

# Northward Expansion of Two Palms Native to the Southeastern USA

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Since 2010, I have documented the presence of *Roystonea regia* naturalizing within the Emerson Point Preserve in Manatee County, Florida, approximately 160 kilometers (100 miles) north of the nearest habitat in the Fakahatchee strand, and 55.5 kilometers (34.5 miles) north of the northernmost vouchered population in DeSoto County. Additionally, palm hobbyists in North Carolina and Florida have used satellite imagery to identify a population of *Sabal palmetto* in Kure Beach, New Hanover County, North Carolina, that is 10 kilometers (6.21 miles) north of the northernmost historical population on Bald Head Island, Brunswick County, North Carolina. This article will discuss potential causes behind this northward expansion and provide photographic documentation of both groupings.

Palms, as a family, consist of a large number of species which inhabit a diverse range of habitats. Due to their tropical appearance, palms are often planted in landscapes far outside their native range. In the US southeast, *Sabal palmetto* and *Roystonea regia* are two of the most commonly planted native palms in the landscape (Fitzpatrick 2005). *Sabal palmetto* is native to a diverse range of habitats in Florida, Georgia, South Carolina and North Carolina, and the current northernmost vouchered population occurs on Bald Head Island, in Brunswick County in North Carolina (Zona 1990). Due to the adaptability of the species, as well as its cold hardiness, landscape specimens are found much further north, and

it is not uncommon to see fully mature specimens as far north as Virginia Beach (Virginia). *Roystonea regia* is somewhat more limited in its native habitat requirements, and within Florida it is currently vouchered for only Collier, Desoto, Dade, Martin, Monroe (mainland), and Martin Counties (Wunderlin et al. 2020). Moreover, it is classically listed as being distributed in the hammocks of the Everglades in Collier, Dade and Monroe counties (Zona 1996). Despite this, it is commonly found through landscaping in suitable zones in Florida, mainly within the southern third of the state (with some individuals surviving to maturity in private gardens as far north as Jacksonville). These range reports have been relatively stable (with one exception, discussed later in this article), despite the ready availability of both species for much of this time. Climate change appears to be altering the climate of the southeastern US, facilitating northward migration of both species in the environment.

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Somewhat counterintuitively, the ability to cultivate a palm in a particular area is not necessarily indicative of a palm's ability to grow wild in that area, as the environmental conditions of cultivation can facilitate growth of palms when they would otherwise perish under natural circumstances (Eiserhardt et al. 2011). Studies on modern palms have demonstrated that temperature range is the primary factor restricting palms from growing wild in areas where they may be found in cultivation, but other factors like availability of water and topography are important at the local scale (where temperature range is adequate).

Recent work has demonstrated the northern expansion of palms coinciding with increased average temperatures, including another member of the genus *Sabal*, *S. minor*, both at the northeastern most portion of its range in North Carolina (Tripp & Dexter 2006), as well as at the northwesternmost portion of its range in southeast Oklahoma (Butler et al. 2011, Butler & Tran 2017). Moreover, recent work predicts that northward expansion of several palm species native to the Southeastern US (*Sabal etonia*, *S. minor*, *S. palmetto*, *Rhapidophyllum hystrix* and *Serenoa repens*), with the northern shift of the centroid of the range of each species predicted to occur at a rate of 23.5 km/decade. This was most notable for *S. palmetto*, whose distribution was predicted to increase by a median of 21% by 2070. Other species were predicted to shift northward as the southern portion of their habitat became unsuitable, most notably for *S. etonia* and *S. minor*, which were predicted to become extirpated at the southernmost portion of their current habitat by 2070 due to warming climate (Butler & Larson 2020), although *S. minor* may be more tolerant of warm conditions than current range suggests, as evidenced by an isolated population of *S. minor* south of its main range in Nuevo León, Mexico (Goldman 1999).

Surveys by the US Forestry Service have demonstrated a general northward migration of up to 70% of tree species in recent years. The current rate is not known, but fossil plant and pollen records have generally demonstrated a northward migration at the rate of 50 km per century during warming periods. Current migration of tree species is typically assessed by examining the average age of the tree within a known area. Predominance of seedlings and immature trees suggest a younger population, whereas predominance

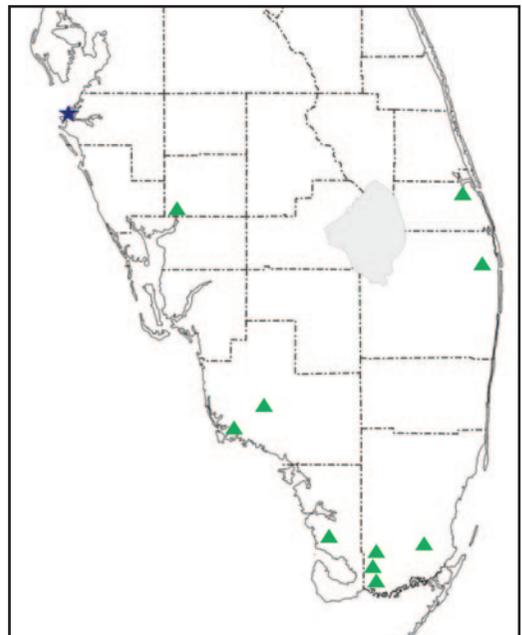
of more mature trees suggest an older population (United States Forest Service 2010). As will be described below, both populations listed in this current observation are represented largely by younger plants.

### Northward expansion of *Roystonea regia* habitat

To underscore the significance of a northward moving *Roystonea regia* in Florida, a brief history of the species may be helpful. *Roystonea regia* was originally described in Florida by William Bartram in 1774 near Lake Dexter along the St. John's River. This originally described population is no longer present, and current hypotheses suggest that severe 1835 weather or exploitation of palm wood may have caused the demise of that population (Small 1928). Nonetheless, currently the northernmost vouchered native specimen of *R. regia* exists within the Deep Creek Preserve in DeSoto County, Florida (Wunderlin et al. 2020). Before publication of this article, *R. regia* has not been described naturalizing north of this population, despite having been cultivated in Manatee County for nearly as long as the nursery trade has existed in the state.

The first recorded collection of *Roystonea regia* from the Everglades for nursery trade and cultivation was made in April of 1885 by Pliny

1. Map of the southern portion of Florida with Emerson Point Preserve marked with a star. Currently vouchered populations of *Roystonea regia* marked with triangles.





2. *Roystonea regia* in Emerson Point Preserve.



3. *Roystonea regia* in Emerson Point Preserve.



4. Juvenile *Roystonea regia* in Emerson Point Preserve.

Reasoner of the Reasoner Brother's nursery in Oneco, Florida (Reasoner 1886–87, Simpson 1902). Since then, *R. regia* has been a staple in Manatee County landscaping, and century-old specimens still exist in some areas of Manatee County from the original collections by the Reasoner Brothers. Possibly most notable of these palms is a grouping at the historic Haley house in Palmetto, Florida, seen by many who have driven along the Bob Graham Sunshine Skyway Bridge. The presence of these individuals in the area stands testament to the long-term ability of this species to grow in Central Florida, despite the infrequent deep freezes. The question then arises as to why the species has not naturalized at this latitude during this span of time. Other work, which has studied the spread of *Trachycarpus fortunei* in the forests of southern Ticino and Northern Lago Maggiore, has shown that warming climate can allow a palm species which has been successfully cultivated in an area for many years to spread into nearby forests as the climate warms and becomes more suitable to naturalization (suggesting that climate appropriate for naturalization may be warmer than that required for cultivation) (Walther 2007, Fehr & Burga 2016).

Within the Emerson Point Preserve of Manatee County, Florida, is a pre-Columbian Portavant

Temple Mound Complex, the largest Amerindian temple mound in the Tampa Bay region. Most of this mound is within or adjacent to the park's tropical hardwood hammock habitat (Tryon 2013). Per the Manatee County Parks and Natural Resources Department, canopy trees within this community consist of many West-Indian-origin trees and shrubs, and the dominant species seen are *Quercus virginiana*, *Capparis cynophallophora*, *Bursera simaruba*, *Sideroxylon foetidissimum*, *Eugenia axillaris*, *Zanthoxylum fagara*, *Ficus aurea*, *Coccoloba uvifera*, *Ardisia escallonioides* and *Lysiloma latisiliquum*. In this temple mound complex, soil mainly consists of calciferous shell substrate, with flatter areas predominated by Eau Gallie fine sand (Hunsicker 2013) Average yearly rainfall totals 142 cm (56 in), with the majority of this falling between the months of June and September. Climate of the area is considered humid subtropical, closely bordering a tropical savanna climate, with cold-snaps being significantly moderated by the near-by waterways, such as the Terra Ceia Bay, the Tampa Bay, the Manatee River, and the Gulf of Mexico (NOAA 2018). A map of the southern portion of Florida with the location of the preserve denoted by a star can be seen in Figure 1 (Wunderlin et al. 2020). Though not listed by the Manatee County Parks and



5. Map of the eastern portion of North Carolina with Kure Beach marked with a star. Currently vouchered populations of *Sabal palmetto* on Bald Head Island marked with a triangle.

Natural Resources Department within the species list in their management plan, multiple individuals of *Roystonea regia* are present within this area. During survey of the area, I noted 12 easily accessible individuals with ringed trunk up to 5 m (16.4 ft), 15 individuals with fully pinnate leaves but no ringed trunk, and five to ten seedlings (individuals without fully pinnate leaves) (Figs 2–4). In my ten years of observing the population at Emerson Point

Preserve, I have noticed numerous palms that do not continue to develop past the seedling stage before perishing. However, individuals which developed fully pinnate leaves have generally survived once they reach this stage. The reason for this could be due to the lesser amount of rainfall during the dry season compared to the rainy season, as larger palms would have more extensive root systems and would be more resistant to drought, whereas smaller seedlings would more easily succumb. The size of the largest individuals, considering the quick growth of *R. regia* juvenile, suggest that the population of naturalized palms within the park is less than 20 years old. These palms are presumably the offspring of a number of large *R. regia* planted in the park when the property was purchased by Peter and Golden in 1910 (FCIT 2019). There are currently four surviving individuals from this original planting. Given the time of planting, and years of Reasoner's Nursery operation, these cultivated palms were most likely provided by the Reasoner's Nursery collection (Reasoner 1886–87). Some studies suggest that palms at the northern edge of their range may exhibit some additional cold hardiness, such as with the Oklahoma population of *S. minor* (Butler & Tran 2017), so it is possible that these

6. Kure Beach *Sabal palmetto*. Photo by Chris Eaton.





7. Kure Beach *Sabal palmetto* seedlings. Photo by Vincent Mario Falvo.

*R. regia*, likely sourced from the Florida population in the Everglades may have additional hardiness compared with individuals sourced from the Cuban population, introduced into the state by Thomas Edison (Dunn 1960).

As mentioned above, the main limiting factor behind distribution of a palm species is temperature range, with other factors like availability of water and topography becoming more important at the local scale. The presence of century-old palms within the region suggests that temperature range plays a small role for already established palms. However, as also mentioned previously, ecology in cultivation is distinct from that in the wild, and the establishment phase of the palm may be the limiting factor. Seedlings within the population appear to have a high mortality rate, as their smaller root systems are more susceptible to periods of cold and drought. However, water availability varies within the county, and areas exist which display waterlogged soils during droughts which should sustain *Roystonea regia*. These areas,

however, tend to be located inland of the narrow band in which freezes are infrequent at this latitude within the state. As average temperatures in Florida have been increasing, and as freezes become less frequent, this could be the difference between survival and damping off of the royal palm seedlings. This changing climate could help explain the new increase in range.

#### Northward expansion of *Sabal palmetto* range

As mentioned above, currently the northernmost vouchered population of *Sabal palmetto* exists on Bald Head Island, in Brunswick County in North Carolina (Zona 1990) A combination of climate change, plus pressure from herbivory, may have led to the increase in relative local density of *S. palmetto* (Smith et al. 2015). Recently, members of an online palm forum have used satellite imagery to identify several palms located in Kure Beach, North Carolina, approximately 10 Kilometers (6.21 miles) north of the population on Bald Head Island (and, notably, in a more northern

county). A map of the eastern portion of North Carolina with the location of Kure Beach denoted by a star can be seen in Fig. 5. After potential identification of these *S. palmetto* individuals via satellite imagery, Mr. Chris Eaton and Mr. Vincent Mario Falvo traveled to locate these *S. palmetto* specimens. It was observed that there were a number of *S. palmetto* growing within the maritime forest in the Kure Beach area. This included over 30 juvenile, non-trunking palms, 5–10 trunking palms (with petiole boots) up to 2 m (6.5 feet) in height, and at least one trunking palm with petiole boots fully shed at approx. 3 m (10 ft) in height. Unlike the population of *Roystonea regia* mentioned earlier in this article, the *S. palmetto* population discussed here consists of mostly juvenile individuals, with mature trees making up a small portion of the population. However, given that the oldest palms in the population are mature enough for seed production (Figs 6 & 7), it is still possible that this population could be self-sustaining. One should also remember that *S. palmetto* is slower to gain vertical height than *R. regia*, thus the younger population could be indicative of the slower growth rate. Of note, another juvenile *S. palmetto* was found growing in the woods of Emerald Isle Woods Park, 66 miles (106 km) north of the population on Bald Head Island. No other *S. palmetto* were found nearby, so this is not sufficient evidence to indicate that *S. palmetto* has become established in this location, but is an interesting curiosity given the findings in Kure Beach.

As with *Roystonea regia* in Florida, *Sabal palmetto* is historically common in coastal Carolinian landscaping, but this landscaping is primarily done through transplanting of mature palms from Florida. Previous research has demonstrated that nurseries and ornamental plantings may play a role in expanding the range of palm species (Svenning 2002), including in the northern expansion of native palms, such as *Washingtonia filifera* into the Death Valley via ornamental plantings nearby (Cornett 1987, Holmquest et al. 2011), so more investigation may be needed to determine if these northern naturalized *S. palmetto* palms originate from the Bald Head population or from more close-by landscaping specimens.

### Conclusion

This current observation supports potential northward naturalization of two palm species in the southeastern United States, a

phenomenon which may be due in part or whole to continuance of warming climates. Further research may be needed to determine the extent of northward movement of these two species, as well as the other 13 palm species native to the southeastern United States. Many of these native palms appear to be restricted by local ecology and slow growth, rather than absolute cold tolerance. However, these species are becoming more frequently used in public landscapes outside of their natural habitat, as the benefits of landscaping with native plants become more widely known, and thus habitat expansion may begin to occur.

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