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American flamingos in Florida: Updates on sightings, distributions and conservation efforts

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Abstract

The status of the American flamingo *(Phoenicopterus ruber)* in Florida has been misunderstood and controversial for nearly a century, leaving them without legal protection at state level in Florida or conservation planning for the entire United States. However, flamingo sightings in the early 2000s made biologists consider the origins and history of the species in the state. In 2018, a comprehensive review of the American flamingo's history in Florida was published. Here, we summarise the main findings of this review and provide an update on observations, conservation considerations and management attention following that original publication.

Resumen

El estatus del flamenco americano (*Phoenicopterus ruber*) en Florida, EE.UU. ha sido mal comprendido y controvertido durante casi un siglo, dejándolo sin protección legal a nivel estatal en Florida y sin plan de conservación para todo el país. Sin embargo, los avistamientos de flamencos a principios de la década de 2000 hicieron que los biólogos consideraran los orígenes y la historia de la especie en el estado. En 2018, se publicó una revisión exhaustiva de la historia del flamenco americano en Florida. Aquí, resumimos los principales hallazgos de esta revisión y proveemos una actualización sobre las observaciones, las consideraciones de conservación y la atención de la gestión después de esa publicación original.

Résumé

Le statut du flamant des Caraïbes *(Phoenicopterus ruber)* en Floride a été mal compris et controversé pendant près d'un siècle, laissant cette espèce sans protection juridique au niveau de l'État de Floride et sans plan de conservation aux États-Unis. Cependant, les observations de flamants roses au début des années 2000 ont amené les biologistes à réfléchir aux origines et à l'histoire de l'espèce dans l'État. En 2018, un examen complet de l'histoire du flamant des Caraïbes en Floride a été publié. Ici, nous résumons les principales conclusions de cette revue et fournissons une mise à jour des observations, des enjeux de conservation et de gestion suite à cette publication originale.

Introduction

The American or Caribbean flamingo (*Phoenicopterus ruber)*, hereafter "flamingo", has been a well-known icon of Florida for decades (Price, 2000). Many visitors to, and residents of, the state have been greeted by flamingo images on advertising, souvenirs, and logos (Irvine and Arluke, 2017). One of the most popular sites for bird watchers and recreation in Everglades National Park is the

Flamingo Visitor Center, located in Monroe County. Despite the cultural association of flamingos in Florida, their natural history in the state has been misunderstood and debated for a century (Howell, 1932; Allen, 1956).

Many reports of flamingo sightings in the 20th century have been discounted as escapees from nearby captive facilities (Bailey, 1932; Allen, 1956; Stevenson and Anderson, 1994). The Florida Fish and Wildlife Conservation Commission (FWC) has considered the flamingo a non-native species, disqualifying it for protection under state wildlife laws (Millsap et al., 1990). However, flamingo sightings have appeared to increase within the past decade, bringing up many questions, including- what is the status of the flamingo in Florida?

In 2018, review, "Status and trends of American Flamingos (*Phoenicopterus ruber*) in Florida, USA" was published (Whitfield et al., 2018). This review was the first paper to discuss the presence and natural history of flamingos in Florida since a report by Allen (1956). Some of the major ideas the publication brought forward included, but not limited to:

- Narrative accounts of flamingo observations from the 1800s to early 1900s provide robust evidence for a historical population hunted to extinction by humans

- Digitised records of museum egg specimens collected from Florida in the 1800s suggest that the historical population nested within Florida

- Analysis of contemporary trends from 1950 to 2016 show increasing numbers of flamingos in each decade

- Rather than being listed as a non-native species, flamingos should receive conservation and management attention, and may be suitable for listing under state or federal endangered species laws

Efforts to gain legal protections

The 2018 review of flamingos in Florida has brought the need for flamingo conservation to the attention of many people, agencies, and non-profit organizations. With articles from various media sources discussing the long-lost history of flamingos in Florida, many people have become supportive and interested in helping them gain protective status.

In June 2018, several agencies partnered together once again to draft a petition to FWC citing over 60 sources on why the flamingo should be protected as a native species that is either designated as a "species of special concern" or "threatened". The petition was supported by three local Audubon Societies (Tropical Audubon, Audubon of the Everglades, and Florida Keys Audubon). In October 2019, FWC biologists approved the petition to move forward to the Biological Review Group to review the status of the species against state ranking criteria.

Commissioners from the FWC are likely to make a final decision on the status of flamingos in late 2020 or early 2021, and a formal listing under Florida's threatened species laws would lead to increased protections or conservation actions for the Florida population.

Natural dispersal of Flamingos in 2000s

Since banded birds from Yucatan, Mexico were seen in the early 2000s, biologists have pondered the natural dispersal of flamingos in this region. Banded birds "DFJV" and "HRTJ" were observed in Everglades National Park during 2002 and 2012, respectively (Whitfield, et al., 2018). Both birds were observed with other individuals in small groups (three to six birds). These observations provided incontrovertible evidence that natural dispersal occurs and not all flamingos in Florida are escapes of captive origin. On 23rd October 2019, a third banded flamingo (coded "DPDA") was observed in the Calusa Keys in Florida Bay (Figure 1). Banding records reveal that this individual was banded in August 2016

in Ría Lagartos Biosphere Reserve, México (M. Lopez, personal communication). This bird has not been observed since 2019, but a small group of flamingos was observed south of Florida Bay in the Lower Keys in June 2020. Similarly, a small group of six birds was seen at Big Torch Key. Given the 2019 banded flamingo sighting as well as banded bird sightings mentioned in 2002 and 2012, there is a distinct possibility that these individuals could also be migrants from other regions such as Mexico. (Galvez et al., 2016).

Figure 1: Banded "DPDA" in Calusa Keys on 23rd October 2019 (photo credit: Bryan White)

Discussion of current trends

Since 2018, flamingos have continued to appear in Florida. On 16th May 2018, 84 flamingos were observed flying over the turnpike in Miami. On that same day, about 24 flamingos were seen in Biscayne Bay and Snake Bight in Everglades National Park. A month later, on 13th June, about 90 flamingos were observed flying over Miami. As shown in Figure 2, flamingo sightings expanded to a larger area of Florida during the 2010s, with sightings in nearly every region of Florida.

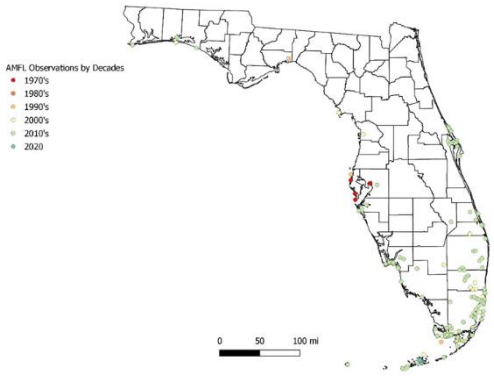

Figure 2: Map of flamingo sightings in Florida from the 1970s to August 2020. Map created by A. Mauro (QGIS 3.14 16-Pi).

While most of the sightings are centred around Everglades National Park and Florida Bay, birds have started to appear in new areas such as Cape Canaveral, Fort Myers, and the panhandle region. Sightings in such new areas have mainly consisted of a singular bird. However, larger groups have been seen since 2010 as well (Table 1). Florida Bay, Everglades National Park, and surrounding southeast Florida areas have seen the largest flocks (Figure 3). More study is needed to determine if these larger flocks correlate with the habitat characteristics of the areas that flamingos are selecting in Florida.

Table 1: Largest flamingo flocks in Florida since 1st January 2020 (asterisk represents flock in flight). Observations without specific dates were recorded to the first date of the month they were observed.

Date	Location	# Birds
01/12/2010	Florida Bay	31
09/11/2011	Florida Bay	20
01/06/2013	Garfield Bight	32
22/06/2013	Matheson Hammock Channel	45*
06/05/2014	Stormwater Treatment Area 2	147
03/05/2014	Stormwater Treatment Area 3/4	20
07/05/2014	Stormwater Treatment Area 2	87
01/07/2015	Solider Key	20

14/05/2016	Stormwater Treatment Area 2	20
16/05/2016	Stormwater Treatment Area 2	36
16/05/2018	Florida Turnpike	84*
16/05/2018	Biscayne Bay	25*
16/05/2018	Snake Bight	24*
13/06/2018	NW 74th, Miami	90*

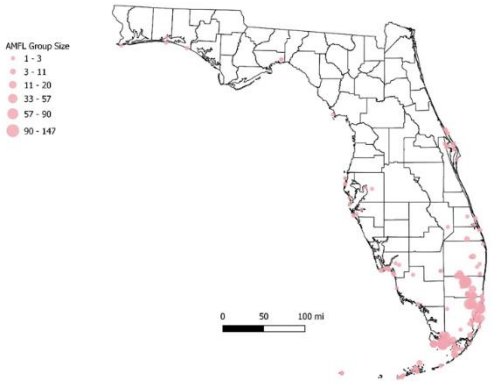

Figure 3: Map of flamingo sightings depicted by group size from the 1970s to August 2020. Map created by A. Mauro (QGIS 3.14 16-Pi).

As discovered by Baldassarre & Arengo (2000), flamingos in Yucatan, Mexico selected foraging habitats with water no deeper than 60 cm. The foraging patches selected were dominated by either plant or invertebrate structures. Flamingos sampled in Uaymitun and Celestun, Mexico selected deeper water, ranging from 30 to 50 cm. Only one group of flamingos was seen foraging in waters less than 2 cm deep (Arengo & Baldassarre, 1999).

In 1859, Bryant found that flamingos in Great Inagua, Bahamas foraged in Lake Windsor, which varied from depths of 25.4 cm to 91.44 cm (Allen, 1956). This water level is deeper than the preference for most Florida wading birds, which favour depths around 10 cm (Gawlik & Crozier 2007; Lantz et al., 2011). This could also help explain why large groups of flamingos appeared in the Everglades during years that were not optimal conditions for smaller wading bird species (Cook, 2014; Cook & Baranski, 2017). The years 2014 and 2016 had relatively poor foraging conditions for smaller wading birds due to wetter than average dry seasons or rain events that produced water level reversals during the dry season (Cook 2014, Cook & Baranski, 2017). While those rain events were not favourable for smaller wading bird foraging conditions, they may have provided high quality food and habitat normally unavailable to flamingos.

Contrastingly, a few groups of flamingos were observed in wetland habitat (Snake Bight and Biscayne Bay) during 2018, a year optimal for smaller foraging and nesting wading birds. This year resulted in historically significant wading bird nesting numbers throughout the Everglades (Cook & Baranski, 2019). Preceding the 2018 nesting season were two tropical storms and Hurricane Irma, which led to above-ground wet conditions for a long period. Slightly higher elevation marshes that are normally over-drained were able to sustain adequate water levels for the production and survival of prey species populations. The following dry season in 2018 was dryer than average, allowing a continuous drop in water levels that created a greater amount of foraging habitat that is not normally available for birds (Cook & Baranski, 2019). This increase in available habitat may have been beneficial for the flocks of flamingos observed flying in the area (Table 1).

While we do not yet fully understand the cause behind the increased flamingo sightings in Florida, it is likely that flamingos are returning to Florida because the population of American flamingos throughout the Caribbean have grown at many nesting sites, and birds are starting to naturally disperse from their breeding grounds (Allen, 1956) (Wiley and Wiley, 1979). According to the latest evaluation by the IUCN in September 2018, the species is currently at 330,000

individuals and is increasing (BirdLife International, 2018).

While estimates for individual nesting colonies are decades-old or not available, there is evidence that shows the species has recovered in total population numbers from hunting pressures in the late 19th century and early 20th centuries. In 1955, Allen reported that there were 21,500 individuals in the Caribbean (Allen, 1956). Sprunt (1975) estimated that there were 57,410 to 65,610 individuals across the Caribbean in 1972. Legal protections and management practices have helped in leading several breeding populations to recovery in several Caribbean regions as well. Breeding populations in the Yucatan, Cuba, Great Inagua, and Venezuela have all increased (Baldassare & Arengo, 2000; Espinoza et al. 2000; Johnson 2000).

One noteworthy occurrence of flamingo sightings has occurred in St. Marks National Wildlife Refuge (St. Mark's NWF) in Wakulla, Florida. Since 31st October 2018, a lone flamingo has been observed at the refuge. It has been seen year-round, except for the months of August and September. The flamingo arrived after Hurricane Michael in 2018. Using eBird data (Sullivan et al., 2009), observations of the flamingo from November 2018 to August 2020 were mapped by season in Figure 4. Since 2018, the flamingo has been observed on 15 days during autumn (October and November), 98 days in the winter (December to February), 109 days in the spring (March to May) and 30 days in the summer (June and July). Despite the bias in citizen science data, the occurrence of this bird (and others) indicates that there is suitable, year-round, habitat for flamingos in various locations throughout the state of Florida.

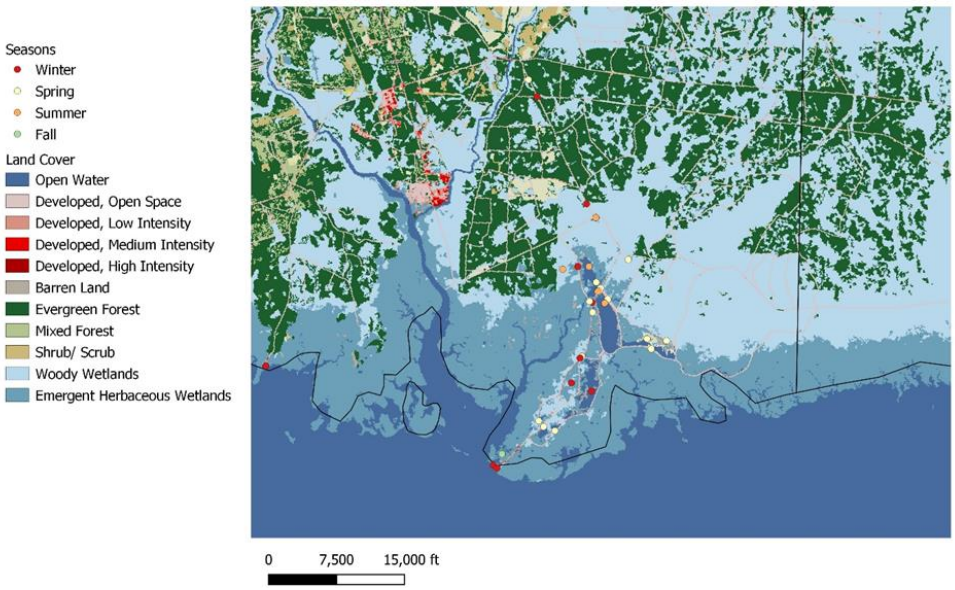

Figure 4: Map of flamingo sightings in St. Mark's National Wildlife Refuge from 1st November 1 2018 to August 2020 by season on land cover as categorized by National Land Cover Database 2016. Map created by A. Mauro (QGIS 3.14 16-Pi).

An interesting aspect of the sighting at St. Mark's NWR was the habitat the flamingo was using. Most flamingo habitat consists of remote, desolate areas with minimal flora or fauna diversity (Allen, 1956; Chandler, 1988; Espino-Barros & Baldassarre, 1989; Brown & King, 2005). Early naturalists and biologists often remarked at how shocked they were to find that much of the habitat had a "virtual absence of visible life" (Allen, 1956). St. Mark's NWR is a popular destination for tourists and is easily accessible via a paved road that travels through the managed impoundment habitat the flamingo was using

(Burnett, 2013). The impoundment is also adjacent to salt marsh and freshwater marsh habitat. The salt marsh is dominated by various emergent plant species such as black needlerush (*Juncus roemerianus*), smooth cordgrass (*Spartina alterniflora*), and saltmeadow cordgrass (*Spartina patens*). The freshwater marsh habitat is dominated by emergent herbaceous plants and sparse woody shrubs or small trees (Burnett, 2013).

Many flamingo habitats are also consistent with high salinity lagoons or vast, shallow waters. (Allen, 1956; Baldassarre & Arengo, 2000; Herrera-Silveira et al., 2001). Allen's (1956) report recorded flamingos using habitats with salinity ranging from 27.5 parts per million (ppm) in Rio Cauto, Cuba to 181.4 ppm in Yucatan, Mexico. In 2000, high-salinity ponds in Yucatan were reported with a higher range of salinity reaching 205 ppm (Baldassarre & Arengo, 2000). In 2008, bottom salinity at St. Marks estuary was 28 to 30 ppm and surface salinity was 18 to 20 ppm, comparable to the lower range of salinity recorded in 1956.

Under a projected sea level rise of 0.85 m, the surface salinity ranges from 24 to 25 ppm and the bottom salinity increases to 33 ppm (Xiao et al., 2014). It is quite possible that as sea levels rise, salinity will increase to concentrations in which flamingos thrive. More research is needed to study the effects of sea level rise on habitat salinity requirements with the American flamingo throughout its range.

Conclusions

The 2018 review of American (Caribbean) flamingos in Florida catalysed an interest in this species and this story for the public, organisations and agencies. While we await for the results of the petition in 2021, we continue to see flamingos using a variety of habitat types throughout Florida. More study is needed to better understand the natural history and current trends of flamingos in the state, including, but not limited to foraging patch selection, salinity significance, and geographic origins. State of Florida legal protection of the species would be instrumental to future research and management activities.

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