List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

■ Accordingly, we 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 a new entry for "Puffleg, black-breasted" in alphabetical order under BIRDS, to the List of Endangered and Threatened Wildlife, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*		*	*
BIRDS							
*	*	*	*	*		*	*
Puffleg, black-breasted	*Eriocnemis nigrivestis*	Ecuador, South America	Entire	E	767	NA	NA
*	*	*	*	*		*	*

Dated: June 29, 2010

Jeffrey L. Underwood,

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

[FR Doc. 2010–18018 Filed 7–26–10; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R9-IA-2008-0108]

[90100-1660-1FLA B6]

RIN 1018-AW01

Endangered and Threatened Wildlife and Plants; Final Rule to List the Medium Tree-Finch (*Camarhynchus pauper*) as Endangered Throughout Its Range

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine endangered status for the medium tree-finch (*Camarhynchus pauper*) under the Endangered Species Act of 1973, as amended (Act). This species is native to Floreana Island, one of the Galapagos Islands in Ecuador. This rule implements the protections of the Act for this species.

DATE: This final rule is effective August 26, 2010.

ADDRESSES: The supporting file for this rule is available for public inspection, by appointment, during normal business hours, Monday through Friday, in Suite 400, 4401 N. Fairfax Drive, Arlington, Virginia 22203.

FOR FURTHER INFORMATION CONTACT: Janine Van Norman, Chief, Branch of Foreign Species, Endangered Species Program, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 420, Arlington, VA 22203; telephone 703-358-2171; 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:

Background

In this final rule, we determine endangered status for the medium tree-finch (Camarhynchus pauper) under the Act.

Previous Federal Actions

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, remove, or reclassify a species from the list of endangered or threatened species has presented substantial information indicating that the requested action may be warranted. To the maximum extent practicable, the finding shall be made within 90 days following receipt of the petition and 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 on whether the requested action is warranted, not warranted, or warranted but precluded by higher-priority listing actions (this finding is referred to as the "12–month finding''). 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 take action on a proposal to list or withdraw our original finding. 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.

On May 6, 1991, we received a petition (hereafter referred to as the 1991 petition) from the International Council for Bird Preservation (ICBP), to add 53 species of foreign birds to the list of Threatened and Endangered Wildlife

(50 CFR 17.11(h)), including the medium tree-finch that is the subject of this final rule. In response to the 1991 petition, we published a positive 90–day finding on December 16, 1991 (56 FR 65207), for all 53 species, and announced the initiation of 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. In that document, we proposed listing 15 of the 53 bird species included in the 1991 petition, and announced our finding that listing the remaining 38 species from the 1991 petition, including the medium tree-finch, was warranted but precluded because of other listing activity.

On May 21, 2004 (69 FR 29354), and April 23, 2007 (72 FR 20184), we published in the **Federal Register** notices announcing our annual petition findings for foreign species. In those notices, we made warranted but precluded findings for all outstanding foreign species from the 1991 petition, including the medium tree-finch which is the subject of this final rule.

Per the Service's listing priority guidelines (September 21, 1983; 48 FR 43098), our 2007 annual notice of review (ANOR) (April 23, 2007; 72 FR 20184) identified the listing priority numbers (LPNs) (ranging from 1 to 12) for all outstanding foreign species, including the medium tree-finch, which was designated with an LPN of 11. The medium tree-finch does not represent a monotypic genus. As reported in the 2007 ANOR, the magnitude of threat to the species was moderate as the species was common in the forested highlands and its habitat had not been highly degraded. The immediacy of threat was nonimminent because the species' habitat is protected by the area's national park and World Heritage Site status.

On January 23, 2008, the United States District Court ordered the Service to propose listing rules for five foreign bird species, actions which had been previously determined to be warranted but precluded: The Andean flamingo (*Phoenicoparrus andinus*), black-breasted puffleg (*Eriocnemis nigrivestis*), Chilean woodstar (*Eulidia yarrellii*), medium tree-finch (*Camarhynchus pauper*), and the St. Lucia forest thrush (*Cichlherminia herminieri sanctaeluciae*). The court ordered the Service to issue proposed listing rules for these species by the end of 2008.

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 that proposing 30 taxa for listing under the Act is warranted. In order to comply with the recent court-order, the medium tree-finch was included as one of the 30 taxa for which listing is warranted.

Summary of Comments and Recommendations

In the proposed rule published on December 8, 2008 (73 FR 74434), we requested that all interested parties submit written comments on the proposal by February 6, 2009. We received six comments. We received a comment from the Center for Biological Diversity supporting the proposed listing. Three comments received were from peer reviewers, and two other comments were received from the public that contained no substantive information. We did not receive any requests for a public hearing.

During the comment period for the proposed rule, we received three comments containing substantive information. No comments in opposition of the rule were received. All substantive information provided during the comment period has either been incorporated directly into this final determination or addressed below.

New clarifying information, particularly concerning the degree of threat by the parasitic fly (*Philornis downsi*) and confirmation of the success of the goat eradication program, was provided by one peer reviewer and has been incorporated into this finding.

Peer Review

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from four knowledgeable individuals with scientific expertise that included familiarity with the medium tree-finch and its habitat, biological needs, and threats. We received responses from three of the peer reviewers.

We reviewed all comments received from the peer reviewers for substantive issues and clarifying information regarding the listing of the medium tree-finch. The peer reviewers generally concurred with our methods and conclusions and provided additional clarifications and suggestions to improve the final rule. Peer reviewer comments are addressed in the following summary and incorporated into this final rule as appropriate.

Public Comments

Comment 1: Three independent specialists agreed that our description and analysis of the biology, habitat, population trends were accurate and agreed generally with our conclusions. One researcher provided recent information on the medium tree finch's nesting success between 2004 and 2008; indicating that between 4 and 8 percent of nests produced fledglings.

Our Response: This information has been considered and incorporated into the rulemaking as appropriate.

Comment 2: Three commenters supported the proposed listing.

Our Response: While general support of a listing is not, in itself, a substantive comment that we take into consideration as part of our five-factor analysis, we appreciate the support of these commenters. Support is important to the conservation of foreign species.

Comment 3: One commenter suggested that tourist visitation to the Scalesia highlands (the preferred habitat of the Medium Tree finch) increased more than tenfold since 2004, indicating that there has been an increase in the number of bus rides and highland tours.

Our Response: We acknowledge that tourism may be increasing on Floreana Island; however, no supporting information was provided with the comment for corroboration. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) 2007 report indicated that visitation has grown in Galapagos from 40,000 in 1991 to over 120,000 in 2006 (pp. 9-10). This is discussed in factor B, below.

Comment 4: One commenter provided additional information on this species, specifically three research papers — two published in 2008 and the other in 2007— regarding the avian parasite discussed in factor C below.

Our Response: The Service has reviewed the research, and the information has been considered and incorporated into the rulemaking as appropriate.

Summary of Changes from Proposed Rule

A commenter pointed out a typographical mistake, which we have corrected. Santa Maroa Island was corrected to Santa María Island. We also updated the clutch size to clarify that it is generally between two and three for this species, rather than between two and four, which was the size indicated in the proposed rule. Additionally, the medium tree-finch population estimate and trend has been updated in this document (see Species Information below).

Species Information

The medium tree-finch (*Camarhynchus pauper*) is endemic to Floreana Island in the Galapagos Islands, Ecuador (Harris 1982, p. 150; Sibley and Monroe 1990, p. 771; BirdLife International (BLI) 2010). This

species is one of the 14 species of Darwin's finches, collectively named in recognition of Charles Darwin's work on the theory of evolution (Grant 1986, p. 6). It is approximately 12.5 centimeters (cm) (5 inches (in)) in length (Harris 1982, p. 150; BLI 2010). Medium tree-finches have wings and tails that are short and rounded, and often hold their tails slightly cocked in a wren-like manner (Jackson 1985, p. 188). Males have a black head, neck, and upper breast (Harris 1982, p. 150; Jackson 1985, p. 188; Fitter *et al.* 2000, p. 78), and an underside that is gray-brown, and white or yellowish in color (BLI 2010). Their tail and back are olive green (Fitter *et al.* 2000, p. 78). Females have a head that is more gray-brown (BLI 2010), and a body that is generally olive-green above and pale yellowish below (Fitter *et al.* 2000, p. 78). It is similar to the large and small tree-finches of the same genus, but differs from the large tree-finch (*Camarhynchus psittacula*) primarily due to its significantly smaller and less parrot-like beak, and from the small tree-finch (*Camarhynchus parvulus*) because of its larger beak (Harris 1982, p. 150; BLI 2010). It is also known as the Charles tree-finch, the Santa María tree-finch, and the Floreana tree-finch (Sibley and Monroe 1990, p. 771). This is due to the fact that the island of Floreana is also referred to as Charles Island or Santa María Island, the official Spanish name of the island (Harris 1973, p. 265; Grant 1986, Appendix). The species is locally known as "*Pinzón Mediano de árbol*" (Castro and Phillips 1996, p. 130).

The species was first taxonomically described by Ridgeway in 1890 (Sibley and Monroe 1990, p. 771). Sulloway (2008a, pers. comm.) recently conducted an analysis of the relative numbers of tree-finch specimens in the California Academy of Sciences' collections, compared with the frequencies found by Dr. Sonia Kleindorfer between 2000 and 2006. Sulloway found that the population of the medium tree-finch did not significantly change for over a century, during which time settlers and introduced animals and plants were present on Floreana (2008b, pers. comm.). Sulloway's analysis indicates that the medium tree-finch is much less common today than it was prior to 1961 (Sulloway 2008a, pers. comm.). Specifically, the chance of seeing a medium tree-finch today is approximately 25 percent less than it would have been more than 50 years ago, as compared to the likelihood of spotting a large or small tree-finch (Sulloway 2008a, pers. comm.). As reported by Sulloway (2008a, pers. comm.) and O'Connor *et al.* (2009, p. 862), the population density of the medium tree-finch is declining. O'Connor *et al* found (2008a) density of the species decreased from 154 birds/km^2 (59 birds/mi^2) in 2004 to 60 birds/km^2 (23 birds/mi^2) in 2008.

In 1996, Stotz *et al.* considered the relative abundance of the species to be "common" (1996, p. 262). BirdLife International currently estimates the population to be between 1,000 and 2,499 birds (2010, p. 1). In 2006, Fessl *et al.* reported that there were about 300 breeding pairs remaining on Floreana (2006a, p. 745). In another study, researchers compared bird abundance survey data from 2004 and 2008 in order to estimate the population density of the medium tree-finch in the highlands of Floreana (O'Connor *et al.* 2008, 20 pp). Based on the results of their study, O'Connor *et al.* (2008, p. 1) estimate that the total medium tree-finch population in 2008 consisted of 860 to 1,220 individuals (an average of 72 birds/km^2 (28 birds/mi^2)) observed in their prime habitat. Their study also showed that the population density of the species overall decreased from 154 birds/km^2 (59 birds/mi^2) in 2004 to 60 birds/km^2 (23 birds/mi^2) in 2008 (pp. 6-7).

Habitat and Life History

Floreana, one of the 19 principal islands that make up the Galapagos archipelago (McEwen 1988, p. 234), is 173 km^2 (67 mi^2) in area, and has a maximum elevation of 640 meters (m) (2,100 feet (ft)) (Swash and Still 2005, p. 10).

The medium tree-finch mainly occurs in the moist highland forests (i.e., the *Scalesia* zone, named for the dominant tree species, *Scalesia* spp., found in this zone) (Stewart 2006, p. 193; Kleindorfer 2007, p. 796), primarily above 300 m (984 ft) (Castro and Phillips 1996, p. 130). The *Scalesia* zone begins at an altitude of 180 - 200 m (591 - 656 ft), and ends at approximately 600 m (1,968 ft) ((Wiggins and Porter 1971, p. 22; Stephenson 2000, p. 34). On Floreana, the medium tree-finch's habitat is a lush evergreen cloud forest dominated by *Scalesia pedunculata* (daisy tree), the largest of the 20 species of *Scalesia* found in the Galapagos, (Jackson 1985, p. 95; Fitter *et al.* 2000, p. 137). *Scalesia* form dense stands with *S. pedunculata* frequently reaching 15 m (49 ft) in height, and 20 m (66 ft) or more given good environmental conditions (Wiggins and Porter 1971, p. 22; Fitter *et al.* 2000, p. 137). A large amount of the *Scalesia* zone has been destroyed on the inhabited islands. The zone is the best area for agriculture because the garúa (dense sea mist that sometimes blankets the highlands) keeps the area well watered during the cool season (Jackson 1985, p. 61; Fitter *et al.* 2000, p. 137). Currently, 12 to 17 km^2 (4.6 to 6.6 mi^2) of *Scalesia*-dominated forest is believed to remain (O'Conner *et al.* 2008; p. 8).

On Floreana, other common trees in the *Scalesia* zone are the endemic trees *Croton scouleri* (Galápagos croton) and *Zanthoxylum fagara* (lime prickly-ash). Dominant plant species include *Phoradendron henslowii* (mistletoe), the shrub *Macraea laricifolia*, and introduced fruit species such as *Citrus limetta, Passiflora edulis*, and *Psidium guajava* (Christensen and Kleindorfer 2008, p. 5). Beneath the top of the canopy, epiphytes (plants that live on another plant without causing harm to the host plant) cover trunks, branches, twigs, and even leaves of some plant species (Wiggins and Porter 1971, p. 24; Fitter *et al.* 2000, p. 137). Common epiphytes found in the *Scalesia* zone are mosses, liverworts, ferns, *Peperomia*, bromeliads (such as *Tillandsia*), and orchids (Wiggins and Porter 1971, pp. 22, 24; Jackson 1985, p. 60; Fitter *et al.* 2000, p. 137). Epiphytes are a prominent feature of the moist zones of the Galapagos Islands because of the large amount of time that clouds and mist cover the upper reaches of the higher islands (Fitter *et al.* 2000, p. 137).

In 1996, researchers reported that the elevational zone in which the medium tree finch is most common is "Hill Tropical," described as hills and lower slopes in the altitude range of 500 – 900 m (1,640 – 2,953 ft) (Stotz *et al.* 1996, pp. 121, 262). The species reaches its minimum elevation in relatively low-relief lowland areas and its maximum elevation at 600 m (1,969 ft) (Stotz *et al.* 1996, p. 262). As a result, one can infer from this data that the medium tree-finch is predominantly found at the highest end of its elevational distribution, between 500 and 600 m (1,640 and 1,969 ft).

These researchers found that the medium tree-finch forages at more than one level within its habitat; specifically, they noted that it can be found foraging from the understory (undergrowth) to the canopy (Stotz *et al.* 1996, pp. 120, 262). *Camarhynchus* species were found to spend a little less than 25 percent of their time foraging at the ground level, while spending the majority of their time foraging above ground (Bowman 1963, p. 132). The medium tree-finch uses its powerful tip-biting bill to search under twigs and foliage, probe crevices in the bark of trees, and cut into tough woody tissues in search of insect larvae (Bowman 1963, pp. 117, 125), which is its primary food source (Bowman 1963,

p. 121). The species also feeds, to a lesser extent, on seeds (Bowman 1963, p. 121), nectar, young buds, and leaves (Castro and Phillips 1996, p. 130).

The medium tree-finch prefers to forage and nest in the tree *Scalesia pedunculata* (O'Connor *et al.* 2009, p. 855). Its clutch size is generally between two and three (Fessl *et al* 2006a, p. 740, Dudaniec *et al.* 2007, pp. 326-327; O'Connor *et al.* 2009, p. 855). The nests of Darwin's finches are similar in construction from one species to another: the male builds a dome-shaped nest, made from twigs, grass, pieces of bark, lichens, feathers, and other materials, with a small, round side entrance (Jackson 1985, p. 191). In a study of the nesting success of the small tree-finch in the highlands of Santa Cruz Island in the Galapagos, Kleindorfer (2007, p. 796) found that all nests were located 6 to 10 m (20 to 33 ft) above the ground, on horizontal branches of *Scalesia pedunculata,* and were positioned by interweaving surrounding smaller twigs and leaves.

Range and Distribution

In 1982, Harris reported that the species was common in the highlands on Floreana and uncommon to rare on the coast (p. 150). Although the current range of the medium tree-finch is officially estimated to be 23 km^2 (9 mi^2) (BLI 2010), which encompasses the entire highland area of Floreana, the medium tree-finch is restricted to fragmented forest patches within the highlands. The actual available habitat has been estimated to be approximately 4 to 17 km^2 (4.5 to 6.5 mi^2) (O'Connor *et al.* (2008, p. 8; O'Connor *et al.* 2009, p. 856).

Conservation Status

The medium tree-finch is identified as a critically endangered species under Ecuadorian law, Decree No. 3,516–Unified Text of the Secondary Legislation of the Ministry of Environment (ECOLEX 2003b). As of 2010, this poorly known species is considered "Critically endangered" by the International Union for Conservation of Nature (IUCN). This is because it (1) has a very small range, (2) is restricted to a single island, and (3) recent information suggests that it is declining rapidly due to the parasite *Philornis downsi.* (BLI 2010, p. 1).

In 1996, in a review of neotropical birds, Stotz *et al.* described the conservation priority for the medium tree-finch as "high." During this review, they defined this species as "threatened," which generally equated to range or habitat restriction, and already showing signs of serious population decline (1996, p. 262).

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR 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 listing 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. Below is an analysis of these five factors.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Floreana has the longest history of human habitation of any of the Galapagos Islands (Schofield 1989, p. 229; Fitter *et al.* 2000, p. 207). It was first settled in 1832, 3 years before Darwin's historic visit (Jackson 1985, p. 3; Stewart 2006, pp. 55, 68). With human settlement came changes to the habitat on Floreana, including clearing of native vegetation for agriculture and ranching, as well as the introduction of nonnative animals and plants (Grant *et al.* 2005, p. 501).

The medium tree-finch prefers to nest and forage in the tree *Scalesia pedunculata* (O'Connor *et al.* 2009, p. 856). Currently, *S. pedunculata* only occurs in small patches in the highlands of Floreana because much of the highlands have been cleared for agriculture, destroyed by introduced mammals, and outcompeted by invasive plants (O'Connor *et al.* 2008, p. 2). Although the Galapagos National Park covers 97 percent of the land in the Galapagos Islands, a disproportionate amount of the limited moist highlands falls in the remaining 3 percent (Stewart 2006, p. 105), meaning the majority of the medium tree-finch's habitat is unprotected. A large amount of the highlands has been cleared or altered for farming. Much of it has been further degraded or destroyed by the introduction of animals and plants (Stewart 2006, p. 105). Currently, only 12 to 17 km^2 (4.5 to 6.5 mi^2) of habitat for the medium tree-finch remains in the highlands of Floreana, and it continues to decline due to the factors described below.

Agriculture and Ranching

Birds, such as the medium tree-finch, are currently facing problems in the highlands of inhabited islands like Floreana due to the extensive destruction and degradation of habitat as a result of agriculture (Castro and Phillips 1996, pp. 22-23; Fitter *et al.* 2000, p. 74; BLI 2010). On Floreana, the highlands (or *Scalesia* zone) cover an area of approximately 21 km^2 (8 mi^2) (O'Connor *et al.* 2008, pp. 2-3). Within this highland forest, approximately 4 km^2 (1.5 mi^2) has been cleared for agriculture (O'Connor *et al.* 2008, p. 8). Agriculture is concentrated at higher elevations because of the availability of richer soil and greater moisture (Schofield 1989, p. 233). The *Scalesia* zone is the richest zone in terms of soil fertility and productivity (Jackson 1985, p. 61), and therefore has been extensively cleared for agricultural and cattle ranching purposes (Grant 1986, p. 30; Harris 1982, p. 37; Jackson 1985, pp. 61, 233). Stotz *et al.* (1996) found that the medium tree-finch forages in multiple strata, including the understory (p. 262). When the forest is cleared, as is done with agriculture and ranching, the understory layer is destroyed which, can have a negative effect on the species (Stotz *et al.* 1996, p. 121).

Introduced Species

Introduced species are currently considered a major threat to the native species of the Galapagos Islands (Causton *et al.* 2006, p. 121; Fitter *et al.* 2000, p. 218). Since the early 1800s, humans have introduced animals and plants to the Galapagos Islands that have threatened the native vegetation (Schofield 1989, pp. 227, 233). These are further discussed below.

Animals

When settlers arrived in the Galapagos Islands, they brought with them domestic animals, some of which escaped and started feral populations (Jackson 1985, p. 233). On Floreana, introduced livestock animals include goats (*Capra hircus*), donkeys (*Equus asinus*), cattle (*Bos taurus)*, and pigs (*Sus scrofa domesticus)* (Christensen and Kleindorfer 2008, pp. 383-391; Jackson 1985, p. 232). These animals impact the island by significantly altering the habitat. Goats and donkeys damage vegetation by trampling and grazing to the point where native plants are not able to regenerate as easily as before. Wild pigs dig up and eat plant roots. (Schofield 1989, pp. 229-233;

Grant *et al.* 2005, p. 501). This impact, in addition to predation of endemic species by introduced cats (*Felis catus*) and introduced black rats (*Rattus rattus*) (discussed under Factor C), have been linked with the extinction of at least four bird species on the island of Floreana: the large ground finch (*Geospiza magnirostris*), the sharp beaked ground finch (*Geospiza difficilis*), the Floreana mockingbird (*Nesomimus trifasciatus*) (Christensen and Kleindorfer 2008, pp. 383-391; Grant *et al.* 2005, p. 501; Harris 1982, pp. 36-37; Sulloway 1982, pp. 68-69, 88-89), and most recently the warbler finch (*Certhidea fusca*) (Grant *et al.* 2005, p. 501).

Introduced animals magnify the detrimental effects of clearing large areas of native vegetation on Floreana for agriculture and ranching (Grant 1986, p. 30), by further degrading and destroying the habitat (Grant *et al.* 2005, p. 501). The habitat of the medium tree-finch continues to be altered by herbivore degradation caused by free-ranging domestic livestock (BLI 2010; Jackson 1985, p. 110; Lawesson 1986, p. 12). Lawesson (1986) reported that the *Scalesia* forest on Floreana is under the most immediate threat from introduced animals (p. 13).

Goats: Of all the introduced animals in the Galapagos Islands, goats are the most destructive (Fitter *et al.* 2000, p. 218; Schofield 1989, p. 227). Goats were probably introduced to the Galapagos Islands in the 19th century by whalers, fisherman, and pirates, who were looking for an alternative source of meat (Charles Darwin Research Station 2008a; Fitter *et al.* 2000, p. 218). They were also brought to the islands by settlers as livestock (Charles Darwin Research Station 2008a). Goats are able to adapt to varying conditions extremely well and therefore they thrive at all elevations in the Galapagos Islands (Schofield 1989, p. 229), from the arid lowlands to the moist highlands (Fitter *et al.* 2000, p. 218). They have a rapid reproductive rate, which has allowed their population to flourish at the expense of native animals and vegetation (Jackson 1985, pp. 232-233). Goats destroy native vegetation by eating plants down to the ground (Smith 2005, p. 304), converting forests into barren grasslands and causing erosion (Charles Darwin Research Station 2008a). Because goats are able to eat a variety of vegetation, they have quickly eaten their way across an island (Smith 2005, p. 304). A study of goats on Santiago Island in the Galapagos showed that at higher elevations, browsing by goats had eliminated young trees of the dominant forest overstory species consisting of *Scalesia pedunculata, Zanthoxylum fagara,* and *Psidium galapageium*, in addition to the forest understory (Schofield 1989, p. 229). On Floreana, Schofield reported that approximately 77 percent of the plant species other than cacti were either reduced in number or completely eliminated by goats ((1989, p. 229). As discussed in detail below, however, eradication programs have significantly reduced the goat population on Floreana Island.

Cattle: Cattle were introduced to Floreana in 1832 (Hoeck 1984, as cited in Schofield 1989, p. 231). Initially, cattle were kept at lower elevations, but with inadequate moisture available in the lower zones, they were allowed to move into the highlands (Kastdalen 1982, p. 9). Cattle trample and heavily graze native vegetation (Hamann 1981 and Van der Werff 1979, as cited in Schofield 1989, p. 231). When allowed to roam freely through highland forests, they essentially destroy the understory layer (Stotz *et al.* 1996, p. 121). On Santa Cruz Island, cattle inhibited growth of *Scalesia pedunculata* (Kastdalen 1982, p. 8). Schofield (1989) reports that no organized effort has been made to eliminate cattle, but restrictions by the Galapagos National Park Service encourage ranchers to fence in herds on Floreana (p. 232). However, cattle still stray into native vegetation to graze (Schofield 1989, pp. 232, 234).

Donkeys: In 1887, large numbers of donkeys (*Equus asinus*) were seen grazing on hillsides and at the summit on Floreana (Slevin 1959, as cited in Schofield 1989, p. 232). By 1932, donkeys had already tramped out regular paths through the vegetation on Floreana (Wittmer 1961, as cited in Schofield 1989, p. 232). On Santa Cruz, Kastdalen (1982) noted that they followed cattle into the humid highlands (p. 9). Studies have shown that donkeys on Floreana have depleted some populations of *Scalesia* spp. and *Alternanthera nesiotes*, another endemic plant (Eliasson 1982, p. 10). As discussed in detail below, however, eradication programs have significantly reduced the donkey population on Floreana Island.

Pigs: Pigs (*Sus scrofa*) have lived in the Galapagos Islands for over 150 years (Schofield 1989, p. 232). In 1835, Darwin remarked upon the many wild pigs he observed in the forests on Floreana (Schofield 1989, p. 232). Pigs live primarily at higher elevations, where abundant forage is available year-round (Schofield 1989, p. 232). Pigs destroy native vegetation (Jackson 1985, p. 233) directly by digging up and eating plants (Hoeck 1984, as cited in Schofield 1989, p. 232).

Eradication Programs: Since the Galapagos National Park and the Charles Darwin Foundation were established in 1959, efforts to control and eradicate introduced animals have been ongoing (Galapagos Conservancy n.d.(a)). In 1965, the Charles Darwin Research Station began the first eradication program to rid the Galapagos island of Santa Fé of goats (Fitter *et al.* 2000, p. 218). Ten years after the program began, the last goat was culled and now, the vegetation on the island has recovered and native species are beginning to thrive once again (Fitter *et al.* 2000, p. 218). Over the years, many of these control programs have been successful in eradicating introduced animals from some of the Galapagos Islands including ridding Santiago Island of 25,000 feral pigs (Smith 2005, p. 305), removing goats from Española, Plaza Sur, Santa Fe, Marchena and Rábida Islands (Smith 2005, p. 305), and the very successful "Project Isabela," which recently eliminated goats from Pinta, donkeys and goats from northern Isabela, and donkeys, goats, and pigs from Santiago Island (Galapagos Conservancy n.d.(b)).

As a result of the success of Project Isabela, the Charles Darwin Foundation is planning and implementing several projects in partnership with the Galapagos National Park Service, including eradication of goats and donkeys from Floreana (Charles Darwin Foundation n.d.(c)). In December 2006, the Galapagos National Park started a project with the goal of restoring the ecology of Floreana (Galapagos Conservation Trust News 2007). The first phase of "Project Floreana" was to eradicate some of the introduced animals, such as goats and donkeys, in order to stop the continuing degradation of the vegetation of the island and allow some of the native and endemic plant species to recover (Galapagos Conservation Trust News 2007). From the experience gained during Project Isabela, the program was able to eradicate 98 percent of the donkeys and goats on Floreana in 22 days (Galapagos Conservation Trust News 2007). Due to the removal of these invasive species, it is expected that within the next few years the benefits to the ecosystem on Floreana will be seen (Galapagos Conservation Trust News 2007). This will result in an increase in native flora and fauna, and the repopulation of native flora and fauna in areas previously destroyed on Floreana by herbivore degradation (Galapagos Conservation Trust News 2007).

Plants

On Floreana, small populations of *Scalesia* forest still exist in the highlands, but these areas are under pressure and competition from agriculture and the aggressive *Psidium guajava* (guava) and *Lantana camara* (Lawesson 1986, p. 13). Introduced plants outcompete native vegetation, taking sun, water, and nutrients from native species (Smith 2005, p. 304). Agriculture is concentrated at higher elevations because of the rich soil and moisture available in these areas. As a result, escapes by introduced agricultural plants are more frequently found in the humid highland forests (Schofield 1989, p. 233). Schofield found that accidental escape of introduced plant species, as well as the purposeful introduction of these species, has altered the highland habitat where tree-finches occur (1989, pp. 233-235). Christensen and Kleindorfer found that the medium tree-finch frequently forages on introduced fruit species (2008, pp. 383-391). This observation may suggest that the species is able to adapt to and potentially benefit from this change in its environment (Christensen and Kleindorfer 2008, pp. 383-391). These researchers did not observe any species of tree-finch, including the medium tree-finch, nesting in an introduced plant species (Christensen and Kleindorfer 2008, pp. 383-391). However, a further study by O'Connor *et al.* (2008, p. 17) found that the majority (99 percent) of nests built by medium tree-finches were constructed in native species, *Scalesia pedunculata* (83 percent), *Zanthoxylum fagara* (14 percent), and *Croton scouleri* (2 percent), with 1 percent of the nests built in the introduced species, guava.

Guava: The cultivated guava, with its edible fruits, is the most widespread introduced plant species in the Galapagos Islands (Schofield 1989, p. 233). Guava has been characterized as out of control and invading vast areas of native vegetation in the humid highlands on Floreana (Eckhardt 1972, p. 585; Eliasson 1982, p. 11; Tuoc 1983, p. 25). It is an aggressive introduced plant that covers 8,000 ha (19,768 ac) on Floreana (Parque Nacional Galápagos n.d(a)). The dispersal of guava is aided by introduced cattle, which eat the fruits and then wander from the farm into the National Park and excrete the seeds in their dung (De Vries and Black 1983, p. 19; Tuoc 1983, p. 25). In addition, as cattle graze, they trample other vegetation, providing the open spaces and abundant light needed for the germination of guava seeds (Van der Werff 1979, as cited in Schofield 1989, p. 233). Once guava becomes established in an open habitat, it grows quickly and shades seedlings of native species like *Scalesia pedunculata*, thus preventing their growth (Parque Nacional Galápagos n.d.(a); Perry 1974, p. 12).

One obvious step to take in order to minimize the further spread of guava is to fence cattle (De Vries and Black, p. 19; Tuoc 1983, p. 25). Although some residents have already done this, herds of free-ranging cattle are unable to be restricted in this manner (Schofield 1989, pp. 233-234). In 1971, a campaign was started to cut down guava trees on Santa Cruz Island (Schofield 1989, p. 234). One report indicated that over 95,000 guava trees had been eliminated between 1980 and 1981 (Tuoc 1983, p. 25). Schofield suggested that this program should be expanded to other islands with large populations of guava ((1989, p. 234).

Other Plant Species: Floreana is also impacted by other introduced plant species. *Lantana camara* was introduced as an ornamental on Floreana in 1832, and now covers 3,000 ha (7,413 ac) (Parque Nacional Galápagos n.d.(a)). A quickly spreading tropical shrub, that displaces native vegetation, it is now found on Floreana from the arid region up to the Scalesia forest (Hamann 1984, as cited in Schofield 1989, p. 234). Citrus trees (*Citrus* spp.) have been reported as "common" (Eliasson 1982, p. 11) and have invaded the native vegetation at higher elevations on Floreana (Eliasson 1982, p. 11; Porter 1973, p. 276). Cattle and pigs aide in the further spread of citrus trees (*Citrus spp.*) by feeding on the fruits and dispersing seeds in new locations (Wittmer 1961, as cited in Schofield 1989, p. 234).

Summary of Factor A

The medium tree-finch is found primarily in the moist highland forests (i.e., the *Scalesia* zone) on the island of Floreana. Since the island was first settled in 1832, the habitat of the medium tree-finch has been cleared for agriculture and ranching, and further degraded by introduced animals and plants. Herbivores, such as goats, donkeys, cattle, and pigs, destroy the species' habitat by trampling and grazing heavily on native vegetation, including *Scalesia pedunculata*, the tree primarily used by the medium tree-finch for nesting and foraging. In addition, cattle and pigs help to spread introduced plants, such as guava and citrus trees, by feeding on the fruits and depositing the seeds into native vegetation. Although an eradication program was started in December 2006 to eliminate goats and donkeys from Floreana, we are not aware of any current programs to remove cattle and pigs from the island. As a result, these species will continue to destroy and degrade the habitat of the species. Therefore, we find that the medium tree-finch is at significant risk by the habitat destruction of the moist highland forests of Floreana, as a result of agriculture and introduced species.

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

We are not aware of any scientific or commercial information that indicates that overutilization of the medium tree-finch for commercial, recreational, scientific, or educational purposes poses a threat to this species. There is no known use by collectors or hunters of this species. A comment received on the proposed rule suggested that tourist visitation to the Scalesia highlands (the preferred habitat of the Medium Tree finch) increased more than tenfold since 2004. The commenter indicated that there has been an increase in the number of bus rides and highland tours. However, no corroborating data was provided with the comment. A UNESCO 2007 report on the Galapagos Islands did indicate that visitation has grown in Galapagos from 40,000 in 1991 to over 120,000 in 2006 (pp. 9-10). This included all Galapagos islands, and the increase mentioned an increase in tourist boats. There was no specific mention of Floreana Island. According to this report, tourism is being monitored at many levels in Ecuador. The unintended negative effects are recognized and are being addressed (UNESCO 2007, Annex 3, pp. 1-3). Although tourism may be increasing on Floreana Island, a review of the best available information does not indicate that tourism is a threat to this species. As a result, we are not considering overutilization a contributing factor to the continued existence of the medium tree-finch.

C. Disease or Predation

Disease

The discovery of an introduced parasitic fly (*Philornis downsi*) on Floreana Island has raised significant concerns about the impact this parasite is having on the medium tree-finch (Fessl *et al.* 2006b, p. 59; Wiedenfeld *et al.* 2007, p. 17; Dudaniec *et al.* 2008; O'Connor *et al.* 2009, p. 853). This parasite was recently added to the IUCN's Global Invasive Species Database (O'Connor *et al.* pp 864-865). In March 1997, Fessl, Couri, and

Tebbich first observed the presence of *P. downsi* in the nests of Darwin's finches on the Galapagos Islands (Fessl and Tebbich 2002, p. 445). Since then, researchers have found that *P. downsi* may cause up to 100 percent mortality to exposed nestlings (Dudaniec and Kleindorfer 2006, p. 17). This parasite is believed to be the most significant threat to the medium tree-finch (Causton *et al.*, 2006; p. 125; O'Connor *et al.* 2009, p. 853).

P. downsi was sampled by the entomologists S.B. and J. Peck and B.J. Sinclair in 1989, although the fly was not formally identified until the collections were examined in detail in 1998 (Fessl *et al.* 2001, p. 318; Fessl and Tebbich 2002, p. 445). However, it now appears that *P. downsi* was present in the Galapagos Islands at least 40 years ago. It was recently identified from collections made on Santa Cruz Island in 1964 (Causton *et al.* 2006, pp. 134, 143). We are not aware of any information indicating when *P. downsi* may have been introduced to the island of Floreana.

P. downsi is a fly (Muscidae) from a genus of obligate bird parasites (Couri 1985, as cited in Fessl and Tebbich 2002, p. 445; Fessl *et al.* 2001, p. 317), and depends on a host for its survival. The adult fly is free-living, non-parasitic, and feeds on fruits, flowers, and decaying material (Fessl *et al.* 2001, p. 317; Fessl *et al.* 2006b, p. 56). Larvae of *P. downsi* belong to the group of external blood feeders – first, second, and third instar (developmental stage) larvae are haematophages which suck blood from nestlings at night and then retreat to the bottom of the nest during the day (Dodge and Aitken 1968 and Skidmore 1985, as cited in Fessl *et al.* 2006b, p. 56). Adult flies lay eggs inside the nasal cavities of newly hatched nestlings (usually one to three days old). These fly eggs then hatch into first instar larvae (Fessl *et al.* 2006a, p. 744; Muth 2007, as cited in Dudaniec at al. 2008). As the larvae reach their second instar stage, they exit the nasal cavities of nestlings and begin to live as nest-dwelling haematophagous larvae (Fessl *et al.* 2006a, p. 744). Second and third instar larvae of *P. downsi* seem to be exclusively external (Fessl *et al.* 2006b, p. 59), feeding on the blood and tissues of nestlings (Dudaniec and Kleindorfer 2006, pp. 15-16). The majority of larvae reach their third instar stage at the time of host fledging (Dudaniec at al. 2008, p. 5). At this stage, the larvae of *P. downsi* detach from the nestling and form their pupae at the bottom of the nesting material, remaining for approximately 2 weeks before emerging as adult flies (Dudaniec and Kleindorfer 2006, p. 16; Fessl *et al.* 2006b, p. 56).

P. downsi occurs in finch nests on Floreana (Wiedenfeld *et al.* 2007, p. 17), and has been shown to significantly lower fledgling success of the finches (Fessl and Tebbich 2002, pp. 448-450). A number of studies have associated *Philornis spp.* parasitism with mortality (Fessl and Tebbich 2002, p. 448), and reductions in nestling growth and development (Fessl *et al.* 2006b, p. 58), and a reduction in hemoglobin levels (Dudaniec *et al.* 2006, p. 88). In Causton *et al.*'s proposed ranking system, *P. downsi* was given the highest invasiveness ranking affecting fauna endemic to the Galapagos Islands, because this insect seriously impacts species of high conservation value in the Galapagos (Causton *et al.* 2006, pp. 123, 134). The ranking system was based on species' trophic functional role, distribution in Galapagos, and history of invasiveness in areas other than the Galapagos Islands.

In 2002, 97 percent of finch nests were infected with the *P. downsi* parasite on Santa Cruz Island, both in the lower arid zone and the higher *Scalesia* zone of the island (Fessl and Tebbich 2002, p. 449). Parasitism by *P. downsi* caused complete brood loss in approximately 19 percent of the infected finch nests and partial brood loss (defined as the loss of one or two nestlings) in an additional 8 percent of the finch nests studied (Fessl and Tebbich 2002, p. 448). They also found that in parasitized nests, the percentage of successful fledglings differed significantly depending upon brood size: Nests with only one nestling always failed, nests with two nestlings successfully fledged nestlings 50 percent of the time, and nests with three or four nestlings successfully fledged nestlings 75-85 percent of the time (Fessl and Tebbich 2002, p. 448).

In 2006, nesting success in the medium tree-finch was examined for the first time (Fessl *et al.* 2006a, p. 746). In an experimental study conducted on Santa Cruz Island, researchers found that high mortality of nestlings was directly attributable to parasitism by *P. downsi*, as evidenced by a near threefold increase in fledgling success in a parasite-reduced group (87 percent) versus a parasite-infested control group (34 percent) (pp. 58-59). They also found that within four days, mass gain was significantly higher (an almost twofold positive difference) in the parasite-reduced group than in the parasite-infested control group (Fessl *et al.* 2006b, p. 58). In studies of other avian species, fledgling body mass has been found to be a key factor for juvenile survival (Magrath 1991, pp. 343-344; Tinbergen and Boerlijist 1990, pp. 1123-1124). As a result, Fessl *et al.* (2006b, p. 59) concluded that the results of their study showed that given the significant difference in body mass between the two groups, parasitized nests will likely provide less recruitment into the breeding population. Further, because species with small broods have been found to suffer higher parasite loads and higher nestling mortality (Fessl and Tebbich 2002, pp. 445, 449-450), infestation of *P. downsi* on species with naturally low clutch sizes, such as the medium tree-finch, is of particular concern (Fessl *et al.* 2006b, p. 59).

Dudaniec *et al.* found a significant negative correlation between *P. downsi* parasite intensity and hemoglobin concentrations (2006, pp. 88, 90, 92). She also found a positive correlation between parasite intensity and immature red blood cell counts in small ground finches studied on Santa Cruz and Floreana Islands. Small ground finch nestlings with higher *P. downsi* densities suffered from lower hemoglobin concentrations and reduced fledging success (Dudaniec *et al.* 2006, p. 92). Furthermore, nestlings with lower parasite intensity had higher hemoglobin levels and increased fledging success (Dudaniec *et al.* 2006, p. 93). The same researchers also found a negative correlation between the number of immature red blood cells and hemoglobin levels in nestlings (2006, p. 92). The fitness impacts to nestlings of lower hemoglobin levels are significant (Dudaniec *et al.* 2006, p. 93). Other researchers found that 6 of 63 monitored nests produced fledglings (O'Connor *et al.* 2008, p. 1). The results of another study showed that low hemoglobin levels in nestlings reduce the transport of oxygen to tissues (O'Brien *et al.* 2001, p. 75).

Thus, fledglings that are anemic (hemoglobin deficient) from parasite feeding may have a reduced ability to sustain flight and consequently a reduced ability to escape predators and find food (O'Brien *et al.* 2001, p. 75). The high hemoglobin levels found by Dudaniec *et al.* in mature birds, combined with their observation that adult finches were never found to be actively parasitized, suggests that adult birds are not physiologically affected by *P. downsi* (2006, p. 92). Fessl *et al.* reported extremely high levels of blood loss in nestlings (18 to 55 percent) caused by *P. downsi* larvae ((2006a, p. 745). Daily blood loss over 10 percent is likely to have negative impacts on nestlings, including health problems and developmental deficiencies, while

blood loss over 25 percent would become lethal (Kaneko, pers. comm., as cited in Gold and Dahlsten 1983, p. 569).

Another study of tree-finches in the highlands of Floreana showed that the medium tree-finch had the highest *P. downsi* parasite intensity (an average of 52 parasites per nest), compared to the small and large tree-finches (O'Connor *et al.* 2009, pp. 853–866). Of 63 active medium tree-finch nests, only 16 nests had nestlings that survived to six days post-hatching, and only 4 nests produced fledglings (O'Connor *et al.* 2009, pp. 853-866). Most nests failed to produce fledglings: Approximately 68.8 percent (11 of 16) of medium tree-finch nests suffered total brood loss, while 18.8 percent (3 of 16) of nests had partial brood loss (O'Connor *et al.* 2009, pp. 853-866). *P. downsi* larvae or pupae were found in 100 percent (16 of 16) of medium tree-finch nests, and all nestlings had *P. downsi* parasites (O'Connor *et al.* 2009, pp. 853-866). The majority (54 percent) of nestling mortality in medium tree-finches was due to parasitism by *P. downsi* (O'Connor *et al.* 2009, pp. 853-866). All nestlings found dead in nests had large open wounds on their bodies and significant loss of blood or body fluids, all of which are signs of *P. downsi* parasitism (O'Connor *et al.* 2009, pp. 853-866). O'Connor *et al.* discuss the reasons why the *P. downsi* parasite intensity is high in the medium tree-finch (2009, pp. 853-866). One possible explanation is that the medium tree-finch's preferred breeding habitat is next to an agricultural area, where the close proximity of the agriculture fields (with citrus trees and other fruits) act as a feeding location for the adult flies (O'Connor *et al.* 2009, pp. 853-866). In addition, moist highlands favor consistent breeding of medium tree-finches, thus providing flies with a dependable supply of nestlings for *P. downsi* larvae to feed upon (O'Connor *et al.* 2009, pp. 853-866). Currently, the medium tree-finch has the highest *P. downsi* parasite intensity of any finch species on Floreana, and the second highest of any finch species studied on the Galapagos Islands (O'Connor *et al.* 2009, pp. 853-866).

A study by Wiedenfeld *et al.* (2007) found that there was a significant increase in the number of *P. downsi* parasites (larvae, pupae, or puparia) per nest at higher altitudes (i.e., in the humid highlands) (pp. 17-18). According to their study, the distribution of *P. downsi* seems to be related to the amount of humidity and moisture available on the islands (Wiedenfeld *et al.* 2007, p. 18). Although it appears that the fly does more poorly in dry conditions (either in the lowland, arid zone of islands, or during drought), birds similarly do more poorly in these situations (Wiedenfeld *et al.* 2007, p. 18). In addition, during years of abundant rainfall when birds breed more successfully, the flies are also likely to be more plentiful and therefore, can cause higher mortality (Wiedenfeld *et al.* 2007, p. 18).

Researchers believe that finches do not suffer from any type of endemic haematophagous ectoparasite (Fessl *et al.* 2006b, p. 56). Therefore, medium tree-finches have not developed an adaptive response to this kind of introduced pathogen (Altizer *et al.* 2003, pp. 593, 594). Because the medium tree-finch is newly parasitized by *P. downsi*, it may experience significant initial mortality since the host has not yet developed a strong behavioral or immunological defense mechanism against the parasite (Dudaniec and Kleindorfer 2006, pp. 18-19).

As many of the above studies show, finches have a slim chance of reproducing without avoiding effects of *P. downsi* mortality (Dudaniec and Kleindorfer 2006, p. 18; Wiedenfeld *et al.* 2007, p. 18). Researchers suggest that the decline and possible local extinction of one of Darwin's finches, the warbler finch (*Certhidea fusca*), on Floreana by 2004 may have been partially caused by *P. downsi* although there is no conclusive evidence (Grant *et al.* 2005 p. 502; Fessl *et al.* 2006b, p. 59; Dudaniec and Kleindorfer 2006, p. 13).

Although it is better to eliminate invasive species before they are able to genetically adapt to the local environment in which they have colonized (Frankham 2005, p. 385), early eradication often does not occur. A long-term eradication program in conjunction with continuous quarantine and monitoring practices is needed to eradicate *P. downsi* (Dudaniec *et al.* 2008).

Programs to eradicate *P. downsi* from the Galapagos Islands are difficult and costly (Fessl *et al.* 2006b, p. 59). Fessl *et al.* (2006b, pp. 57-59) found that a single insecticide treatment of 1 percent pyrethrin solution (done at a nestling age of 4 days) was sufficient to reduce the number of parasites per nest to almost zero. This treatment offers one short-term solution to locally protect single nests of species of high conservation concern (Fessl *et al.* 2006b, p. 59). However, this treatment is not feasible as a long-term solution for controlling the fly on the Galapagos Islands.

The Charles Darwin Foundation (CDF) has begun an effort to develop biological control approaches for *P. downsi* (Charles Darwin Foundation n.d.(c)). In 2008, CDF received $58,000 for Phase I of the CDF Priority Project "Control of the parasitic fly *P. downsi*" (Charles Darwin Foundation 2008b, 2008c). This project studies the biology and life history of *P. downsi*, aiding in the development of effective, long-term control methods that will not harm other species (Charles Darwin Foundation 2008b). CDF reports that control methods are urgently needed to eliminate the threat of extinction among bird species, such as the medium tree-finch, affected by this parasite (Charles Darwin Foundation 2008b). A recent study reported that sterile insect technique (SIT) may be effective in controlling this parasite (Dudaniec *et al.*, 2010, p. 582); however, it has not been fully tested.

Predation

Floreana has a suite of introduced predators including black rats (*Rattus rattus*) and cats (*Felis catus*) (O'Connor *et al.* 2009, pp. 864). These predators feed on eggs, nestlings, and even adult birds (Castro and Phillips 1996, p. 22), and have seriously depleted native populations (Grant *et al.* 2005, p. 501; Jackson 1985, p. 232).

Rats: Second only to the parasitic fly (*Philornis downsi*), black rats are one of the worst introduced species to the Galapagos Islands. They destroy bird nests and eggs and consume hatchlings (Charles Darwin Foundation 2008d; Charles Darwin Research Station 2008b). Rats arrived in the Galapagos Islands on ships beginning in the late 1600s, and currently are found on all inhabited islands, including Floreana (Charles Darwin Research Station 2008b). Because rats can easily climb, they have been implicated in the population declines of tree nesting birds such as the mangrove finch (*Camarhynchus heliobates*) (Charles Darwin Research Station 2008b). The CDF's long term plan is to successfully eradicate introduced rats on all islands, a necessary measure in order to restore the Galapagos Islands and its endemic species (Charles Darwin Research Station 2008b). One of the next steps in accomplishing this goal is to develop the capacity to attempt a rat eradication program on large islands such as Floreana (Charles Darwin Research Station 2008b).

Cats: Cats are highly predatory animals, targeting birds and other native species (Charles Darwin Foundation 2008b; Charles Darwin Research Station 2008c; Smith 2005, p. 304). Cats were introduced to the Galapagos Islands by ships and as domestic pets of settlers

(Charles Darwin Research Station 2008c). Both feral and domestic cats prey upon and impact the survival of Darwin's finches, and are a threat to endemic species on Floreana (Charles Darwin Research Station 2008c). In the 19th century, cats may have caused significant declines in the populations of large ground finches, sharp-beaked ground finches, and mockingbirds, pushing them toward extinction on Floreana (Grant *et al.* 2005, p. 501). All three species mostly forage on the ground and are approachable (Grant *et al.* 2005, p. 501). However, the more arboreal finches, such as the medium tree-finch, may be less vulnerable to predation by cats, unless their nests are constructed unusually low in the vegetation (Grant *et al.* 2005, p. 501). The Galapagos National Park Service and the CDF are working to control and eradicate domestic and feral cats on all of the islands (Charles Darwin Research Station 2008c). This plan includes working with communities to gain acceptance and compliance with the sterilization or removal of domestic cats, and the development of an eradication program to eliminate feral cats from natural areas on all populated islands, such as Floreana (Charles Darwin Research Station 2008c).

A study of tree-finches in the highlands of Floreana found that one third of medium tree-finch nests experienced nestling predation in both 2006 and 2008. Egg depredation was observed in 22 percent of the nests (but only in 2008) (O'Connor *et al.* 2009, pp. 853-866). Predators such as rats feed on agricultural products being grown in the agricultural areas. Because agricultural areas are close to the breeding sites of the medium tree-finch, these areas provide a base for the continued persistence and movement of introduced predators, mainly rodents, into medium tree finch habitat (O'Connor *et al.* 2009, pp. 853-866).

Summary of Factor C

As stated above, we believe, based on an abundance of research, that *Philornis downsi*, the introduced parasitic fly, is the most significant threat to the survival of the medium tree-finch (Causton *et al.*, 2006 as cited in O'Connor *et al.* 2009, p. 854). The larvae feed on finch nestlings, causing mortality, reduced nestling growth, lower fledgling success, and a reduction in hemoglobin levels, which all combine to severely affect the reproductive success of the species. The medium tree-finch has the highest *P. downsi* parasite intensity of all the finch species found on Floreana, and the second highest rate of parasitism by *P. downsi* of any finch species studied in the Galapagos Islands. Although a study examining the biology of *P. downsi* and how to control it began in 2008, a long-term (and wide-spread) control method for the parasitic fly has not yet been developed. As a result, the medium tree-finch and its reproductive success will continue to be negatively impacted by *P. downsi*. Therefore, we find that parasitism by *P. downsi* is a significant threat to the continued existence of the medium tree-finch.

Introduced predators on Floreana, such as black rats and cats, feed on eggs and nestlings, causing dramatic reductions in native populations. One study found that 33 percent of medium tree-finch nests experienced nestling predation; and egg depredation was observed in 22 percent of the nests. In an effort to help restore endemic species in the Galapagos Islands, one goal of CDF is to develop programs to eradicate introduced rats and cats on all islands. However, we do not have information to indicate that the eradication program has been completed on Floreana island. Therefore, we find that predation is a threat to the continued existence of the medium tree-finch.

D. Inadequacy of Existing Regulatory Mechanisms

The medium tree-finch is identified as a critically endangered species under Ecuadorian law and Decree No. 3,516–Unified Text of the Secondary Legislation of the Ministry of Environment of 2002 (ECOLEX 2003b). Decree No. 3,516 of 2002 summarizes the legislation governing environmental policy in Ecuador and provides that the country's biodiversity be protected and used primarily in a sustainable manner (ECOLEX 2003b). Appendix 1 of Decree No. 3,516 lists the Ecuadorian fauna and flora that are considered threatened or in danger of extinction. Species are categorized as critically endangered (En peligro crítico), endangered (En peligro), or vulnerable. Resolution No. 105–Regulatory control of hunting seasons and wildlife species in the country, and Agreement No. 143–Standards for the control of hunting seasons and licenses for hunting of wildlife, regulate and prohibit commercial and sport hunting of all wild bird species except those specifically identified by the Ministry of the Environment or otherwise permitted (ECOLEX 2000; ECOLEX 2003a). The Ministry of the Environment does not permit commercial or sport hunting of the medium tree-finch because of its status as a critically endangered species (ECOLEX 2003b). However, we do not consider hunting (Factor B) to be a risk to the medium tree-finch since it is not known to have ever been hunted. Although this law does not reduce any threats to the species, hunting is not a threat to the species, so it is not applicable.

The first legislation to specifically protect the Galapagos Islands and its wildlife and plants was enacted in 1934 and further supplemented in 1936, but effective legislation was not passed until 1959, when the Ecuadorian government passed new legislation declaring the islands a National Park (Fitter *et al.* 2000, p. 216; Jackson 1985, pp. 7, 230; Stewart 2006, p. 164). Ecuador designated 97 percent of the Galapagos land area as the National Park, leaving the remaining 3 percent distributed between the inhabited areas on Santa Cruz, San Cristóbal, Isabela, and Floreana Islands (Jackson 1985, p. 230; Schofield 1989, p. 236). National park protection, however, does not mean the area is maintained in a pristine condition. The park land area is divided into various zones signifying the level of human use (Parque Nacional Galápagos n.d(b)). Although Floreana Island includes a large "conservation and restoration" zone, it also includes a significantly sized "farming" zone (Parque Nacional Galápagos n.d.(b)), where agricultural and grazing activities continue to impact the habitat.

In March 1998, the National Congress and the Ecuadorian President enacted the Law of the Special Regimen for the Conservation and Sustainable Development of the Province of the Galapagos, which has given the islands some legislative support to establish regulations related to the transport of introduced species and implement a quarantine and inspection system (Causton *et al.* 2000, p. 10; Instituto Nacional Galápagos n.d.; Smith 2005, p. 304). As a result, in 1999, the Inspection and Quarantine System for Galapagos (SICGAL) was implemented (Causton *et al.* 2006, p. 121), with the aim of preventing introduced species from reaching the islands (Causton *et al.* 2000, p. 10; Charles Darwin Foundation n.d.(d)). Inspectors are stationed at points of entry and exit in the Galapagos Islands and Continental Ecuador, where they check freight and luggage for permitted and prohibited items (Charles Darwin Foundation n.d.(d)). The goal is to rapidly contain and eliminate newly arrived species (detected by SICGAL and early warning monitoring programs) that are considered threats for the Galapagos Islands (Causton *et al.* 2006, p. 121). However, a scarcity of information on alien insect species currently in the Galapagos Islands prevents officials from knowing whether or not a newly detected insect is in fact

a recent introduction (Causton *et al.* 2006, p. 121). Without the necessary information to make this determination, they cannot afford to spend the time and resources on a rapid response when the "new introduction" is actually a species that already occurs elsewhere in the Galapagos Islands (Causton *et al.* 2006, p. 121).

The April 2007 World Heritage Centre-IUCN monitoring mission report assessed the state of conservation in the Galapagos Islands. Based on information gathered during their monitoring mission and multiple meetings, they found continuing problems with regulatory mechanisms in the Galapagos Islands (UNESCO World Heritage Centre 2007, pp. 9-10). The UNESCO World Heritage Centre indicated that there is a continuing lack of political will, leadership, and authority and it is a limiting factor in the full application and enforcement of the Special Law for Galapagos. They also reported that there appears to be a general lack of effective enforcement (UNESCO World Heritage Centre 2007, p. 9).

The risk from invasive species is rapidly increasing, while the Agricultural Health Service of Ecuador (SESA) and SICGAL have inadequate staff and capacity to deal with the nature and scale of the problem (UNESCO World Heritage Centre 2007, p. 9). SICGAL estimates that 779 invertebrates [interpreted as 779 individuals] entered the Galapagos Islands via aircraft in 2006 (UNESCO World Heritage Centre 2007, p. 9). In addition, the staff of the Galapagos National Park lack the capacity and facilities for effective law enforcement (UNESCO World Heritage Centre 2007, pp. 9-10).

Previous UNESCO-IUCN Galapagos mission reports (in 2005 and 2006) to the World Heritage Committee have consistently outlined major threats to the long-term conservation of the Galapagos Islands, including the introduction of non-native plant and animal species, and the inability to apply laws (UNESCO World Heritage Centre News 2007b). UNESCO World Heritage Centre reports that despite an excellent legal framework, national government institutions encounter difficulties in ensuring its full application (UNESCO World Heritage Centre News 2007b).

The Galapagos Islands were declared a World Heritage Site (WHS) under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1978 (UNESCO World Heritage Centre n.d.(a)), as they were recognized to be "cultural and natural heritage of outstanding universal value that needs to be protected and preserved" (UNESCO World Heritage Centre n.d.(b)). The aim of establishment as a WHS is conservation of the site for future generations (UNESCO World Heritage Centre 2008). However, in June 2007, due to threats to this site posed by introduced invasive species, increasing tourism, and immigration, the World Heritage Committee placed the Galapagos on the "List of World Heritage Sites in Danger." Placement on this list is intended to increase support for a site's conservation (UNESCO World Heritage Centre News 2007a). In March 2008, the UNESCO World Heritage Centre/United Nations Foundation project for invasive species management provided funding of 2.19 million U.S. dollars (USD) to the Ecuadorian National Environmental Fund's "Galapagos Invasive Species" account to support invasive species control and eradication activities on the islands (UNESCO World Heritage Centre News 2008). In addition, the Ecuador government previously had contributed 1 million USD to this fund (UNESCO World Heritage Centre News 2008), demonstrating the government of Ecuador's commitment to reducing the threat of invasive species to the islands.

Summary of Factor D

Ecuador has developed numerous laws and regulatory mechanisms to manage wildlife in the Galapagos Islands. The medium tree-finch is listed as critically endangered under Ecuadorian law. Ninety-seven percent of the land in the Galapagos Islands is designated as the National Park. Some of this park land on Floreana is identified as a "farming" zone, where agricultural and grazing activities continue to threaten the habitat of the species. Although tourism is a problem generally throughout the Galapagos Islands, it was not found to be a specific threat to this species. Additional regulations have created an inspection and quarantine system in order to prevent the introduction of nonnative species, but are not being effectively enforced. Additionally, this program does little to eradicate species already introduced to the Galapagos Islands. Therefore, we find that the existing regulatory mechanisms currently in place are inadequate for the conservation of this species.

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

This species exists on a single island with decreasing available habitat. The population is believed to be between 1,000 and 2,499 individuals and decreasing in size. Small, declining populations are vulnerable to demographic stochasticity. 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, and 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 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 (Shaffer 1981, p. 131; Charlesworth and Charlesworth 1987, p. 231). 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) (Mangel and Tier 1994, p. 612; Young 1994, pp. 410-412; Dunham *et al.* 1999, p. 9).

The population size is significant because critically small and declining populations such as that of the medium tree finch face higher extinction risk than large, stable populations. Therefore, this species may be more vulnerable to extinction relative to other species with larger, more stable population sizes facing similar threats. Small, declining populations of wildlife species may be 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.

Various past and ongoing human activities and their secondary influences continue to impact all of the remaining suitable habitats that may still harbor the medium tree-finch (see Factor A). We expect that any additional loss or degradation of habitats that are used by the medium tree-finch will have disproportionately greater impacts on the species due to the population's small and declining population size.

We expect that the medium tree-finch'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 (Gilpin and Soulé 1986, pp. 25-26). For example, any further decrease of the populations will, by definition, result in the further removal of individuals, which will exacerbate the other threats.

Small, declining populations such as the medium tree-finch may 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 and declining, it is likely that demographic stochasticity or inbreeding may 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 medium tree-finch's population makes it susceptible to natural environmental variability or chance events. In addition to its declining numbers, the high level of parasitism by *P. downsi* makes the species more susceptible to genetic and demographic stochasticity. Therefore, we find that demographic stochastic events are an additional threat to the continued existence of the medium tree-finch.

Determination for the Medium Tree-finch

We have carefully assessed the best available scientific and commercial information regarding the past, present, and potential future threats faced by the medium tree-finch. The species is currently at risk throughout all of its range, primarily due to the immediate and ongoing threat of the introduced parasitic fly *Philornis downsi*. The clearing of native vegetation for agriculture, the destruction and degradation of habitat caused by introduced animals and plants (Factor A); disease and predation, particularly by the parasitic fly (Factor C); inadequate existing regulatory mechanisms (Factor D); and small population size (Factor E) are threats to this species.

Philornis downsi is the most severe threat to the survival of the medium tree-finch (Causton *et al.* 2006). As shown in numerous studies (Fessl and Tebich 2002, Dudaniec *et al.* 2006, Fessl *et al.* 2006b, O'Connor *et al.* 2009, and Dudaniec *et al* 2010), the fitness costs of *P. downsi* parasitism in finches is severe, with high incidences of nestling mortality. This parasite causes lower fledgling success, reduced nestling growth, and a reduction in hemoglobin levels (i.e. anemia) in nestlings. Currently, the medium tree-finch has the highest *P. downsi* parasite intensity of all the finch species found on Floreana, and the second highest of any finch species studied in the Galapagos Islands (O'Connor *et al.* 2009, pp. 853-866). These researchers also found *P. downsi* in 100 percent of medium tree-finch nests, causing parasitism of all nestlings (2009, pp. 853-866). Their study found that only 6.3 percent of active medium tree-finch nests produced fledglings, with the majority (54 percent) of nestling mortality caused by *P. downsi* parasitism. With severely low reproductive success, the medium tree-finch is likely to provide very little recruitment into the breeding population. Since finches are not known to suffer from a similar type of endemic parasite, it appears that they have not yet developed an adaptive response or defense mechanism against this kind of parasite. Therefore, a long-term control method for *P. downsi* is needed in order to eliminate this threat to the species.

The medium tree-finch is found only on the island of Floreana; primarily in the moist highland forests (i.e. the *Scalesia* zone) which currently covers approximately 21 km^2 (8 mi^2). Because of the significant amounts of moisture and fertile soil available in the highlands, approximately 4 km^2 (1.5 mi^2) of the highland forests on Floreana have been altered or cleared for agricultural purposes. Although the Galapagos National Park covers 97 percent of the land in the Galapagos Islands, the remaining 3 percent includes a large portion of the moist highlands on inhabited islands, such as Floreana, which allows farming to continue in this area today. Introduced animals, both domestic livestock and feral populations, have magnified the negative effects of clearing large areas of native vegetation for agriculture and ranching. Herbivores destroy the species' habitat on Floreana by trampling and grazing heavily on native vegetation, including *Scalesia pedunculata*, the tree primarily used by the medium tree-finch for nesting and foraging. Non-native fruit trees, easily spread by cattle and pigs, grow quickly and shade native seedlings of this species' preferred habitat of *Scalesia pedunculata*.

Even though the Galapagos National Park Service encourages ranchers to fence in their cattle on Floreana, cattle still stray into native vegetation to graze. Other introduced species, such as black rats and cats, predate on the eggs and nestlings of birds. One study (O'Connor *et al.* 2009) found that 33 percent of medium tree-finch nests experienced nestling predation, while egg depredation was observed in 22 percent of the nests. Because agricultural areas are close to the breeding sites of the medium tree-finch, non-native, introduced predators, mainly rats are able to easily access the habitat of the medium tree-finch. Although an eradication program has been developed on Floreana to eliminate some of the introduced species, such as donkeys and goats, we are not aware of current programs to remove other herbivores or introduced predators from Floreana. Even though the medium tree-finch is listed as a critically endangered species under Ecuadorian law and its range includes the Galapagos National Park, existing regulatory mechanisms are inadequate to protect the habitat of the species and have been ineffective in controlling the primary threat to the medium tree-finch, which is parasitism by *Philornis downsi*.

The Endangered Species 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 immediate and ongoing significant threat to the medium tree-

finch throughout its entire range, as described above, we determine that the medium tree-finch is in danger of extinction throughout all of its range. Therefore, on the basis of the best available scientific and commercial information, we have determined the species is in danger of extinction throughout all of its range primarily due to ongoing threats to its habitat (Factor A), predation (Factor C), and inadequacy of regulatory mechanisms (Factor D), and we determine endangered status for the medium tree-finch.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, 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 governments, private agencies and 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 listed as endangered or threatened, and with respect to its critical habitat, if any is being designated. However, given that this species is not native to the United States, no critical habitat is being proposed for designation with 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 species in foreign countries. Sections 8(b) and 8(c) of the Act authorize the Secretary to encourage conservation programs for foreign endangered species and to provide assistance for such programs in the form of personnel and the training of personnel.

We may issue permits 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 at 17.32 for threatened species. With regard to endangered wildlife, a permit must 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.

Required Determinations

National Environmental Policy Act

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 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).

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 Endangered Species Program, U.S. Fish* and Wildlife Service (see the **FOR FURTHER INFORMATION CONTACT** section).

Author

The primary author of this final rule is staff of the Branch of Foreign Species, Endangered Species Program, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Arlington, VA 22203.

List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

■ Accordingly, we 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 a new entry for "Tree-finch, medium" in alphabetical order under "BIRDS" in the List of Endangered and Threatened Wildlife, as follows:

§ 17.11 Endangered and threatened wildlife.

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(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	
BIRDS							
*	*	*	*	*	*	*	
Tree-finch, medium *Camarhynchus pauper*	Ecuador (Galapagos Islands)	Entire	E	767	NA	NA.	
*	*	*	*	*	*	*	

* * * * *

Dated: July 7, 2010

Wendi Weber,

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

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