur at Doce River State Park in Minas Gerais (Scoss *et al.* 2006, p. 1).

Population Estimates

Unknown, although certainly very low if it still exists (ICBP 1981, p. 1).

Conservation Status

IUCN considers the southeastern rufous-vented ground-cuckoo to be ''Endangered'' because although the subspecies was ''never numerous, this extremely shy species is among the first to disappear if its primary forest habitat is disturbed and in south-eastern Brazil where it occurs, most of such forest has been destroyed'' (ICBP 1981, p. 1).

Summary of Factors Affecting the Southeastern Rufous-vented Ground-cuckoo

A. The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Based on a number of recent estimates, 92 to 95 percent of the area historically covered by tropical forests within the Atlantic Forest biome has been converted or severely degraded as a result of various human activities (Butler 2007, p. 2; Conservation International 2007a, p. 1; Höfling 2007, p. 1; Morellato and Haddad 2000, p. 786; Myers *et al.* 2000, pp. 853–854; The Nature Conservancy 2007, p. 1; Saatchi *et al.* 2001, p. 868; World Wildlife Fund 2007, pp. 2–41). In addition to the overall loss and degradation of native habitat within this biome, the remaining tracts of habitat are severely fragmented. The current rate of habitat decline within the Atlantic Forest is unknown.

The region has the two largest cites in Brazil, São Paulo and Rio de Janeiro, and is home to approximately 70 percent of Brazil's 169 million people (CEPF 2002; IBGE 2007). The major human activities that have resulted in the loss, degradation, and fragmentation of native habitats within the Atlantic Forest biome include extensive establishment of agricultural fields (*e.g.,* soy beans, sugarcane, and corn), plantations (*e.g.,* eucalyptus, pine, coffee, cocoa, rubber, and bananas), livestock pastures, centers of human habitation, and industrial developments (*e.g.,* charcoal production, steel plants, and hydropower reservoirs). Forestry practices (*e.g.,* commercial logging), subsistence activities (*e.g.,* fuelwood collection), and changes in fire frequencies also contribute to the destruction of native habitats (BLI 2003a, p. 4; Júnior *et al.* 1995, p. 147; The Nature Conservancy 2007, p. 2; Nunes and Kraas 2000, p. 44; Peixoto and Silva 2007, p. 5; Saatchi *et al.* 2001, pp. 868–869; Scott and Brooke 1985, p. 118; World Wildlife Fund 2007, pp. 3–51).

Most of the tropical forest habitats believed to have been used historically by the southeastern rufous-vented ground-cuckoo have been converted or severely degraded by the above human activities (del Hoyo *et al.* 1997, pp. 606–607; ICBP 1981, p. 1; Payne 2005, p. 207; Scott and Brooke 1985, p. 118; Sick 1993, p. 286). Terrestrial insectivorous birds that are primary forest-obligate species, such as the southeastern rufous-vented ground-cuckoo, are especially vulnerable to habitat modifications (Goerck 1997, p. 116), and can not occupy these extensively altered habitats.

Even when they are formally protected (see Factor D), the remaining fragments of primary forest habitat where the subspecies may still occur will likely undergo further degradation due to their altered dynamics and isolation (Tabanez and Viana 2000, pp. 929–932).

In addition, secondary impacts that are associated with human activities that cause severe fragmentation of the remaining tracts of primary forest habitat potentially used by the subspecies include the potential introduction of disease vectors or exotic predators within the subspecies' historic range (see Factor C). As a result of the above influences, there is often a time lag between the initial conversion or degradation of suitable habitats and the extinction of endemic bird populations (Brooks *et al.* 1999a, p. 1; Brooks *et al.* 1999b, p. 1140). Therefore, even without further habitat loss or degradation, the southeastern rufous-vented ground-cuckoo remains at risk from past impacts to its primary forest habitats.

Summary of Factor A

The above human activities and their secondary impacts continue to threaten the remaining tracts of habitat within the Atlantic Forest biome that may still harbor the southeastern rufous-vented ground-cuckoo (BLI 2003a, p. 4; Conservation International 2007a, p. 1; del Hoyo *et al.* 1997, pp. 606–607; Höfling 2007, p. 1; The Nature Conservancy 2007, p. 1; Payne 2005, p. 207; World Wildlife Fund 2007, pp. 3–51). Even with the recent passage of national forest policy, and in light of many other legal protections in Brazil (see Factor D), the rate of habitat loss throughout southeastern Brazil has increased since the mid-1990s (CEPF 2001, p. 10; Hodge *et al.* 1997, p. 1; Rocha *et al.* 2005, p. 270). The subspecies' population has already been reduced to such an extent that it is now only known from one possible recent (ca. 2004) sighting of a single bird (Scoss *et al.* 2006, p. 1), and any further loss or degradation of remaining suitable habitat could cause the extinction of this subspecies. Therefore, we find that destruction and modification of habitat are threats to the continued existence of the southeastern rufous-vented ground-cuckoo throughout its range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The extant population of the southeastern rufous-vented ground-cuckoo is considered to be extremely small, if it currently exists at all. Therefore, the removal or dispersal of any individuals of this subspecies or even a slight decline in the population's fitness due to any intentional or inadvertent hunting, specimen collection, or other human disturbances (*e.g.,* birding, hunting, specimen collection, scientific research) would adversely impact the southeastern rufous-vented ground-cuckoo's overall viability (see Factor E). However, while these potential influences remain a concern for future management of the subspecies, we are not aware of any information currently available that indicates the use of this subspecies for any commercial, recreational, scientific, or educational purpose. As a result, we are not considering overutilization to be a contributing factor to the continued existence of the southeastern rufous-vented ground-cuckoo.

C. Disease or Predation

Extensive human activity in previously undisturbed or isolated areas can also result in altered predator populations and the introduction of various exotic predator species, some of which (*e.g.,* feral cats (*Felis catus*) and rats (*Ratus* sp.)) can be especially harmful to populations of endemic bird species (American Bird Conservancy 2007, p. 1; Courchamp *et al.* 1999, p. 219; Duncan and Blackburn 2007, pp. 149–150; Salo *et al.* 2007, pp. 1241–1242; Small 2005, p. 257). Although large, stable populations of wildlife species have adapted to natural levels of disease and predation within their historic ranges, the extant population of the southeastern rufous-vented ground-cuckoo is considered to be extremely small, if it currently exists at all. In addition, extensive human activity in previously undisturbed or isolated areas can lead to the introduction and spread of exotic diseases, some of which (*e.g.,* West Nile virus) can negatively impact endemic bird populations (Neotropical

News 2003, p. 1; Naugle *et al.* 2004, p. 704).

Any additive mortality to the southeastern rufous-vented ground-cuckoo population or a decrease in its fitness due to an increase in the incidence of disease or predation would adversely impact the subspecies' overall viability (see Factor E). However, while these potential influences remain a concern for future management of the subspecies, we are not aware of any information currently available that indicates the occurrence of disease in the southeastern rufous-vented ground-cuckoo, or that documents any predation incurred by the subspecies. As a result, we are not considering disease or predation to be a contributing factor to the continued existence of the southeastern rufous-vented ground-cuckoo.

D. The Inadequacy of Existing Regulatory Mechanisms

The southeastern rufous-vented ground-cuckoo is formally recognized as ''endangered'' in Brazil (Order No. 1.522) and is directly protected by various laws promulgated by the Brazilian government (ICBP 1981, p. 1; ECOLEX 2007, pp. 1–2). For example, there are measures that prohibit, or regulate through Federal agency oversight, the following activities with regard to endangered species: export and international trade (*e.g.,* Decree No. 76.623, Order No. 419–P), hunting (*e.g.,* Act No. 5.197), collection and research (Order No. 332), captive propagation (Order No. 5), and general harm (*e.g.,* Decree No. 3.179). In addition, there are a wide range of regulatory mechanisms in Brazil that indirectly protect the southeastern rufous-vented ground-cuckoo through measures that protect its remaining suitable habitat (ECOLEX 2007, pp. 2–5). For example, there are measures that: (1) Prohibit exploitation of the remaining primary forests within the Atlantic Forest biome (*e.g.,* Decree No. 750, Resolution No. 10); (2) govern various practices associated with the management of primary and secondary forests, such as logging, charcoal production, reforestation, recreation, and water resources (*e.g.,* Resolution No. 9, Act No. 4.771, Decree No. 1.282, Decree No. 3.420, Order No. 74–N, Act No. 7.803); (3) establish provisions for controlling forest fires (*e.g.,* Decree No. 97.635, Order No. 231–P, Order No. 292–P, Decree No. 2.661); and (4) regulate industrial developments, such as hydroelectric plants and biodiesel production (*e.g.,* Normative Instruction No. 65, Law No. 11.116). Finally, there are various measures (*e.g.,* Law No. 11.516, Act No. 7.735, Decree No. 78, Order No. 1, Act No. 6.938) that direct Federal and state agencies to promote the protection of lands and natural resources under their jurisdictions (ECOLEX 2007, pp. 5–6).

Various regulatory mechanisms in Brazil govern the formal establishment and management of protected areas to promote conservation of the country's natural resources (ECOLEX 2007, pp. 6–7). These mechanisms generally aim to protect endangered wildlife and plant species, genetic resources, overall biodiversity, and native ecosystems on Federal, state, and privately owned lands (*e.g.,* Law No. 9.985, Law No. 11.132, Resolution No. 4, Decree No. 1.922). Brazil's formally established protection areas are categorized based on their overall management objectives (*e.g.,* National Parks versus Biological Reserves), and based on those categories they allow varying uses and provide varying levels of protection for specific resources (Costa 2007, pp. 5–19).

Two of these protected areas, Sooretama Biological Reserve and Doce River State Park, represent the major sites where the southeastern rufous-vented ground-cuckoo may still occur (Payne 2005, p. 207; Scott and Brooke 1985, pp. 125–126), and the protective measures potentially implemented at these two areas are considered critical for protecting any remaining populations of the subspecies. However, not all of the identified threats for the subspecies (*e.g.,* unregulated tourism, residential encroachment, resource extraction, grazing, and intentional burning) are sufficiently addressed at the two protected areas that may still harbor the southeastern rufous-vented ground-cuckoo (AMDA 2006, p. 2; Barbosa 2007, p. 1; Bruner *et al.* 2001, pp. 125–128; Nunes and Kraas 2000, p. 44). Due to various reasons (*e.g.,* lack of funding, personnel, or local management commitment), some of Brazil's protected areas exist without the current capacity to achieve their stated natural resource objectives (Costa 2007, p. 7; IUCN 1999, p. 23–24; Neotropical News 1996, pp. 9–10; Neotropical News 1999, p. 9). For example, the Worldwide Fund for Nature found that 47 of 86 protected areas are considered to remain below their minimum level of implementation of Federal requirements, with only 7 considered to be fully implemented (Neotropical News 1999, p. 9).

In the past, the Brazilian government, through various regulations, policies, incentives, and subsidies, has actively encouraged settlement of previously undeveloped lands in southeastern Brazil which helped facilitate the large-scale conversions that have occurred in the Atlantic Forest biome (Brannstrom 2000, p. 326; Butler 2007, p. 3; Conservation International 2007c, p. 1; Pivello 2007, p. 2; Ratter *et al.* 1997, pp. 227–228; Saatchi *et al.* 2001, p. 874). More recently, the Brazilian government has given greater recognition to the environmental consequences of such rapid expansion, and has taken steps to better manage some of the natural resources potentially impacted (Butler 2007, p. 7; Costa 2007, p. 7; Neotropical News 1997a, p. 10; Neotropical News 1997b, p. 11; Neotropical News 1998b, p. 9; Neotropical News 2003, p. 13; Nunes and Kraas 2000, p. 45). These competing priorities make it difficult to enforce regulations that protect the habitat of the southeastern rufous-vented ground-cuckoo.

Summary of Factor D

Although there are various government-sponsored measures that remain in place in Brazil that continue to facilitate development projects that could harm the species, there are also a wide variety of regulatory mechanisms in Brazil that require protection of the southeastern rufous-vented ground-cuckoo and its habitat throughout the subspecies' potentially occupied range. The existing regulatory mechanisms, as currently enforced, do not reduce the threats to the species (BLI 2003a, p. 4; Conservation International 2007c, p. 1; Costa 2007, p. 7; The Nature Conservancy 2007, p. 2; Neotropical News 1997b, p. 11; Peixoto and Silva 2007, p. 5; Scott and Brooke 1985, p. 118, 130; Venturini *et al.* 2005, p. 68). Therefore, when combined with Factors A and E, we find that the existing regulatory mechanisms are inadequate to ameliorate the current threats to the southeastern rufous-vented ground-cuckoo throughout its range.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Under this factor we explore whether three risks, represented by demographic, genetic, and environmental stochastic events, are substantive to threaten the continued existence of the southeastern rufous-vented ground-cuckoo. In basic terms, demographic stochasticity is defined by chance changes in the population growth rate for the species (Gilpin and Soulé 1986, p. 27). Population growth rates are influenced by individual birth and death rates (Gilpin and Soulé 1986, p. 27), immigration and emigration rates, as well as changes in population sex ratios. Natural variation in survival and reproductive success of individuals and chance disequilibrium of sex ratios may act in concert to contribute to demographic stochasticity (Gilpin and Soulé 1986, p. 27). Genetic stochasticity is caused by changes in gene frequencies due to genetic drift, and diminished genetic diversity, and/or effects due to inbreeding (*i.e.,* inbreeding depression) (Lande 1995, p. 786). Inbreeding can have individual or population-level consequences either by increasing the phenotypic expression (the outward appearance or observable structure, function or behavior of a living organism) of recessive, deleterious alleles or by reducing the overall fitness of individuals in the population (Charlesworth and Charlesworth 1987, p. 231; Shaffer 1981, p. 131). Environmental stochasticity is defined as the susceptibility of small, isolated populations of wildlife species to natural levels of environmental variability and related ''catastrophic'' events (*e.g.,* severe storms, prolonged drought, extreme cold spells, wildfire) (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994, p. 612; Young 1994, pp. 410–412). Each risk will be analyzed specifically for the southeastern rufous-vented ground-cuckoo.

Small, isolated populations of wildlife species are susceptible to demographic and genetic problems (Shaffer 1981, pp. 130–134). These threat factors, which may act in concert, include: natural variation in survival and reproductive success of individuals, chance disequilibrium of sex ratios, changes in gene frequencies due to genetic drift, diminished genetic diversity and associated effects due to inbreeding (*i.e.,* inbreeding depression), dispersal of just a few individuals, a few clutch failures, a skewed sex ratio in recruited offspring over just one or a few years, and chance mortality of just a few reproductive-age individuals.

The southeastern rufous-vented ground-cuckoo requires large blocks of undisturbed tropical forest (del Hoyo *et al.* 1997, pp. 606–607; Payne 2005, pp. 204–207; Sick 1993, p. 286). In addition, while the subspecies has likely always been rare throughout its historic range (ICBP 1981, p. 1), it must have maintained a minimum level of genetic interchange among its local subpopulations in order for them to have persisted (Middleton and Nisbet 1997, p. 107; Vilà *et al.* 2002, p. 91; Wang 2004, p. 332). However, the tropical forest habitats throughout the Doce River valley, where the southeastern rufous-vented ground-cuckoo was last documented, have been severely fragmented (see Factor A) and the subspecies' extant population is extremely small and isolated, if it currently exists at all.

In the absence of more species-specific life history data, a general approximation of a minimum viable population size is referred to as the 50/500 rule (Franklin 1980, p. 147), as described under Factor E for the Brazilian merganser. There are no specific past or present abundance estimates for the southeastern rufous-vented ground cuckoo; however, the subspecies is only known from one possible recent (ca. 2004) sighting of a single bird (Scoss *et al.* 2006, p. 1), and the extant population is almost certainly well below both of the thresholds (N_e = 50 and N_e = 500) for an effective population size. This means that the subspecies' population likely does not have enough individuals to avoid risks from inbreeding or the ability to maintain genetic diversity and adapt to changing conditions over time. Furthermore, if the subspecies does still exist, continued loss of suitable habitats (see Factor A) is likely to further exacerbate fragmentation of any remaining occupied patches. As such, we currently consider the subspecies to be at risk due to its lack of near- and long-term genetic viability.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the southeastern rufous-vented ground cuckoo (see Factors A and D). We expect that any additional loss or degradation of habitats that are used by the southeastern rufous-vented ground cuckoo will have disproportionately greater impacts on the subspecies due to the population's fragmented state. This is because with each contraction of an existing subpopulation, the likelihood of interchange with other subpopulations within patches decreases, while the likelihood of its complete reproductive isolation increases.

The combined effects of habitat fragmentation (Factor A) and genetic and demographic stochasticity on a species population are referred to as patch dynamics. Patch dynamics can have profound effects on fragmented subpopulations and can potentially reduce a species' respective effective population by orders of magnitude (Gilpin and Soulé 1986, p. 31). For example, an increase in habitat fragmentation can separate subpopulations to the point where individuals can no longer disperse and breed among habitat patches, causing a shift in the demographic characteristics of a population and a reduction in genetic fitness (Gilpin and Soulé 1986, p. 31). Without efforts to maintain buffer areas and reconnect some of the remaining tracts of suitable habitat near the subspecies' currently occupied sites, it is doubtful that the individual tracts are currently large enough to support viable populations of many birds endemic to the Atlantic Forest, like the southeastern rufous-vented ground cuckoo, and the eventual loss of any small, isolated populations appears to be inevitable (Goerck 1997, p. 117; Harris and Pimm 2004, pp. 1609–1610; IUCN 1999, pp. 23–24; Machado and Da Fonseca 2000, pp. 914, 921–922; Saatchi *et al.* 2001, p. 873; Scott and Brooke 1985, p. 118). Del Hoyo *et al.* (1997, p. 207) suggests that the rufous-vented ground-cuckoo would be one of the first species to be extirpated from an area when their primary forest habitat is isolated, as has occurred to another *Neomorphus* geoffroyi subspecies at Barro Colorado in response to operations of the Panama Canal (del Hoyo *et al.* 1997, pp. 606–607; Payne 2005, p. 207). Furthermore, as a species' status continues to decline, often as a result of deterministic forces such as habitat loss or overutilization, it will become increasingly vulnerable to a broad array of other forces. If this trend continues, its ultimate extinction due to one or more stochastic events becomes more likely.

We expect that the southeastern rufous-vented ground cuckoo's increased vulnerability to demographic stochasticity and inbreeding will be operative even in the absence of any human-induced threats or stochastic environmental events, which only act to further exacerbate the species' vulnerability to local extirpations and eventual extinction. Demographic and genetic stochastic forces typically operate synergistically. Initial effects of one threat factor can later exacerbate the effects of other threat factors, as well as itself (Gilpin and Soulé 1986, pp. 25–26). For example, any further fragmentation of populations will, by definition, result in the further removal or dispersal of individuals, which will exacerbate the other threats. Conversely, lack of a sufficient number of individuals in a local area or a decline in their individual or collective fitness may cause a decline in the population size, despite the presence of suitable habitat patches.

Small, isolated populations of wildlife species, such as the southeastern rufous-vented ground cuckoo, are also susceptible to natural levels of environmental variability and related ''catastrophic'' events (*e.g.*, severe storms, prolonged drought, extreme cold spells, wildfire), which we will refer to as environmental stochasticity (Dunham *et al.* 1999, p. 9; Mangel and Tier 1994,

p. 612; Young 1994, pp. 410–412). A single stochastic environmental event can severely reduce existing wildlife populations and, if the affected population is already small or severely fragmented, it is likely that demographic stochasticity or inbreeding will become operative, which would place the population in jeopardy (Gilpin and Soulé 1986, p. 27; Lande 1995, pp. 787–789).

Summary of Factor E

The small and declining numbers that make up the southeastern rufous-vented ground cuckoo's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of population fragmentation makes the subspecies susceptible to genetic and demographic stochasticity. Therefore, we find that demographic, genetic, and environmental stochastic events are a threat to the continued existence of the southeastern rufous-vented ground cuckoo throughout its range.

Status Determination for the Southeastern Rufous-vented Ground-cuckoo

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the southeastern rufous-vented ground-cuckoo. The subspecies is currently at risk throughout all of its range due to ongoing threats of habitat destruction and modification (Factor A), and its lack of near- and long-term genetic and viability due to threats associated with demographic, genetic, and environmental stochasticity (Factor E). Furthermore, we have determined that the existing regulatory mechanisms (Factor D) are not adequate to ameliorate the current threats to the southeastern rufous-vented ground-cuckoo.

Section 3 of the Act defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range'' and a ''threatened species'' as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' Based on the threats to the southeastern rufous-vented ground-cuckoo throughout its entire range, as described above, we determine that the southeastern rufous-vented ground-cuckoo is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we are proposing to list the southeastern rufous-vented ground-cuckoo as an endangered species throughout all of its range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and encourages and results in conservation actions by Federal and State governments, private agencies and interest groups, and individuals.

Section 7(a) of the Act, as amended, and as implemented by regulations at 50 CFR part 402, requires Federal agencies to evaluate their actions within the United States or on the high seas with respect to any species that is proposed or listed as endangered or threatened, and with respect to its critical habitat, if any has been proposed or designated. However, given that the black-hooded antwren, Brazilian merganser, cherry-throated tanager, fringe-backed fire-eye, Kaempfer's tody-tyrant, Margaretta's hermit, and southeastern rufous-vented ground-cuckoo are not native to the United States, we are not designating critical habitat in this rule.

Section 8(a) of the Act authorizes the provision of limited financial assistance for the development and management of programs that the Secretary of the Interior determines to be necessary or useful for the conservation of endangered and threatened species in foreign countries. Sections 8(b) and 8(c) of the Act authorize the Secretary to encourage conservation programs for foreign endangered and threatened species and to provide assistance for such programs in the form of personnel and the training of personnel.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered and threatened wildlife. As such, these prohibitions would be applicable to the black-hooded antwren, Brazilian merganser, cherry-throated tanager, fringe-backed fire-eye, Kaempfer's tody-tyrant, Margaretta's hermit, and southeastern rufous-vented ground-cuckoo. These prohibitions, under 50 CFR 17.21, in part, make it illegal for any person subject to the jurisdiction of the United States to ''take'' (take includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) any endangered wildlife species within the United States or upon the high seas; or to import or export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or to sell or offer for sale in interstate or foreign commerce any endangered wildlife species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken in violation of the Act. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species, and 17.32 for threatened species. With regard to endangered wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

Peer Review

In accordance with our joint policy with National Marine Fisheries Service, ''Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities,'' published in the **Federal Register** on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three appropriate independent specialists regarding this proposed rule. The purpose of peer review is to ensure that our final determination is based on scientifically sound data, assumptions, and analyses. We will send copies of this proposed rule to the peer reviewers immediately following publication in the **Federal Register**. We will invite these peer reviewers to comment during the public comment period on our specific assumptions and conclusions regarding the proposal to list the black-hooded antwren, Brazilian merganser, cherry-throated tanager, fringed-backed fire-eye, Kaempfer's tody-tyrant, Margaretta's hermit, and the southeastern rufous-vented ground-cuckoo.

We will consider all comments and information we receive during the comment period on this proposed rule during our preparation of a final determination. Accordingly, our final decision may differ from this proposal.

Public Hearings

The Act provides for one or more public hearings on this proposal, if we receive any requests for hearings. We must receive your request for a public hearing within 45 days after the date of this **Federal Register** publication (see **DATES**). Such requests must be made in writing and be addressed to the Chief of the Branch of Listing at the address shown in the **FOR FURTHER INFORMATION CONTACT** section. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** at least 15 days before the first hearing.

Required Determinations

National Environmental Policy Act (NEPA)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), need not be prepared in connection with regulations adopted under section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Clarity of the Rule

We are required by Executive Orders 12866 and 12988, and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in the **ADDRESSES** section. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, *etc.*

References Cited

A complete list of all references cited in this proposed rule is available on the Internet at *http://www.regulations.gov* or upon request from the Branch of Listing, Endangered Species Program, U.S. Fish and Wildlife Service (see **FOR FURTHER INFORMATION CONTACT**).

Author(s)

The primary authors of this proposed rule are staff members of the Division of Scientific Authority, U.S. Fish and Wildlife Service.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) by adding new entries for ''Antwren, Black-hooded,'' ''Cuckoo, Southeastern Rufous-vented Ground,'' ''Fire-eye, Fringe-backed,'' ''Hermit, Margaretta's,'' ''Merganser, Brazilian,'' ''Tanager, Cherry-throated,'' and ''Tody-tyrant, Kaempfer's'' in alphabetical order under BIRDS to the List of Endangered and Threatened Wildlife as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	
BIRDS							
*	*	*	*	*	*	*	
Antwren, black-hooded.	*Formicivora erythronotos*.	Brazil	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Cuckoo, southeastern rufous-vented ground.	*Neomorphus geoffroyi dulcis*.	Brazil	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Fire-eye, fringed-backed.	*Pyriglena atra*	Brazil	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Hermit, Margaretta's	*Phaethornis malaris margarettae*.	Brazil	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Merganser, Brazilian	*Mergus octosetaceus*.	Brazil, Argentina, Paraguay.	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Tanager, cherry-throated.	*Nemosia rourei*	Brazil	Entire	E	....	NA	NA
*	*	*	*	*	*	*	
Tody-tyrant, Kaempfer's.	*Hemitriccus kaempferi*.	Brazil	Entire	E	....	NA	NA

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	

Dated: July 15, 2009.

James J. Slack,

Acting Deputy Director, U.S. Fish and Wildlife Service.

[FR Doc. E9–18691 Filed 8–11–09; 8:45 am]

BILLING CODE 4310–55–P