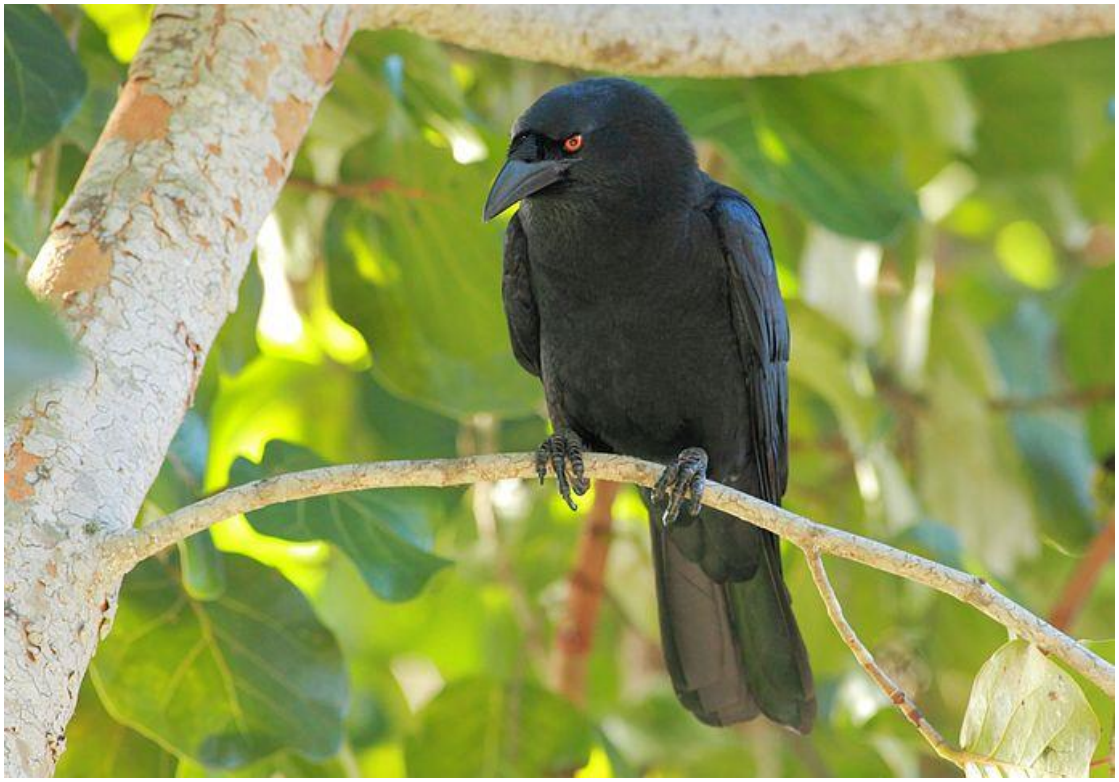
White-necked Crow
(*Corvus leucognaphalus*)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Southeast Region
Caribbean Ecological Services Field Office
Boquerón, Puerto Rico



White-necked crow (*Corvus leucognaphalus*), Dominican Republic
(http://upload.wikimedia.org/wikipedia/commons/c/c3/DR_White-necked_Crow.jpg)

5-YEAR REVIEW
White-necked crow (*Corvus leucognaphalus*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: On April 9, 2010, the Service published a notice in the *Federal Register* (75 FR 18232) announcing initiation of 5-year status review of 15 Caribbean species, including the white-necked crow (*Corvus leucognaphalus*), and requested new information concerning the biology and status of the species. A 60-day comment period was opened; however, no information on the species was received from the public during that period.

On July 28, 2010, the Service signed an Intra-agency Agreement with U.S. Geological Survey, Mississippi Cooperative Research Unit to gather and summarize new information on the white-necked crow. Dr. Francisco J. Vilella, USGS Mississippi Cooperative Research Unit, reviewed available literature and consulted with specialists on the status of the white-necked crow, and prepared a draft review. Then, a Service biologist completed the 5-year review, and assessed and determined the appropriate status recommendation for the species. The draft of this document also was sent to three peer reviewers. Comments received were evaluated and incorporated as appropriate (see Appendix A).

B. Reviewers

Lead Region: Kelly Bibb, Southeast Region, Atlanta, Georgia. (404) 679-7132.

Lead Field Office: José A. Cruz-Burgos, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico. (787) 851-7297, extension 218.

C. Background

1. Federal Register Notice citation announcing initiation of this review: April 9, 2010; 75 FR 18232.

2. Species Status: Declining. Unevenly distributed island-wide in Hispaniola, and present in about 7 protected areas. This bird is listed as threatened by the governments of the Dominican Republic and Haiti.

3. Recovery Achieved: 0 (No recovery objectives or actions have been defined for this species).

4. Listing History

Original Listing
FR notice: 56 FR 13598
Date listed: April 3, 1991
Entity listed: species
Classification: endangered

5. Associated rulemakings: Not Applicable.

6. Review History: The April 3, 1991, final rule (56 FR 13598) is the most comprehensive analyses of the species' status, and is used as the reference point document for this 5-year review.

Recovery Data Call: 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014.

7. Species' Recovery Priority Number at start of review (48 FR 43098): 11. At the time of listing, the white-necked crow was recognized as a species with a moderate degree of threat and low recovery potential.

8. Recovery Plan:
Name of plan: No recovery plan has been written for the white-necked crow because the species is considered extirpated from U.S. jurisdiction.

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

1. Is the species under review listed as a DPS? No.

2. Is there relevant new data that would lead you to consider listing this species as a DPS in accordance with the 1996 policy? No.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria? No, because the white necked crow is considered extirpated in areas under U.S. jurisdiction (see Recommendations for Future Actions for ways we can work with other governments to help this endangered bird).

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Species' abundance, population trends (e.g., increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends.

No quantitative information on abundance or demographic features is available for the white-necked crow from Hispaniola, the second largest island of the West Indies that is divided into the Republic of Haiti and the Dominican Republic. The bulk of available information for the species is mostly contained in a single long-term study conducted by Wiley (2006), and anecdotal observations by ornithologists working in Hispaniola (Stockton de Dod 1987, Keith et al. 2003, Latta et al. 2006) as well reports from birders in the Dominican Republic and Haiti (www.ebird.org). Current available estimates (2,500-10,000 individuals) are based on assessment of known records, including descriptions of abundance and range size (BirdLife International 2012). However, no studies have been conducted to develop abundance estimates with precision across the species' range. Information for the white-necked crow in Puerto Rico is limited to historical anecdotal accounts and a handful of observations made before the local extinction of the species in the early 1960s (Biaggi 1983, Wiley 2006).

No data is available on white-necked crow's population trends though current estimates indicate there has been a consistent decline over the last several decades (BirdLife International 2012). The species is believed to have declined in Hispaniola during the last 30 years mainly due to habitat loss and degradation, and shooting (Wiley 2006, UN-REDD 2012). Nonetheless, available information suggests white-necked crows may be somewhat tolerant to habitat alteration from agriculture in occupied areas. In fact, at a local scale crow populations can remain stable over extended periods in modified landscapes, provided core quality forest habitat persists (Latta 2005). For example, Wiley (2006) reported crow populations in Los Haitises National Park, Dominican Republic, remained relatively stable in numbers and distribution during the period of 1974-1996 despite extensive alteration of the original forest cover into a patchwork of remaining forest fragments, separated by patches of active and abandoned agriculture.
The only available information on reproductive traits of the white-necked crow comes from a limited number of nests monitored by Wiley (2006) in the Dominican Republic. Nest building initiates in late January and into February. Crows place nest structures high in trees, eggs are incubated for 18-22 days, and nestlings fledge after 35-44 days. Adults exhibit high nest attendance during incubation, which gradually declines through the nestling period, with breeding ending by late May. No records of white-necked crow nests exist for Puerto Rico.

b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.).

No information on genetic structure or levels of variation is available for the species.

c. Taxonomic classification or changes in nomenclature.

No new information is available on taxonomic classification or nomenclature for the white-necked crow. However, by virtue of its extirpation in Puerto Rico, it is now considered endemic to the island of Hispaniola (Keith et al. 2003, Latta et al. 2006).

d. Spatial distribution, trends in spatial distribution, or historic range.

The white-necked crow was originally distributed across Hispaniola and Puerto Rico (Wiley 2006). The only information for the species from St. Croix is derived from aboriginal kitchen middens; however, it cannot be confirmed that the species actually occurred in the wild in the Virgin Islands (Wetmore 1925).

Presently, the white-necked crow is restricted to the island of Hispaniola, including some of its larger satellite islands (i.e., Gonave and Saona Islands), where it is more common in areas with large tracts of forest habitat (Latta et al. 2006). Wiley (2006) reported white-necked crows were more widely distributed and abundant in the northeastern region of the Dominican Republic, namely Los Haitises, Miches and the Samaná Peninsula. Further, the crow is seasonally abundant on Saona Island when white-crowned pigeons (*Patagioneas leucocephala*) aggregate for nesting. Flocks of ≥35 crows have been recently reported in coastal forest and mangroves on the southern coast of Saona Island (www.ebird.org). White-necked crow observations documented by researchers working in Hispaniola, and birders, include 195 records during the period of 1976-2012. Of these, 137 observations were recorded in the Dominican Republic and the rest (58) in Haiti. Per Keith et al. (2003) the white-necked crow has also occurred on the islands of Navassa and Ile a-Vache, west and south-west of Haiti, respectively.

Recent information has documented presence of white-necked crows at multiple sites in Haiti. For example, crows have been reported in forested areas south of Leogane, where flocks (≥ 35 individuals) have been sighted. Further, in Massif de la Hotte and Loma Gran Bois, located approximately 50 km (31.1miles) west of Port-au-Prince, smaller flocks (±15 individuals) have been recorded (J. L. Brocca, Hispaniola Ornithological Society, pers. comm., 2012). White-necked crows in Haiti seem to be associated with remaining areas of forest, including urban areas, where tree cover is available.

The white-necked crow in Puerto Rico was known from the main Island, but was never reported in the satellite islands of Culebra, Vieques and Mona. The crow was common during the early exploration of the island following its discovery by Columbus in 1493 (Wiley 2006). In the last quarter of the 19th century, the crow could still be found in good numbers in the interior moist karst forests of north-central Puerto Rico (e.g., municipalities of Lares and Utuado) and had been reported in the eastern region of the Island (Gundlach 1878).

Wetmore (1927) found white-necked crows greatly reduced in distribution and numbers by the time he visited Puerto Rico (1911-1912). He encountered the crow in the Sierra de Luquillo, where it was still fairly common. Interviews with older woodsmen by Wiley (2006) indicated crows were rare by the 1950s. The rapid and extensive loss of forest habitat in Puerto Rico during the early 1900s may have been one of the causes for the extirpation of the white-necked crow in the Island (Wadsworth 1950). Shooting may have also contributed to the crow's decline in Puerto Rico. According to Wiley (2006), older woodsmen interviewed in the Sierra de Luquillo and Río Abajo areas of Puerto Rico reported that crows were shot in the past. The last confirmed sighting of the species in Puerto Rico (1963) was in the Sierra de Luquillo (Bond 1973, Raffaele 1983). Subsequent reports of white-necked crows in Puerto Rico have been confirmed to be escaped American Crows (*Corvus brachyrhynchos*) imported as pets (Raffaele 1983, Wiley 2006).

e. Habitat or ecosystem condition.

Although adequate habitat stills remain for the white-necked crow, some of the historic habitat certainly has been diminished or degraded. Haiti, for example, is one of the most environmentally degraded countries in the world. Forest cover in Haiti averages less than 3.7% of the territory (101,000 ha (249,575.4 acres); FAO 2010). Examples of some remaining forest stands, restricted to the most inaccessible, steep hillsides in this country, include Massif de La Hotte and Massif de La Selle (Paryski et al. 1989, Latta 2014).

In the Dominican Republic, only about 32% of the forest cover still remains (FAO 2010). In response to ongoing environmental concerns, the government has greatly expanded the network of terrestrial protected areas. Currently, approximately 16% (800,000 ha [1,976,835 acres]) of the country is designated as protected terrestrial ecosystems. Remaining tracts of forest cover are widely dispersed throughout the country. Dry forests of the Dominican Republic have been altered considerably by charcoal production and there are only a few pristine areas left (Schubert 1993). Pine forests are possibly the habitat most threatened by fire, and also by other reasons (e.g., logging and clear-cutting) in the Dominican Republic (Latta et al. 2000). Many wild fires in this forest type are a result of escaped fires from slash-and-

burn agriculture in adjoining dry forests (Latta 2014). Reforestation with exotic pine species does not necessarily provide good bird habitat (Woods and Ottenwalder 1992). Until recently, the rain and cloud forests have been relatively protected due to their highest elevation and isolation. However, these habitats have been increasingly impacted by cutting and fires in some areas mainly due to shifting (slash-and-burn) agriculture (Schubert 1993, Latta 2014).

Continuing habitat loss is likely the primary factor responsible for the current diminished status of the white-necked crow in Hispaniola (BirdLife International 2012, Latta 2014). Clearing of forests for subsistence agriculture, grazing, logging and fires continues to reduce the quantity and quality of nesting habitat. However, hunting may have also contributed to the decline of the crow because birds are shot to protect crops, for food, and sport (Wiley 2006, Latta 2014). Nonetheless, no data is available to support one cause over the other.

The Dominican Republic has expanded its network of protected areas, and now includes all major ecosystems. However, there is a need for increased representation of wetlands and grasslands in that network (Latta 2005). Moreover, several of protected areas are small (<7,500 ha [18,532.83 acres]) and have limited prospects for long-term maintenance of biological diversity. Furthermore, only two small national parks in Haiti remain with forest cover, La Viste (2,000 ha [4,942.1 acres]) and Macaya (5,500 ha [13,590.7 acres]).

Areas of special importance for the white-necked crow in Hispaniola include:

a. Los Haitises National Park (Dominican Republic): recently extended to 160,000 ha (395,367 acres) this reserve is dominated by continuous tracts of wet karst forest. While some cutting of trees and subsistence agriculture is ongoing in the periphery of the park and even within the reserve boundaries, the region remains the most important location for the white-necked crow (Wiley 2006).

b. Sierra de Bahoruco National Park (Dominican Republic): covers an area of approximately 80,000 ha (197,683.5 acres). This reserve and the adjoining 42,700 ha (105,513.6 acres) Aceitillar-Cabo Rojo Panoramic Way, are located in the southwestern Dominican Republic and represent a major site for endemic birds (Latta 2005).

c. Jaragua National Park (Dominican Republic): one of the largest reserves (137,400 ha [339,521.4 acres]) in Hispaniola. The park harbors extensive tracts of mature mangrove, coastal scrub and dry forest as well as two large islands associated with the reserve (Latta 2005). White-necked crows have been documented in mangrove and dry forests of Jaragua National Park (www.ebird.org).

d. Macaya Biosphere Reserve (Haiti): located in the southwestern peninsula of Haiti is a 5,500-ha (13,590.7 acres) forest reserve with elevations ranging from 950-2,347 m (3,116.8-7,700.1ft), including ridges and deep ravines with extensive areas of exposed karst (Rimmer et al. 2005). This reserve includes pine forest, savanna, montane broadleaf forest, karst forest, and other habitats in varying stages of disturbance. In recent years, access has resulted in agricultural encroachment. Researchers working in Hispaniola have argued for additional protection to surrounding forested areas (Latta et al. 2006).

On the contrary, in Puerto Rico, forest cover has greatly expanded since the time when the white-necked crow was found and eventually extirpated in 1963. Forested areas now cover approximately 57% of the main Island, 85% of Vieques, and 88% of Culebra (Brandeis et al. 2007). Moreover, forest structure has rapidly recovered through secondary succession in the last 40-50 years, reaching mature levels of local biodiversity and biomass (Grau et al. 2003).

2. Five Factor Analysis

(a) Present or threatened destruction, modification or curtailment of its habitat or range:

Past and ongoing habitat loss and degradation from forest clearing for timber and agricultural purposes has likely contributed significantly to the extirpation of the white-necked crow in Puerto Rico, and recent declines in Hispaniola. While the species has been described as somewhat tolerant of disturbed habitat, levels of tolerance to varying types of disturbance are unknown. Although forest cover remains in Hispaniola, mostly in the Dominican Republic, historical habitat has been diminished or degraded with unknown consequences for the species. As previously stated, only an average of less than 3.7% of the territory in Haiti remains with forest cover, and although in Dominican Republic the network of protected areas has been expanded, deforestation and alteration of many habitats still ongoing. Therefore, the Service considers destruction, modification or curtailment of white-necked crow's habitat or range, a moderate and imminent threat to the species.

(b) Overutilization for commercial, recreational, scientific, or educational purposes:

White-necked **c**row is still persecuted in the Dominican Republic and Haiti (Wiley 2006). Crows are shot by farmers, mainly in the Dominican Republic, as they are mistakenly considered crop pests and are also hunted for food. Their aggregation in large foraging flocks may lead farmers to overestimate their impact on various crop types. While crows will on occasion forage at ground level, and indeed, have been documented feeding on crops, they are largely arboreal and feed mostly on fruit and seeds (Wiley 2006). In the moist

karst forest of Los Haitises, crows are particularly active among vines, bromeliads, and orchid masses, where they probe for invertebrates, reptiles, and amphibians (F.J. Vilella, Mississippi Cooperative Research Unit, pers. obs.). Based on the above information, the Service considers overutilization for commercial, recreational, scientific, or educational purposes of the white-necked crow as a moderate and imminent threat to the species.

(c) Disease or predation:

West Nile virus (WNV) has been documented in the Dominican Republic, specifically in Los Haitises and Sierra de Bahoruco reserves (Komar et al. 2003). However, while the virus was not reported in white-necked crows, corvids have been documented to be particularly susceptible to WNV infection and propagation due to their highly sociable nature (Reisen et al. 2006). No information was found on the effects of predation on this species.

Based on the above information, we believe disease may represent a moderate and imminent threat to the white-necked crow, particularly because of its susceptible to the WNV.

(d) Inadequacy of existing regulatory mechanisms:

While there have been recent government efforts to enhance the network of protected areas in the Dominican Republic, previous estimates place forest loss at greater than 90% in the last 20 years (Ottenwalder 2000). Even as many laws protect forests and watersheds in the Dominican Republic, there is lack of enforcement. Government agencies responsible for forest administration and management (i.e., *Ministerio de Medio Ambiente y Recursos Naturales*) are underfunded and understaffed. Reforestation programs have been proposed and executed from time to time by both government agencies and private sector organizations, but implementation and enforcement of regulations have been hampered by small budgets and insufficiently trained personnel (Ottenwalder 2000).

The Dominican Republic has a number of national laws and policies that regulate activities, enforcement and incentive mechanisms for forest conservation (UN-REDD 1992). The *Ministerio de Medio Ambiente y Recursos Naturales* (SEMARENA) is responsible for ensuring compliance with forest protection laws and policies, as well as selecting and managing civil and military forest enforcement personnel responsible for monitoring protected areas and reporting illegal activities. Enforcement strategies (e.g., Law 632) prohibit illegal logging, which is punishable by fines and incarceration. Other laws (e.g., Law 290) create incentives for forest development and conservation and offer tax exemptions for people who invest in reforestation. A certification program for timber plantations has been set up to incentivize landowners to invest in managed forests. Therefore,

legislation does exist related to forest management, incentives for forest conservation, payments for ecosystem services, and property rights of forests.

However, a critical element affecting wildlife, including the white-necked crow, is the lack of enforcement of these laws. A number of reserves in the Dominican Republic lack adequate boundary delineation, absence of management and enforcement. As a result, forests inside protected areas (i.e., Los Haitises, and more recently Sierra de Bahoruco [Latta 2014]) are cleared using slash and burn practices for subsistence agriculture (Geissler et al. 1997). As a result, habitat degradation and land use conversion continues to the detriment of resident wildlife, including the white-necked crow (Wiley 2006).

In Haiti, the landscape is already almost entirely deforested, with little chance under present conditions for recovery (Paryski et al. 1989, Ottenwalder 2000). The Division of Natural Resources within the Ministry of Agriculture of Haiti is responsible for protection and regulation of all forests and for reforestation efforts. However, high population density, poverty, political instability, absence of trained staff, lack of clear policies, and shifting government priorities have prevented any sustained conservation efforts. Nature reserves in Haiti are few and essentially unprotected. Overall lack of enforcement of environmental laws in both Haiti and the Dominican Republic, associated with lack of funding, curtails the ability to control illegal timber harvest, slash-and burn agriculture and illegal hunting, all of which threaten remaining populations of the white-necked crow. Bird collection for the illegal trade has long been the most serious threat to Hispaniola's parrots and parakeets, but many other species have also been found in captivity, including white-necked crows.

Based on the above discussion, the Service believes that inadequacy of existing regulatory mechanisms is a high and imminent threat to the white-necked crow.

(e) Other natural or manmade factors affecting its continued existence:

The Service has no current information on other natural or manmade factors affecting the continued existence of the white-necked crow.

3. Synthesis

The white-necked crow was extirpated from Puerto Rico in 1963. Furthermore, environmental pressures threaten biodiversity in both the Dominican Republic and Haiti where the white-necked crow has declined since the early 1980s, with subsequent contraction in its range. Remaining populations are small, fragmented and continue to decline (Wiley 2006). The loss and degradation of habitat, along with the inadequacy of regulatory

mechanisms, are the principal problems threatening the white-necked crow throughout its range. These threats, coupled with overutilization in the form of birds shot because they are considered crop pests and for food, reduce the possibility of recovery for the species. Due to these ongoing pressures, there is a need of monitoring the current status of the white-necked crow, as well as developing conservation actions for its eventual recovery.

Based on the information gathered during this review, the Service believes that the white-necked crow continues to meet the definition of endangered as it still in danger of extinction throughout all its range.

III. RECOMMENDATIONS FOR FUTURE ACTION

1. Develop a conservation strategy to improve the status of the white-necked crow in cooperation and coordination with the governments of Puerto Rico, the Dominican Republic, and Haiti. The conservation strategy should assess the most up to date information on the species geographic distribution, and reliable information on population dynamics, and resource selection patterns. The conservation strategy also needs to include the preparation of a recovery plan, and an outreach and educational component to make people aware of the status of the species and its protection need.

2. Upon availability of funds, the reintroduction of the white-necked crow in Puerto Rico should be explored as an integral component of the recovery program for the species. The successful implementation of this recovery action would help reassess the status of the species by restoring its original geographic range, which spanned both Hispaniola and Puerto Rico. The benefits of reintroducing the white-necked crow back to its historic range should also be contemplated from its role in the natural restoration process of the Island. Being primarily a frugivore species (Wiley 2006), the white-necked crow probably played an important role in the dispersal of seeds of many large tree species in Puerto Rico (Latta 2014). If determined that expanses of forest habitat existing in Puerto Rico are suitable for the species, assisted colonization, also termed managed relocation, is a viable strategy for species restoration and conservation (Seddon 2010).

The following information should be determined before the decision of reintroducing the species in Puerto Rico is made:

a. How feasible is the reintroduction of the white-necked crow in Puerto Rico?
b. What populations in Hispaniola could serve as sources of individuals for reintroduction in Puerto Rico based on a demographic assessment of those populations? What is the ability of source populations to tolerate extraction of individuals for a period of time?
c. How many individuals can be sustainably extracted from these source populations?
d. How many sites in Puerto Rico are required for successful reintroduction of the species?

e. Which sites in Puerto Rico (including satellite islands) would result in the most successful restoration and establishment of viable crow populations? Based on available information for the species in the Dominican Republic, it has been recommended crows be introduced into the moist karst forest region of Puerto Rico (Wiley 2006). However, the moist karst forest region extends over a considerable portion of northern Puerto Rico and includes over 38,000 hectares (93,899.7 acres) of mature secondary forest (Lugo et al. 2001). Research might be required to determine specific locations for crow reintroductions based on forest structure and landscape composition. Further, areas where ongoing restoration efforts for the Puerto Rican parrot (*Amazona vittata*) are taking place should be avoided to prevent potential conservation conflicts.
f. Identify methods for white-necked crow reintroductions. Methods should be explored to harvest individuals as free-flying birds. The tendency of white-necked crows to associate in mixed flocks of adults and juveniles following the nesting season provides an ideal scenario to capture individuals of different sex and ages.
g. Establish a post-release monitoring in program. This program should include estimating seasonal and annual survival, foraging and flocking behaviors, as well as movements and resource selection at multiple spatial scales (Redford et al. 2011, Parker et al. 2012).

Gaps of information when considering reintroductions to Puerto Rico should be filled with research in the Dominican Republic where the white-necked crow is more common and more information on the species is available. Furthermore, there is an established collaborative relationship between academic institutions and government agencies from Puerto Rico and the Dominican Republic. This is also an opportunity to use the Caribbean Landscape Conservation Cooperative (CLCC) framework to help develop conservation actions associated with recovery of the white-necked crow and expand collaboration with the Dominican Republic. Research should address the following:

a. Develop a quantitative population assessment, including disease surveillance, at Los Haitises National Park and at least one replicate site (e.g., Saona Island).
b. Determine spatial dynamics and resource selection patterns of white-necked crows at Los Haitises National Park.
c. Develop field protocols for capture, holding, and transportation of white-necked crows.
d. Prepare a plan for harvest of crows for approval by government agencies in the Dominican Republic.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of White-necked crow (*Corvus leucognaphalus*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review

_____ **Downlist to Threatened**
_____ **Uplist to Endangered**
_____ **Delist**
__X__ **No change is needed**

Review Conducted By: José A. Cruz-Burgos, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico

FIELD OFFICE APPROVAL:

Edwin E. Muñiz, Lead Field Supervisor, U.S. Fish and Wildlife Service

Approve Edwin Muñiz Date Mar 23, 2015

REGIONAL OFFICE APPROVAL:

Lead Regional Director, U.S. Fish and Wildlife Service

for Approve Date 8/24/15

Appendix A

Summary of peer review for the 5-year review of the white-necked crow (*Corvus leucognaphalus*)

We sent the document to three peer reviewers via electronic mail (see below). We indicated our interest in all comments the reviewers may have about the white-necked crow, particularly any new information on the status and current threats to the species. We received comments only from one peer reviewer, Dr. Steven Latta, from The National Aviary. We addressed and included all his comments accordingly into the 5-year review. The reference for the review comments was included in the literature cited section of this 5-year review, and it is also available in the species' file at the Caribbean Ecological Services Field Office.

List of peer reviewers

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