

## NATURALIZED POPULATIONS OF THE DEVILTREE, *ALSTONIA MACROPHYLLA*, IN PALM BEACH CO., FLORIDA

**JAMES K. WETTERER**

wetterer@fau.edu

**ANGELA CALICCHIO**

acalicchio2019@fau.edu

Wilkes Honors College  
Florida Atlantic University  
Jupiter, Florida

### ABSTRACT

The deviltree, *Alstonia macrophylla* (Apocynaceae), is an evergreen tree native to tropical Southeast Asia, where it is used extensively in traditional medicines. This species has been introduced to several regions outside of its native range, including Sri Lanka, India, Seychelles, Fiji, Hawaii, and Florida. Populations have escaped cultivation and become naturalized in Puerto Rico and perhaps Brazil. All published records of naturalized *A. macrophylla* populations in the USA are from Miami-Dade Co., Florida, where it is becoming widespread. Here, we document two large naturalized populations of *A. macrophylla* in Palm Beach Co., in Boynton Beach/Lantana and West Palm Beach, and one record of this species apparently extirpated in Boca Raton.

The deviltree, *Alstonia macrophylla* Wallich ex. G. Don (Figs. 1–2), is an evergreen tree of Apocynaceae native to tropical Southeast Asia. Mature trees are typically 10–20 meters tall (Monachino 1949) but can grow to a mean height of up to 29.6m in 20 years on tree plantations (Subasinghe 2010). Trees have very large leaves, even as saplings (Fig. 1), a feature alluded to by its epithet. *Alstonia macrophylla* is used extensively in traditional medicines in Southeast Asia, and most research publications concerning it examine bioactive chemicals found in bark and leaves (see Khyade et al. 2014). The species has introduced populations in several regions outside of its native range, including Sri Lanka, India, Seychelles, Fiji, Hawaii, and Florida (Smith 1988; Fleischmann 1997; Wagner et al. 1997; Weerawardane and Dissanayake 2005). It is cultivated in some areas as an agroforestry species (e.g., in Sri Lanka; Subasinghe 2010). Due to its fast growth, it can invade and disrupt native forest restoration projects (Jayawardhane and Gunaratne 2022).

The oldest published record of *Alstonia macrophylla* in the New World is of seeds imported by the U.S. Department of Agriculture's Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry:

"58390. ALSTONIA MACROPHYLLA Wall. Apocynaceae. From Peradeniya, Ceylon. Seeds presented by H.F. Macmillan, superintendent, botanic gardens. Received December 21, 1923. A shrub or small tree, native to the East Indies and the Philippines, introduced for testing by rubber specialists. Most of the members of the family to which this species belongs contain milky latex" (USDA 1926).

All published records of naturalized *Alstonia macrophylla* populations in the New World come from Miami-Dade Co., Florida. Pascarella (1994) summarized its spread in Florida, starting with the earliest record listed:

"Miami. Escape from U.S.D.A. Hammock along Old Cutler Rd. 12 Dec. 1959... *Alstonia macrophylla* is now very abundant in open areas west of Matheson Hammock near Snapper Canal. Other collections have been made in hammocks, pinelands, and disturbed areas."

Pascarella proposed that the species "has likely spread through the wind dispersed seeds from specimens at Fairchild Tropical Gardens and the USDA Plant Introduction Center at Chapman Field." Chapman Field, run by the US Department of Agriculture, includes "land on which to plant out the increasing number of useful and ornamental plants that are coming in from explorers and correspondents" (Fairchild 1934). Langeland and Stocker (2000) wrote that *A. macrophylla* was "becoming widespread" in Miami-Dade County. The Floristic Inventory of South Florida database (Gann et al. 2024) lists *A. macrophylla* as naturalized in four conservation areas, all in Miami-Dade County: Alice C. Wainwright Park, Deering Estate at Cutler, Hattie Bauer Hammock, and Matheson Hammock Park. The Florida Invasive Species Council (FLEPPC 2019) lists it as a Category II invasive, defined as "Species that have shown a potential to disrupt native plant communities. These species may become ranked as Category I, but have not yet demonstrated disruption of natural Florida communities."

The Early Detection and Distribution Mapping System website (EDDMapS 2024) currently lists 29 site records of *Alstonia macrophylla* in Florida. These include two records from outside of Miami-Dade County, both on the property of Pine Jog Environmental Education Center ("Pine Jog") in Palm Beach County. On 19 March 2004, *A. macrophylla* was observed with a comment by the surveyor, Michael Yustin: "This plant is rapidly spreading across the property with new seedlings popping up all the time." In 2010, Florida Natural Areas Inventory Database reported *A. macrophylla* present at Pine Jog based on "data from staff knowledge." Pine Jog is an education center in West Palm Beach, set on a 0.6 km<sup>2</sup> property that includes an elementary school, a Florida Atlantic University research and teaching lab, and a nature preserve. Pine Jog is the former estate of Mr. and Mrs. Alfred G. Kay, who purchased the land in 1946 and named it Pine Jog Plantation. The Kays, "after numerous discussions with John Storer, David Fairchild, Marston Bates, and others, decided to provide the area with an environmental center" (Austin 1976).

Beginning in February 2022, JKW photographed large-leaf trees growing on the grounds of Pine Jog and posted the photos to the iNaturalist website (iNaturalist.org). Alan Franck, collection manager at the University of Florida Herbarium (FLAS), identified the trees as *Alstonia macrophylla*. In August 2022, JKW discovered a second naturalized population in Palm Beach County, straddling the border of Boynton Beach and Lantana. Here, we document the spread of *A. macrophylla* at these two Palm Beach County sites and report one observation from a third site (Fig. 3).

## METHODS

To document the spread of *Alstonia macrophylla* in Palm Beach County, we searched for and photographed this species and posted geo-referenced photographs to iNaturalist. In addition, we searched through photographs posted to iNaturalist for additional observations. We also looked at herbarium specimen records compiled on the Global Biodiversity Information Facility (gbif.org).

Vouchers of Pine Jog records are deposited at the University of Florida Herbarium (FLAS, Accessions #281805 and #281806).

The iNaturalist and EDDMapS observations are mapped using Google Earth. We calculated the area of the minimum convex polygon (MCP) occupied by each population, drawing the smallest polygon around observation points with all interior angles <180°.

## RESULTS

We mapped a total of 244 iNaturalist observations (including 168 by us) and 29 EDDMapS observations of *Alstonia macrophylla* from Florida (Fig. 3). Of these, 168 iNaturalist observations (including 156 by us) and one EDDMapS observation (see above) were from three sites in Palm Beach County: Pine Jog (Fig. 4; n = 114; MCP = 11.0 ha), Boynton Beach/Lantana (Fig 5; n = 53; MCP = 4.9 ha), and Boca Raton (C in Fig. 3; n = 1). Eight other people, including five Wilkes Honors College students, posted 12 *A. macrophylla* iNaturalist observations from Palm Beach County. The populations

at Pine Jog and Boynton Beach/Lantana consisted of several hundred trees. Many were <5m tall, but some were >10m tall (e.g., Fig. 2).

At Pine Jog, most *Alstonia macrophylla* trees were growing near the north end of the property (Fig. 4). This area has large populations of several other non-native plants, e.g., *Psychotria punctata* Vatke (see Wetterer 2022). Several trees, however, were growing farther south on the property, in relatively open areas dominated by native vegetation (Fig. 4).

At the Boynton Beach/Lantana site, we found *Alstonia macrophylla* primarily in a wooded area at the south end of NW 7th Court (Fig. 5). In addition, there were several trees and numerous saplings on the south side of Newport Place (see Fig. 5). One iNaturalist observation of an *A. macrophylla* sapling in Boca Raton was mapped with a high level of error to the middle of High Ridge Road (inaturalist.org/observations/142558547; 22 August 2022; novil2021). The geo-coordinates of iNaturalist observations that novil2021 made immediately before and after this one indicate that this observation was actually from several meters east of High Ridge Road, within High Ridge Scrub Natural Area (Fig. 5). We could not find any *A. macrophylla* in this area. The land manager of High Ridge Scrub Natural Area, Torey Strange (pers. comm.), believes this sapling was removed. The rapid growth of *A. macrophylla* trees can be seen in Google Street View looking south on Newport Place at 26.5694°N, 80.0755°W. In the April 2024 view, a tree extends several meters above surrounding vegetation (as in Fig. 2), while in in June 2022, only the top two meters of the tree is visible. In the December 2016 and earlier street views, no trees are visible. There are many more places in Miami-Dade County where Google Street View can be used to follow rapid *A. macrophylla* tree growth, e.g., two trees planted at 25.7525°N, 80.2054°W.

In Boca Raton, Antonio Rodriguez, who works for the Palm Beach County Department of Environmental Resource Management removing invasive plants from county natural areas, posted a photo of one *Alstonia macrophylla* sapling growing in the Yamato Scrub Natural Area ("Yamato Scrub") (C in Fig. 3; inaturalist.org/observations/115358199; 4 May 2022). On 6 February 2023, JKW searched this site and found no *A. macrophylla*. Lee Lietzke (pers. comm.), land manager for Yamato Scrub, said that crews cleared out many exotics in November 2022 and they must have cut down the *A. macrophylla* sapling. In addition, there was one other observation of *A. macrophylla* in Boca Raton, growing in cultivation at the Morikami Museum and Japanese Garden (inaturalist.org/observations/141920243; 13 November 2022; mmoncayo2021) (D in Fig 3).

In addition to Miami-Dade and Palm Beach records of *Alstonia macrophylla*, there is one herbarium specimen record from Fort Myers in Lee Co., Florida, but lacking information on whether it was cultivated (gbif.org/occurrence/122897528).

## DISCUSSION

We documented two naturalized population of *Alstonia macrophylla* thriving in Palm Beach Co., Florida. It seems unlikely that this species naturally spread from Miami-Dade to Palm Beach simply through wind dispersal of its seeds. The population at Pine Jog may descend from trees originally planted by the former owners of the property. Plants at the Morikami Museum and Japanese Garden, located less than 7 kilometers west of Yamato Scrub, may have been the seed source for the sapling observed in the Yamato Scrub.

Elsewhere in the New World, populations of *Alstonia macrophylla* appear to have escaped cultivation and become naturalized in Puerto Rico. Francis (1989) reported 49 trees planted at the Luquillo Forest Arboretum in Puerto Rico to evaluate its forestry potential. Irish et al. (2014) recorded *A. macrophylla* cultivated at the USDA Tropical Agriculture Research Station in Mayaguez, Puerto Rico, and Lugo & Rullán (2015) listed *A. macrophylla* growing on the grounds of the International Institute of Tropical Forestry headquarters in Rio Piedras, Puerto Rico. There are observations of *A.*

*macrophylla* on iNaturalist and herbarium specimens from sites in Puerto Rico, which appear to be from naturalized populations (e.g., [inaturalist.org/observations/155183474](https://www.inaturalist.org/observations/155183474) and [gbif.org/occurrence/2236011969](https://www.gbif.org/occurrence/2236011969)).

Finally, there are numerous herbarium specimens of *Alstonia macrophylla* from Brazil (see [www.gbif.org/occurrence/search?country=BR&taxon\\_key=5414411&advanced=1](https://www.gbif.org/occurrence/search?country=BR&taxon_key=5414411&advanced=1)). All appear to come from cultivated populations, e.g., growing in botanical gardens.

### ACKNOWLEDGEMENTS

We thank A. Franck, M. Wetterer, and S. Wetterer for comments on this manuscript; A. Franck for identifying the trees and for preparing herbarium voucher specimens; A. Rodriguez, L. Lietzke, and T. Strange for information on *Alstonia macrophylla* in Palm Beach County natural areas; and Florida Atlantic University for financial support.

### LITERATURE CITED

- Austin, D. 1976. Vegetation of southeastern Florida – I. Pine Jog. Fla. Sci. 39: 230–235.
- EDDMapS. 2024. Deviltree (*Alstonia macrophylla*). Early Detection & Distribution Mapping System. University of Georgia, Center for Invasive Species and Ecosystem Health. <<https://www.eddmaps.org/distribution/List.cfm?sub=5062>>
- Fairchild, D. 1934. Reasons for a large general plant introduction garden in southern Florida. Proc. Fla. State Hort. Soc. 47: 117–119.
- Fleischmann, K. 1997. Invasion of alien woody plants on the islands of Mahe and Silhouette, Seychelles. J. Veg. Sci. 8: 5–12.
- FLEPPC. 2019. Florida Exotic Pest Plant Council’s 2019 List of Invasive Plant Species. <[https://bugwoodcloud.org/CDN/fleppc/plantlists/2019/2019\\_Plant\\_List\\_ABSOLUTE\\_FINAL.pdf](https://bugwoodcloud.org/CDN/fleppc/plantlists/2019/2019_Plant_List_ABSOLUTE_FINAL.pdf)>
- Francis, J.K. 1989. The Luquillo Experimental Forest Arboretum. USDA Forest Service, Southern Forest Experiment Station Res. Note SO-358: 1–8. <<https://doi.org/10.2737/SO-RN-358>>
- Gann, G.D., C.S. Stocking, and collaborators. 2022. *Alstonia macrophylla* Wallich ex G. Don. Deviltree. The Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation, Delray Beach, Florida. <<https://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Alstmacr>> Accessed 29 June 2022.
- Jayawardhane, J. and A.M.T.A. Gunaratne. 2022. Influence of *Alstonia macrophylla* spread on the restoration success of pine conversion programs in Sri Lanka. J. Trop. For. Sci. 34: 285–295.
- Khyade, M.S., D.M. Kasote, and N.P. Vaikos. 2014. *Alstonia scholaris* (L.) R. Br. and *Alstonia macrophylla* Wall. ex G. Don: A comparative review on traditional uses, phytochemistry and pharmacology. J. Ethnopharmacol. 153: 1–18.
- Langeland, K.A. and R.K. Stocker. 2001. Control of non-native plants in natural areas of Florida. University of Florida Extension, Institute of Food and Agricultural Sciences SP 242: 1–34.
- Lugo, A.E. and J. Rullán. 2005. The conservation message of the rehabilitated facilities of the International Institute of Tropical Forestry. Res. Note IITF-RN-2. U.S. Dept. Agric. Forest Service, International Institute of Tropical Forestry, Rio Piedras, PR. <<https://doi.org/10.2737/IITF-RN-2>>
- Monachino, J. 1949. A revision of the genus *Alstonia* (Apocynaceae). Pacific Sci. 3: 133–182.
- Pascarella, J.B. 1994. Additions to the flora of South Florida: Four new species of naturalized tropical trees. Fla. Sci. 57: 173–176.
- Smith, A.C. 1988. *Alstonia macrophylla*. Flora Vitiensis Nova 4: 78.
- Subasinghe, S.M.C.U.P. 2010. Predictions of stem volume of *Alstonia macrophylla* growing as even-aged monocultures using diameter at breast height and total height. Proc. Internatl. For. Environ. Symp. 15: 250–258.

- USDA (US Dept. of Agriculture) 1926. Inventory of seeds and plants imported by the Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, during the period from October 1 to December 31, 1923. U.S. Dept. Agric., Bureau Plant Industry 77: 1–20.
- Wagner, W.L., R.K. Shannon, and D.R. Herbst. 1997. Contributions to the flora of Hawai'i. VI. Bishop Mus. Occas. Pap. 48: 51–65.
- Weerawardane, N.D.R. and J. Dissanayake. 2005. Status of forest invasive species in Sri Lanka. Proc. AsiaPacific For. Invasive Species Conf., pp. 114–120. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand, RAP publication, 2005/18.
- Wetterer, J.K. 2022. Naturalized populations of dotted wild coffee (*Psychotria punctata*) in Broward and Palm Beach counties, Florida. *Phytoneuron* 2022-32: 1–6.



Figure 1. Leaf of an *Alstonia macrophylla* sapling at Pine Jog Environmental Education Center (iNaturalist.org/observations/112088029; 22 April 2022; James K. Wetterer).



Figure 2. A fruiting *Alstonia macrophylla* tree visible from Newport Place, Boynton Beach/Lantana ([inaturalist.org/observations/209812964](https://inaturalist.org/observations/209812964); 26 April 2024; James K. Wetterer).

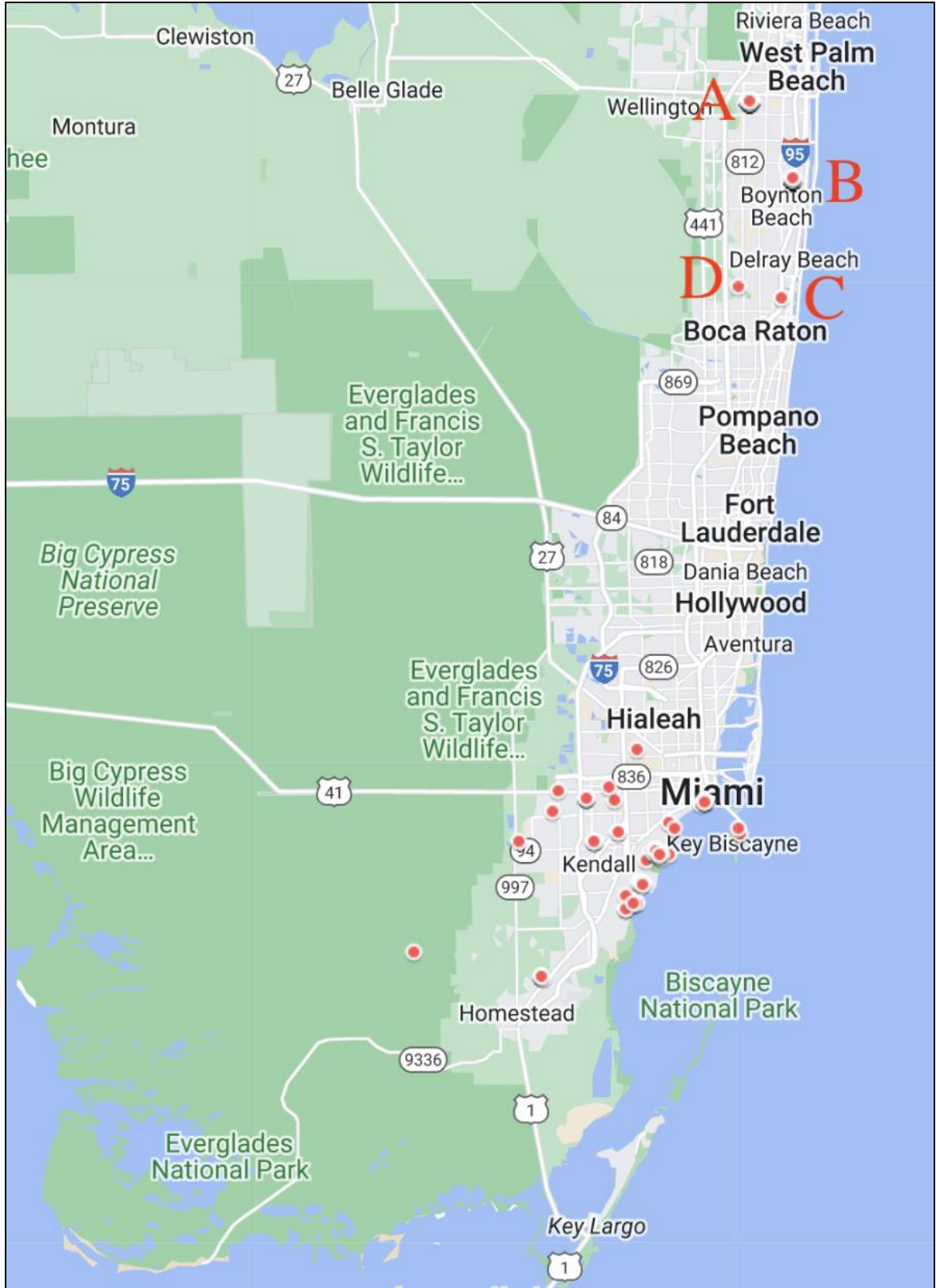


Figure 3. Observations of *Alstonia macrophylla* trees in South Florida based on records from EDDmapS and iNaturalist. A= Pine Jog Environmental Education Center, B = Boynton Beach/Lantana, C = Yamato Scrub Natural Area, D = Morikami Museum and Japanese Garden (map made using Google Earth).



Figure 4. Observations of *Alstonia macrophylla* trees at Pine Jog Environmental Education Center in West Palm Beach (A in Fig. 3) posted to iNaturalist, plus one EDDmapS record (map made using Google Earth).



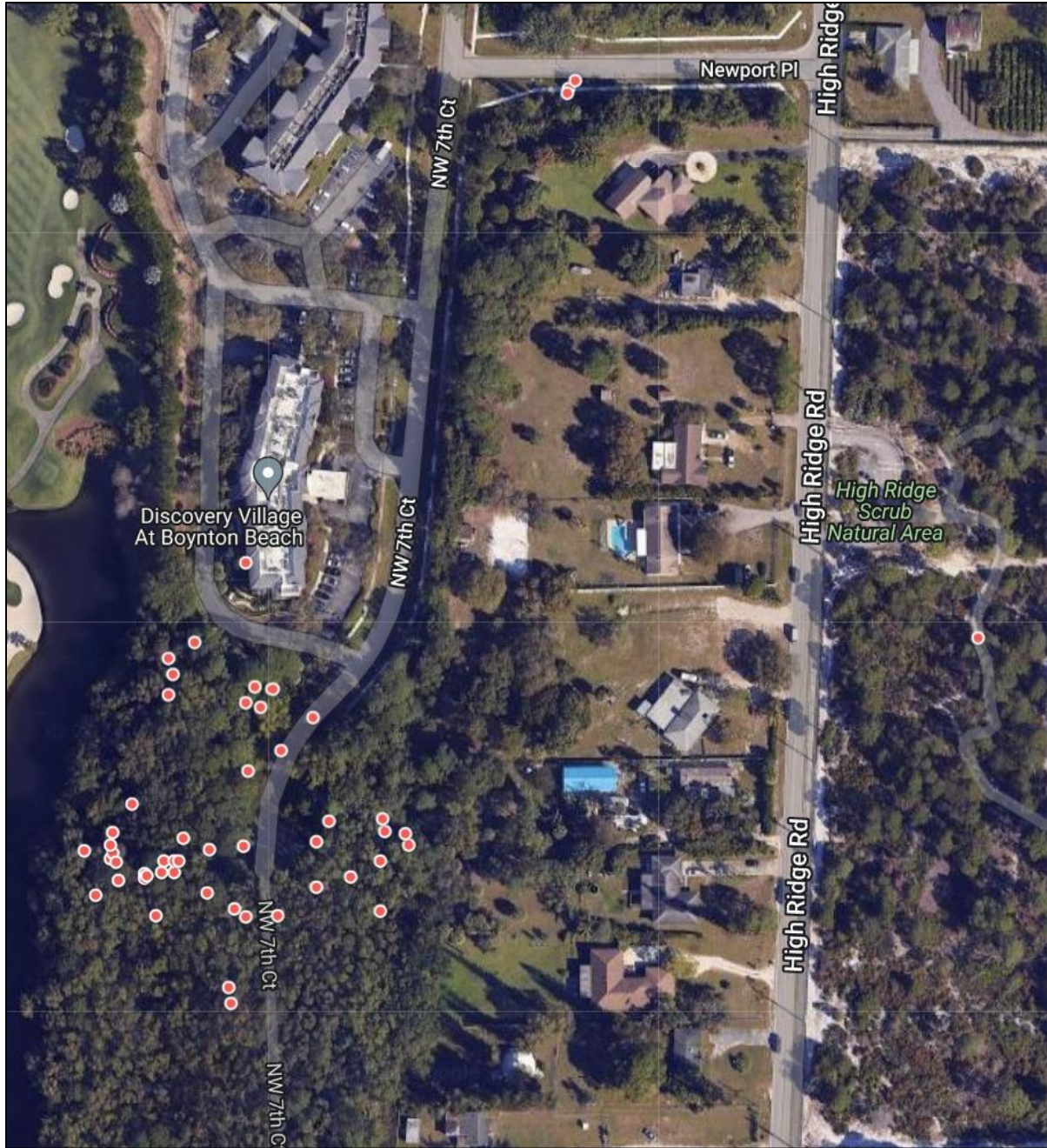


Figure 5. Observations of *Alstonia macrophylla* trees at the Boynton Beach/Lantana site (B in Fig. 3) posted to iNaturalist (map made using Google Earth). Observations west of NW 7th Court and on Newport Place are in Boynton Beach; the rest are in Lantana.