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WHITE-CROWNED PIGEONS (*Patagioenas leucocephala*) IN SUBURBAN MIAMI-DADE COUNTY: A REVIEW OF LITERATURE AND CITIZEN-SCIENCE DATA

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Abstract.—The threatened White-crowned Pigeon (*Patagioenas leucocephala*) forages in intact hardwood hammock forest and breeds in mangroves, and historically is not closely associated with suburban habitat. Our observations of this bird in the Miami-Dade County suburbs prompted us to reassess whether this species is present in these habitats. We reviewed the literature and citizen-science records (through eBird) in the region to determine the frequency of observations of the White-crowned Pigeon across Miami-Dade and Monroe Counties. We found that in Miami-Dade, the frequency of observation of this bird is fairly constant year-round. This contrasts with the Florida Keys, where observations of the pigeon decrease in the winter months. We suggest that ecological changes to the region, such as replacing freshwater marsh with tree-lined suburbs and recently increasing street tree canopy cover, may have facilitated year-round expansion of White-crowned Pigeons in Miami-Dade County.

The White-crowned Pigeon (*Patagioenas leucocephala*; WCP) is a state-listed threatened bird in Florida. This Caribbean species occurs primarily in extreme southern Florida, especially the Florida Keys, but vagrant individuals have been recorded as far northwest as the Panhandle (Ware 1997). This species is under threat across its range, and it is still widely hunted in the Caribbean, especially the Bahamas (Meyer and Wilmers 2006). In the Florida Keys and elsewhere in the Caribbean, the tropical dry and mangrove forests and upon which WCP depend are under constant threat of development (Karim and Main 2009)tropical hardwood hammock is a threatened forest ecosystem that occurs only in extreme south Florida, primarily on the Florida Keys archipelago. This rare forest type is characterized by high plant diversity that is strongly influenced by

tropical, mast-producing trees and shrubs of West Indian origin. Tropical hardwood hammocks in the Florida Keys provide important habitat for resident and migratory birds, particularly Neotropical species that rely on suitable stopover habitat during migration. The Florida Keys are under intense development pressure, particularly in higher elevation sites where tropical hardwood hammock occurs. With exception of a survey completed during 1991 in the Upper Keys, information regarding habitat loss and current coverage, conservation status, and how best to conserve remaining patches of this rare forest habitat are lacking. We used a Geographic Information Systems approach to assess the extent of loss and fragmentation of tropical hardwood hammock in the upper Keys during 1991-2004, quantify area and number of hammock patches under private ownership and in conservation status throughout the Florida Keys as of 2004, and evaluate strategies to most effectively conserve large blocks of remaining tropical hardwood hammock. Total remaining hammock habitat throughout the Keys encompassed 3,712 ha and hammock habitat declined by 31% in the upper Keys during 1991-2004. Hammock habitat in the upper Keys encompassed 1,962 ha among 124 habitat patches (median = 1.5 ha, range = 0.1-205.7 ha. In addition to the short-term threat of deforestation, the entire regional distribution of coastal hardwood forests and mangrove islands are vulnerable to sea level rise (Saha et al. 2011).

Breeding in Florida primarily occurs on mangrove islands that are free from mammalian predators (Strong and Bancroft 1994). The nesting season peaks in May through August (Bancroft et al. 2000). The mangrove islands provide little in way of nourishment for frugivores. Therefore, the pigeons must fly to tropical dry forests on the mainland to forage in order to obtain the nutrient-rich fruits necessary to produce the crop milk fed to nestlings. (Bancroft et al. 1995). Tropical hardwood hammocks, South Florida's dry forests, consist of hundreds of plant species, many of which produce fleshy fruits (Simpson 1920, Ross et al. 1992, Redwine et al. 2007, Diamond and Heinen 2016). Fruiting trees dominate early-, mid-, and late-successional hardwood hammock forests (Diamond and Ross 2016). From mid-July through the end of September, fledglings disperse to the mainline Keys and the Florida mainland (Strong and Bancroft 1994). It is believed that most of the individuals breeding in Florida overwinter in the Caribbean (Bancroft and Bowman 1994). Suburban and urban habitats were reported to be avoided by the WCP, and fledgling birds preferred any size forest fragment over developed habitat (Strong and Bancroft 1994). However, our year-round casual observations of these birds in the densely-populated suburbs of Miami-Dade County prompted us to reassess whether the WCP would use developed habitat. Habitat ecology influences the process of range expansion, for example, two dove species colonized greater proportions of urban habitats in South

Texas (Veech et al. 2011). We reviewed citizen-science data to examine a whether a change in bird activity in developed areas could be noted in the time since the Strong and Bancroft (1994) publication.

METHODS

We used the eBird database of bird observations from 2004-2014 to analyze the frequency of WCP records across developed and natural areas in Miami-Dade and Monroe Counties, Florida. This database is one of the largest collections of citizen-science data in the world, allowing birders to enter data from any computer or smartphone, creating a digital record of bird distributions (Sullivan et al. 2009). This database is particularly useful for reviewing temporal patterns in bird sightings as data collection is constantly ongoing. The Christmas Bird Count is a better estimate of local abundance, which is not a suitable application of eBird data. We downloaded all eBird data from Miami-Dade and Monroe Counties for this time period, and removed duplicate observations from concurrent observers. Here, frequency is calculated as the percentage of checklists reporting the WCP within the specified date range and region. Frequency is only calculated from complete checklists of all birds reported by users, helping to control for seasonal variation in effort. Casual observations, a sighting of a species without recording all other species observed at that time, are not used in frequency calculations. Concurrent observations, multiple checklists submitted by a group of birders, were filtered out.

The eBird database allows users to add links to georeferenced bird photographs. This allows moderators to confirm correct species identification, especially for a rarity or a bird outside of its typical known range. Filtering for only checklists with media attached, we viewed and downloaded all WCP photographs in Miami-Dade and Monroe Counties. If a WCP was photographed while perched, we recorded whether the perch used was a powerline or a tree, and identified the tree to species when possible. This is important because the WCP is an obligate arboreal frugivore, and the use of a perch tree suggests a possible foraging relationship. We examined 15 photographs in suburban Miami-Dade, 14 photographs in Everglades National Park, and 32 photographs from the Florida Keys.

RESULTS

Mapping of nearly 1,500 WCP sightings indicates a large number of observations in certain communities of Miami-Dade County (Fig. 1). The bulk of the observations occur in the inland unincorporated suburbs of Kendall, West Kendall, and the surrounding communities, as well as the coastal towns of Pinecrest, Coral Gables, and South Miami. Relatively few birds were observed in the northern parts of Miami-Dade County. The coastline of southern Miami-Dade County, which includes natural areas and botanical gardens, also has sightings primarily at these public locations. Observations in Everglades National Park show a distribution of sightings along the main park road, and other public-access visitor areas in the southern portion of the park. However, the northern portion of the national park along Tamiami Trail shows no observations. This includes public birding hotspots like the Shark Valley Visitors Center which has over 900 complete bird checklists and over 200 confirmed bird species.

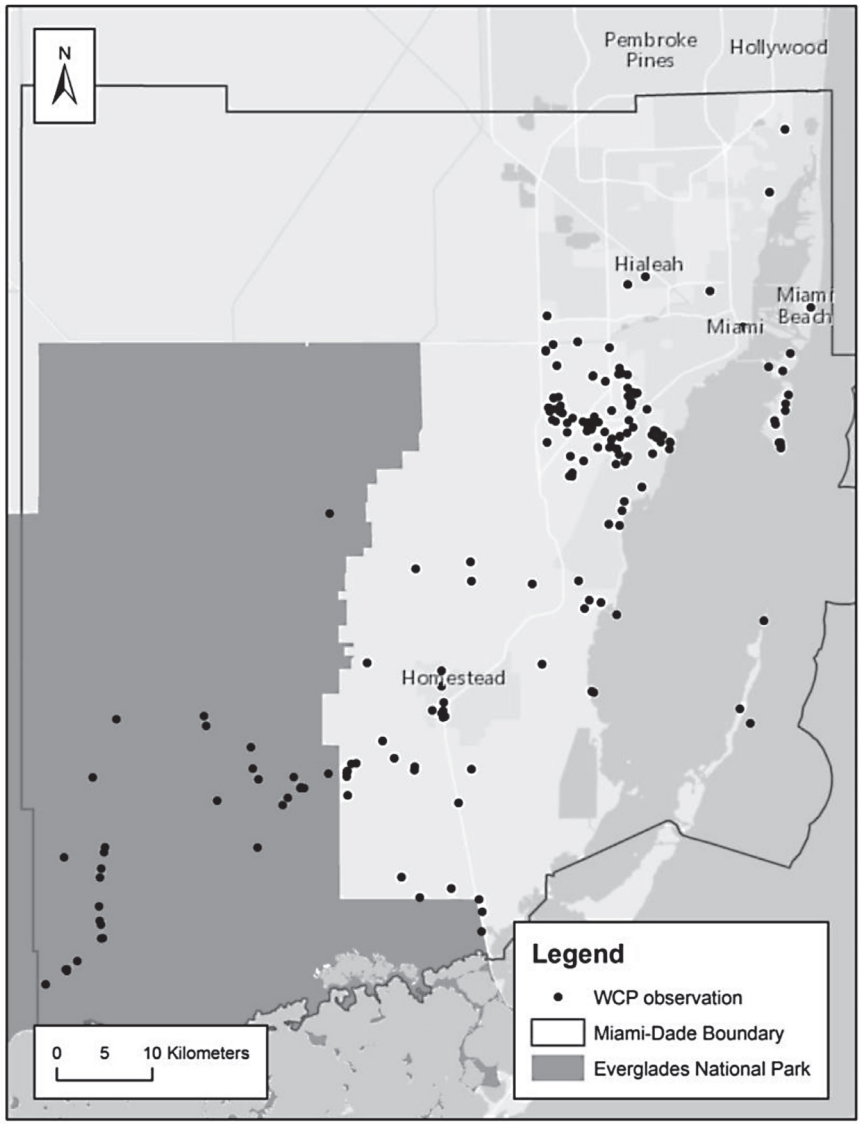

Figure 1. Distribution of White-crowned Pigeon sightings in Miami-Dade County, Florida.

We compared the 11-year annual frequency of observations between the Miami-Dade portion of Everglades National Park and suburban Miami-Dade County (Fig. 2). We compared the years 2004/05 and 2013/14 inside and outside of the park, and the frequency of checklists reporting WCP was significantly different, $\chi^2(3, N = 11{,}895)$

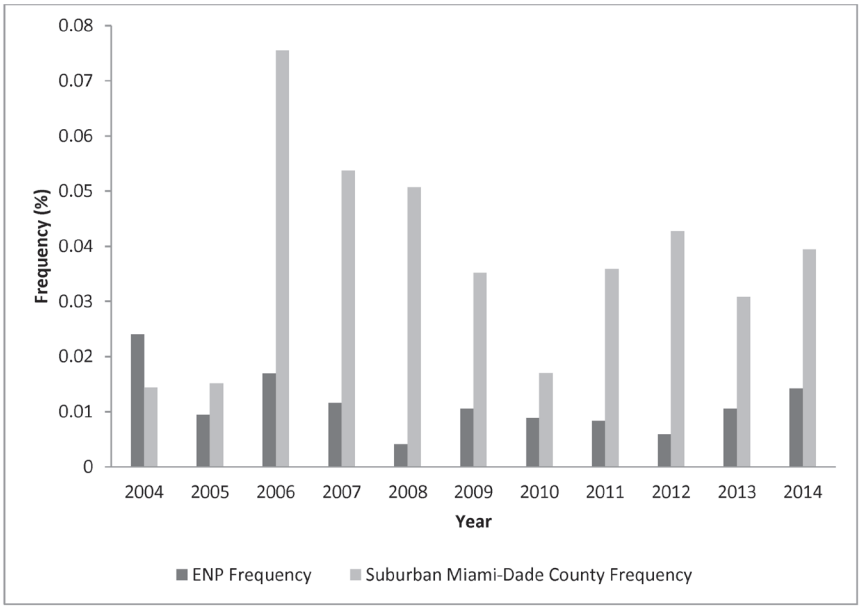

Figure 2. Annual frequencies of observations (percent of complete checklists reporting the species) of White-crowned Pigeons in the suburban and Everglades National Park portions of Miami-Dade County.

= 20.05, $p < .0005$. 2004 was the only year in which the park had a higher frequency of observation for WCP than the suburban areas. By 2006, the frequency of observation in the suburbs was more than four times greater than in the Miami-Dade portion of Everglades National Park. For the next eight years, the suburban areas would continue to record WCP at much greater frequencies.

We compared the 11-year weekly frequency of observations between Miami-Dade County, and Monroe County, Florida (Fig. 3). Monroe County encompasses the Florida Keys and the western portions of Everglades National Park. While the maximum weekly frequency of observation in Miami-Dade is about 13%, the WCP is much more frequently observed in Monroe County, up to almost 60% in the peak post-fledgling period. However, during the winter, the frequencies in both counties are about the same. The frequencies of observations in Miami-Dade are considerably more constant year-round, with a slight increase in the post-fledgling period. In Monroe County, the frequency of observations is six times higher in the first week of September than the first week of November.

We examined all eBird photos of WCP from South Florida. Six of fifteen WCP photographed in suburban Miami-Dade were perched

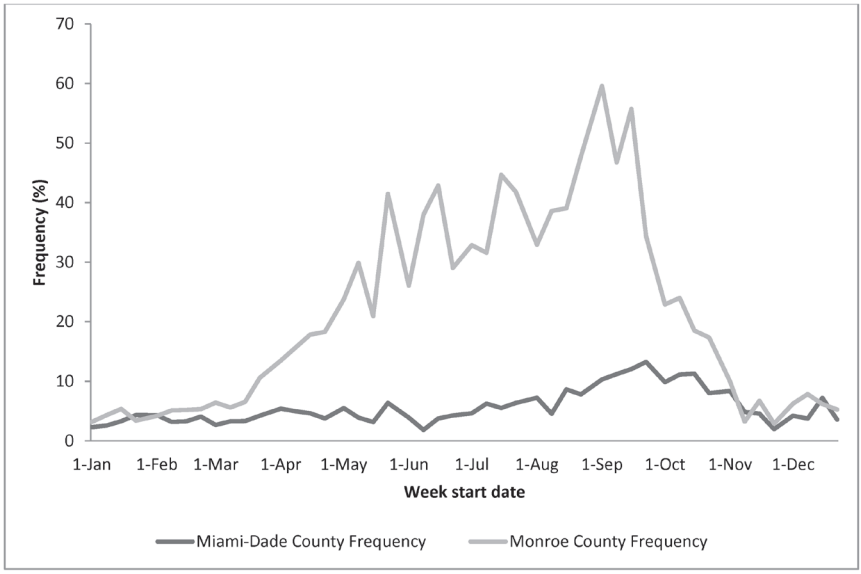

Figure 3. Weekly frequency of White-crowned Pigeons recorded in Miami-Dade and Monroe counties, Florida, from 2004-2014.

on wires, and the rest were perched on vegetation. All fourteen birds photographed in Everglades National Park were perched on vegetation. Five of 30 WCP photographed in the Florida Keys were perched on wires. 13 tree taxa were recorded as perches in these photographs, in addition to dead snags or unidentifiable trees (Table 1). Although this is a small dataset, seven of these 13 tree taxa, Bahama strongbark (*Bourreria ovata*), gumbo limbo (*Bursera simaruba*), cocoplum (*Chrysobalanus icaco*), dahoon holly (*Ilex cassine*), poisonwood (*Metopium toxiferum*), *Coccoloba* and *Trema* species, have already been documented as food sources for the WCP. Four of the trees, buttonwood (*Conocarpus erectus*), South Florida slash pine (*Pinus elliottii var. densa*), Jamaican dogwood (*Piscidia piscipula*) and *Senna* species, do not produce bird-edible fruit, but were likely used because they are tall and serve as a safe perch. These are canopy-level trees, and unlike other columbids, the highly arboreal WCP is rarely seen on the ground (FWC 2013). The remaining species, cabbage palm (*Sabal palmetto*), and umbrella tree (*Schefflera actinophylla*), have not been documented in the WCP diet, but produce fruits that are edible to birds.

Discussion

The changes to the landscape of the Miami-Dade suburbs may have facilitated the increased use by foraging pigeons. Prior to changes of

Table 1. List of tree perches identified in photographic analysis of eBird records from Miami-Dade and Monroe counties, Florida.

Tree species	Everglades National Park (ENP)	Miami-Dade County (excluding ENP)	Monroe County (excluding ENP)
Bourreria ovata			1
Bursera simaruba	2	2	3
Chrysobalanus icaco	2		
Coccoloba uvifera			1
Conocarpus erectus	3	1	4
Dead tree (snag)	2		3
Ilex cassine	1	1	
Metopium toxiferum	2		1
Pinus elliottii var. *densa*			1
Piscidia piscipula			4
Sabal palmetto			1
Schefflera actinophylla		1	
Senna sp.			1
Trema spp.	1	3	1
Unidentified tree	1		4

the hydrological regime of the eastern Everglades, many of the western suburbs of Miami-Dade would have been marl prairie dominated by sawgrass (*Cladium jamaicense*) (Davis et al. 2005). Increasing urbanization may have caused biotic homogenization within a naturally heterogeneous region (Barrett et al. 2008). Following drainage and spread of residential development, trees were grown in a suburban landscape which would not have previously contained many large canopy trees. In 1996, Miami-Dade County had only 10% tree canopy cover, with some neighborhoods having as little as 1-2%, compared to the US metropolitan area average of 33% (Miami-Dade County 2007). Since then, additional trees have been planted in public right-of-way areas such as road medians. The official goal of these street tree plantings are to reduce storm water runoff, provide energy savings with shade, and increase property values (Escobedo et al. 2014). The native trees used in county plantings that have already been documented as WCP food sources include willow bustic (*Sideroxylon salicifolium*), inkwood (*Exothea paniculata*), black ironwood (*Krugiodendron ferreum*), pigeon plum (*Coccoloba diversifolia*), blolly (*Guapira discolor*), and four species of *Eugenia*. Over the past decade these plantings have increased Miami-Dade County's canopy cover closer to the goal of 30%.

Whether planted by humans or naturally dispersed, these trees could be providing food resources needed by the WCP. The most important food source for the WCP is believed to be the berries of poisonwood (*Metopium toxiferum*) (Bancroft and Bowman 1994). This tree has been widely persecuted in developed areas because it causes

dermatitis similar to poison ivy (*Toxicodendron radicans*). Since *M. toxiferum* is nearly absent from the urban landscape, other fruiting trees in the suburban habitat must be important for sustaining pigeons. Several common landscaping trees, including gumbo limbo and strangler fig (*Ficus aurea*), are already documented as food sources for the pigeon. The asynchronicity of fruiting between the two native and nine exotic species of *Ficus* in South Florida may be particularly important in providing a year-round food resource (Reed Bowman, personal communication; Lee and West 2011). WCP have been known to exploit seasonally available food resources. For example, in Jamaica, increased abundance of non-breeding WCPs was recorded during the peak fruiting season of mountain thatch palm (*Thrinax parviflora*) (Strong and Johnson 2001).

In addition to the native tropical hardwood hammock species present in the suburban landscape, Miami-Dade has many non-native tree species. One such tree, Brazilian pepper (*Schinus terebinthifolia*), has been recorded in the crop milk of the WCP. During winter, WCP have been recorded consuming large quantities of dried *Schinus* fruit (Meyer and Wilmers 2006). Our eBird photo analysis also showed a WCP perched in the canopy of a highly invasive umbrella tree that is bearing ripe fruit. The increase in tree species richness in the suburban landscape may have inadvertently provided new food resources for the WCP (Sjöman et al. 2016). Despite any possible benefit to the WCP, we do not recommend spreading invasive vegetation, in particular those that are prohibited for planting as Category I invasive species. Everglades National Park is leading an aggressive campaign to eradicate invasive trees, such as the 4000 acre (1,629 hectare) restoration of the "Hole in the Donut" site (Smith et al. 2011). At this site a monoculture of *Schinus* was established on abandoned farmland. *Schinus* is difficult to eradicate in the urban environment, as it readily colonizes disturbed uplands and is often unwittingly protected by homeowners and landscapers (Gann 2015). Controlling *Schinus* in Everglades National Park necessarily involves controlling it in adjacent urban areas.

In addition to planting new trees, the region has seen an increase in the protection of natural upland forest communities (Diamond and Heinen 2016). The Environmentally Endangered Lands (EEL) program has acquired thousands of hectares of forest and wetland habitats, and restored many parcels by removing invasive plants and planting native trees. Over 300 rare upland plants have been conserved in the EEL program (Diamond and Heinen 2016). This program contains over 600 hectares of pine rockland forest and almost 300 hectares of hardwood hammock (Alonso and Heinen 2011). Since 2011, an additional 400 hectares of hardwood hammock have been purchased and restored.

About one hundred additional forested hectares have been protected on private property, as part of an EEL program providing tax relief to land owners in exchange for habitat conservation (Giannini and Heinen 2014).

The WCP are primarily being recorded in the southern areas of Miami, such as Kendall, Coral Gables, South Miami, and Pinecrest. These areas have greater canopy cover than northern parts of the county at similar levels of urbanization, such as Hialeah and Miami Gardens. In addition, most of the sites in the EEL program are in south Miami-Dade County (Diamond and Heinen 2016). We recommend a continuation of the Miami-Dade County street tree master plan, increasing use of native species, especially in communities that still lag behind in canopy cover. Future acquisitions by the EEL program may increase canopy cover through restoration efforts in northern Miami-Dade County, and potentially provide the WCP additional foraging resources.

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LITERATURE CITED

ALONSO, J., AND J. T. HEINEN. 2011. Miami-Dade County's Environmentally Endangered Lands Program: Local efforts for a global cause. Natural Areas Journal 31:183-189.

BANCROFT, G. T., AND R. BOWMAN. 1994. Temporal patterns in diet of nestling White-crowned Pigeons: implications for conservation of frugivorous columbids. Auk 111:844-852.

BANCROFT, G., A. STRONG, AND M. CARRINGTON. 1995. Deforestation and its effects on forest nesting birds in the Florida Keys. Conservation Biology 9:835-844.

BANCROFT, G. T., R. BOWMAN, AND R. SAWICKI. 2000. Rainfall, fruiting phenology, and the nesting season of White-crowned Pigeons in the upper Florida Keys. Auk 117:416-426.

BARRETT, K., C. M. ROMAGOSA, AND M. I. WILLIAMS. 2008. Long-term bird assemblage trends in areas of high and low human population density. Research Letters in Ecology 2008:1-4.

DAVIS, S. M., E. E. GAISER, W. F. LOFTUS, AND A. E. HUFFMAN. 2005. Southern marl prairies conceptual ecological model. Wetlands 25:821-831.

DIAMOND, J. M., AND J. T. HEINEN. 2016. Conserving rare plants in locally-protected urban forest fragments: A case study from Miami-Dade County, Florida. Urban Forestry & Urban Greening 20:1-11.

DIAMOND, J. M., AND M. S. ROSS. 2016. Canopy gaps do not help establish pioneer species in a South Florida dry forest. Journal of Tropical Ecology 32:107-115.

ESCOBEDO, F. J., D. C. ADAMS, AND N. TIMILSINA. 2014. Urban forest structure effects on property value. Ecosystem Services 12:209-217.

FWC [FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION]. 2013. A Species Action Plan for the White-Crowned Pigeon. Florida Fish and Wildlife Conservation Commission, Tallahassee.

Gann, G. D. 2015. Vascular Plant Species of Management Concern in Everglades National Park: Final Report. Delray Beach, Florida.

Giannini, H. C., and J. T. Heinen. 2014. Miami-Dade County's Environmentally Endangered Lands Covenant Program: Creating protected areas on private lands via financial incentives. Natural Areas Journal 34:338-345.

Karim, A., and M. B. Main. 2009. Habitat fragmentation and conservation strategies for a rare forest habitat in the Florida Keys archipelago. Urban Ecosystems 12:359-370.

Meyer, K. D., and T. J. Wilmers. 2006. Foraging Habitats, Winter Residency, Survival, and Philopatry of Adult White-crowned Pigeons (*Patagioenis leucocephala*) in the lower Florida Keys. Final Report NG03-013 to Florida Fish and Wildlife Conservation Commission, Tallahassee.

Miami-Dade County. 2007. A Greenprint for our Future: Miami-Dade County Street Tree Master Plan.

Redwine, J. R., R. Sawicki, J. J. Lorenz, and W. Hoffman. 2007. Ripe fruit availability in the fragmented hardwood forests of the northern Florida Keys. Natural Areas Journal 27:8-15.

Ross, M. S., J. O'Brien, and L. Flynn. 1992. Ecological site classifications of Florida Keys terrestrial habitats. Biotropica 24:488-502.

Saha, A. K., S. Saha, J. Sadle, J. Jiang, M. S. Ross, R. M. Price, L. S. L. O. Sternberg, and K. S. Wendelberger. 2011. Sea level rise and South Florida coastal forests. Climatic Change 107:81-108.

Simpson, C. T. 1920. In Lower Florida Wilds: A Naturalist's Observations on the Life, Physical Geography, and Geology of the More Tropical Part of the State. G. P. Putnam & Sons, New York.

Sjöman, H., J. Morgenroth, J. Deak, S. A. Saebø, and I. Kowarik. 2016. Diversification of the urban forest–can we afford to exclude exotic tree species? Urban Forestry & Urban Greening 18:237-241.

Smith, C. S., L. Serra, Y. Li, P. Inglett, and K. Ingletт. 2011. Restoration of disturbed lands: The Hole-in-the-Donut restoration in the Everglades. Critical Reviews in Environmental Science and Technology 41:723-739.

Strong, A. M., and G. T. Bancroft. 1994. Postfledging dispersal of White-Crowned Pigeons: Implications for conservation of deciduous seasonal forests in the Florida Keys. Conservation Biology 8:770-779.

Strong, A. M., and M. D. Johnson. 2001. Exploitation of a seasonal resource by nonbreeding Plain and White-Crowned pigeons: Implications for conservation of tropical dry forests. Wilson Bulletin 113:73-77.

Sullivan, B. L., C. L. Wood, M. J. Iliff, R. E. Bonney, D. Fink, and S. Kelling. 2009. eBird: A citizen-based bird observation network in the biological sciences. Biological Conservation 142:2282-2292.

Veech, J. A., M. F. Small, and J. T. Baccus. 2011. The effect of habitat on the range expansion of a native and an introduced bird species. Journal of Biogeography 38:69-77.

Ware, D. M. 1997. White-crowned Pigeon north of its known range. Florida Field Naturalist 25:141-142.