

## ***BIGELOWIA NUDATA* (ASTERACEAE): SUBSPECIES AT SPECIFIC RANK**

**GUY L. NESOM**

Research Associate

Academy of Natural Sciences of Drexel University

Philadelphia, Pennsylvania

guynesom@sbcglobal.net

### **ABSTRACT**

*Bigelowia nudata* subsp. *australis*, a Florida endemic, is recognized here at specific rank as ***Bigelowia australis*** (L.C. Anderson) Nesom, **comb. et stat. nov.**, morphologically and geographically distinct from typical and more widespread *B. nudata*. Gene flow may occur where the two are sympatric in northwestern Florida but a marked distinction in growth habit appears to be constant. In situ photos, images of herbarium specimens, and a distribution map are provided.

*Bigelowia* DC. comprises two species, following Anderson (1970, 1972, 1977) — *B. nudata* (Michx.) DC., with two subspecies, and *B. nuttallii* L.C. Anderson. Although the morphological distinction between the subspecies of *B. nudata* might appear to be quantitative and subtle, Anderson found a sharp geographical divide. Subsp. *nudata* (Figs. 2-8) occurs in northern Florida to eastern Louisiana and to North Carolina, while subsp. *australis* L.C. Anderson (Figs. 9-18) is confined to peninsular Florida. Anderson's interpretation has been accepted by Nesom (2006) and Weakley (2020), but a review here based on specimen images (SERNEC, herbarium US) and in situ photos (iNaturalist) provides a different interpretation.

The two *Bigelowia nudata* entities have essentially contiguous ranges as identified and mapped by Anderson (1970), but he noted the occurrence of scattered intermediates in northeastern Florida within his mapped range of typical *B. nudata*. The putative intermediates were the basis for Anderson's choice of taxonomic rank (Anderson 1977, p. 214): "Sufficient intermediates have been found to warrant the taxonomic recognition as subspecies." A rationale for assignment of rank was not given in 1970, but was likely based on the newly popular (in botany) use of subspecies as the infraspecific rank of choice when there was some indication of imperfect separation of two taxonomic entities, as by the existence of some "intermediate" specimens. Use of varietal rank by Shinnars (1971) was simply to provide taxonomic "uniformity" in a project in which he was using variety as the infraspecific rank of choice, according with traditional usage in botany and with the much more general availability at the time of infraspecific combinations at that rank.

The contrasting interpretation here is that consistent, distinct geographies and morphologies (especially a biologically significant feature of growth habit) justify recognition of each of the two entities at specific rank, and I identify Anderson's putative intermediates as *Bigelowia australis* occurring in sympatry with *B. nudata* (Fig. 1). Typical *B. australis* occurs in the area of sympatry (as documented below by specimen citations) although morphology ambiguously suggests that some collections identified here as *B. australis* may show evidence of genetic interchange with *B. nudata*. In the area of sympatry, both entities flower in late August through October, allowing the possibility of hybridization, although there is a degree of ecological isolation, with *B. australis* tending to grow in wetter habitats. The area of sympatry does not appear to be one of intergradation — additional observations are necessary toward a better understanding of the biological interaction between the two entities.

1. Plants commonly occurring in close clusters; proximal leaves with a distinctly narrowed petiolar region, blade elliptic to oblanceolate, mostly 4–14 mm wide, crowded in a basal rosette (the leaves mainly appressed to the ground or somewhat ascending); involucre 4–6 mm high; florets 2–5, corollas 3–4 mm long ..... **Bigelowia nudata**
1. Plants occurring singly; proximal leaves usually without a clearly distinct petiolar region, linear to linear-oblanceolate, mostly 2–4 mm wide, usually relatively few and not forming a prominent rosette (the basal and lower stem leaves held vertical to the stem or strongly ascending); involucre 6–7.5 mm high; florets 3–6, corollas 4–5 mm long ..... **Bigelowia australis**

**BIGELOWIA NUDATA** (Michx.) DC., Prodr. 5: 329: 1836. *Chrysocoma nudata* Michx., Fl. Bor. Amer. 2: 101. 1803. *Aster nudatus* (Michx.) Kuntze, Rev. Gen. 1: 318. 1891. *Chondrophora nudata* (Michx.) Britton, Mem. Torrey Bot. Club 5: 317. 1894. Protologue. "In humidis Carolinae." **TYPE**: "Ameriq, Sept," A. Michaux (probable holotype: P 703201 image; probable isotype: 703202 image).

Pine flatwoods, sandy prairies, hillside seepage bogs, moist sandy roadbanks; flowering August–October.

**BIGELOWIA AUSTRALIS** (L.C. Anderson) Nesom, **comb. et stat. nov.** *Bigelowia nudata* subsp. *australis* L.C. Anderson, Sida 3: 463. 1970. *Bigelowia nudata* var. *australis* (L.C. Anderson) Shinnery, Sida 4: 274. 1971. **TYPE: Florida**. Lee Co.: Vicinity of Ft. Myers, in pineland, 20 Mar 1916, J.P. Standley 28 (holotype: NY; isotypes: GH image, MO image, US image).

Wet sandy prairies, wet ditches, wet loam of palmetto stands, cypress swamps, pine flatwoods; flowering (August–)September–November(–May). Anderson (1970) noted that the range of *Bigelowia australis* is "rapidly being reduced by 'advances of civilization' (Lakela, personal communication)."

Anderson (1970, p. 452) characterized plants of typical *Bigelowia nudata* as "cespitose with a short, stocky caudex ... Occasionally, layering by sediments results in an elongated, rhizome-like caudex." For *B. australis*, he noted that "caudices are elongate, only moderately thickened, and frequently connected by short rhizomes." Observations here generally confirm Anderson's characterization of their similarity (but not his explanation of origin of rhizomes in *B. nudata*). A difference in growth habit, however, appears to be the most consistent and unambiguous feature distinguishing them — in fact, it may be that identifications by collectors have relied, implicitly, on growth habit as much or more than the quantitative, overlapping size differences for involucre and leaves usually given in keys.

Plants of *Bigelowia australis* occur singly, with proximal leaves narrow, erect-ascending to erect, and usually not congested in a basal rosette — the rhizomes apparently do not lead to colonial growth (Figs. 23-25, Fig. 27). Collections of *B. nudata* often show only a cluster of fibrous roots, but others show short, thickened rhizomes similar to those of *B. australis*. (Fig. 28). Plants of *B. nudata*, however, tend to occur in close clusters, suggesting a colonial habit, with proximal leaves broader, spreading, and in a distinct basal rosette (Figs. 19-22).

A collection of otherwise typical *Bigelowia nudata* from Calhoun Co., Florida (Fig. 29), shows the production of elongate, filiform rhizomes with plantlets at the tips. This is the only collection over the whole geographic range that I have seen with this feature, but this is what might be expected to produce the characteristic, colonial clusters of plants. This suggests to me (speculatively, admittedly) that these slender rhizomes may be ephemeral and usually produced mostly during times when collectors are not making specimens. Alternatively, it may be that some of what appear to be thickened fibrous roots may actually be rhizomes (not apparent from the digital images) and that fragile inter-plant connections are not observed or preserved by most collectors. Or, perhaps this population is genetically unique within the species.

Anderson (1970, p. 464) noted that the morphology of *Bigelowia australis* "is intermediate to that of [*B. nudata*] and *B. nuttallii* in many respects" — referring to floral features in his Table 2 — and speculated that this might reflect close common ancestry of *B. australis* and *B. nuttallii*. The phylogenetic question posed might easily be resolved with molecular data, beyond the scope of this investigation.

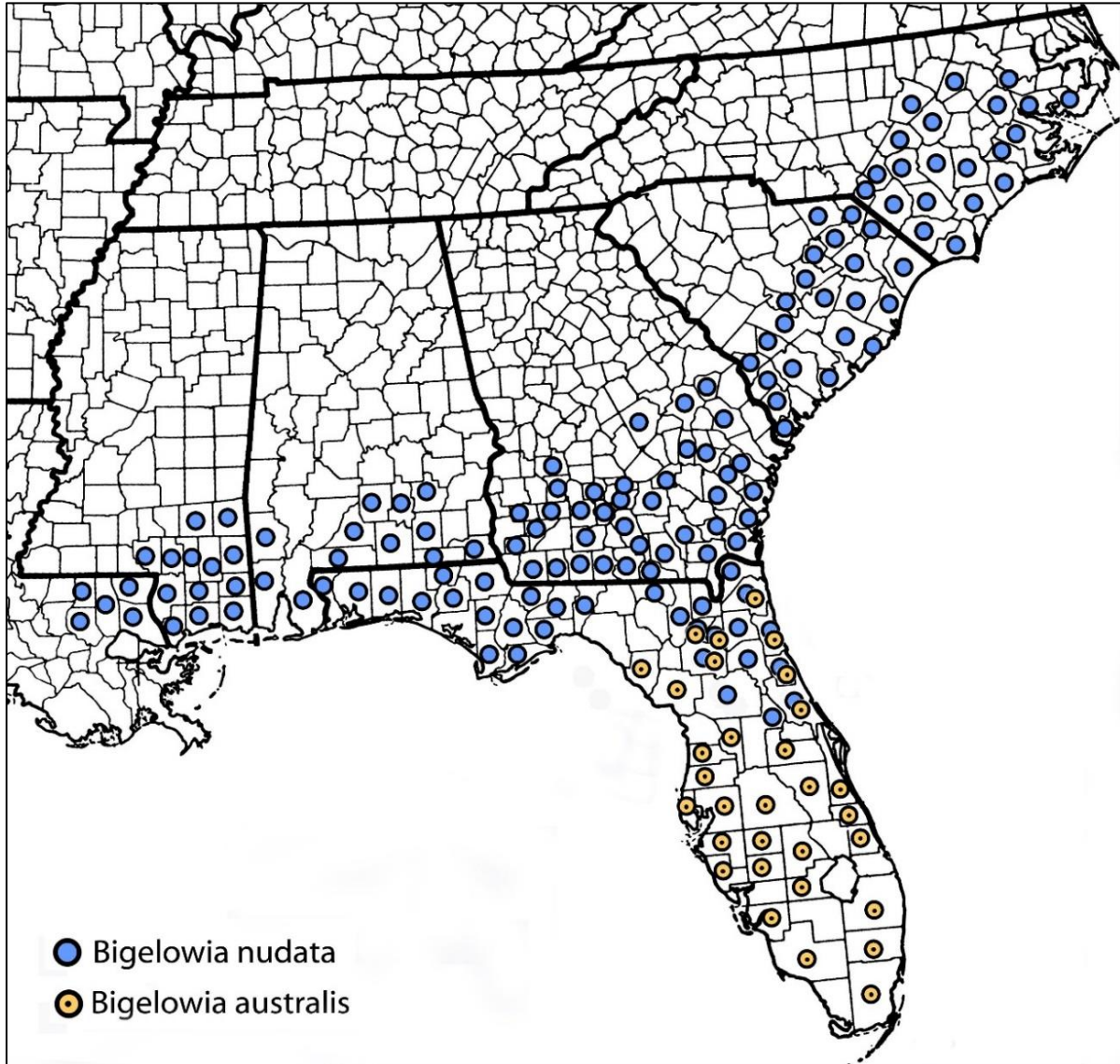


Figure 1. Distribution of *Bigelowia nudata* and *B. australis*.

***Bigelowia australis* in sympatry with *B. nudata*.** **Florida.** Alachua Co.: Fairbanks, cypress swamp, 3 Mar 1927 [in bud], *West 17* (FLAS). Bradford Co.: near US Hwy 301, pineland savannah, 8 Sep 1954, *Radford 8248* (NCU). Duval Co.: Baldwin, 6 Sep 1895, *Nash 2597* (US, Fig. 14). Flagler Co.: 3.4 mi W of Bunnell, along S side of Fla Hwy 100, roadside ditch in pine flatwoods, 12 Oct 1979, *Hansen et al. 6668* (USF). Union Co.: Danville, open flatwoods, 18 Aug 1939, *Murrill 773* (US, Fig. 16). Volusia Co.: Port Orange, Willow Run subdivision just E of I-95, edge of large ditch, thin pine woods with *Serenoa*, *Ilex*, *Pityopsis*, *Lyonia*, 29 Nov 1985, *Nelson 4444* (USCH). St. Johns Co.: Ca. 1.5 mi E of Sampson on Rte 210, moist roadside area, 21 Sep 1971, *Morton 4784* (USF). Collections cited above from Bradford, Duval, and Union counties were cited by Anderson (1970) as intermediates.



Figure 2. *Bigelovia nudata*. Mobile Co., Ala., Deramus D236 (UNA).



Figure 3. *Bigelowia nudata*. Baldwin Co., Ala., Lasseigne 15508 (LSU).



Figure 4. *Bigelowia nudata*. Geneva Co., Ala., McDaniel 7635 (FSU).



Figure 5. *Bigelovia nudata*. Camden Co., Ga., Carter 17352 (VSC).



Figure 6. *Bigelovia nudata*. Marion Co., Fla., Slaughter 15,050 (USF).





Figure 7. *Bigelowia nudata*. Volusia Co., Fla., Anderson 3480 (USF). Compare with Figs. 17 and 18, *B. australis*, also from Volusia Co.



Figure 8. *Bigelovia nudata*. Washington Co., Fla., Anderson 3484 (GA).



Figure 9. *Bigelovia australis*. Brevard Co., Fla., Garrett-Kraus s.n. (PIHG).



Figure 10. *Bigelowia australis*. Levy Co., Fla., Ford 2366 (FLAS).



Figure 11. *Bigelowia australis*. Pinellas Co., Fla., Anderson 3471 (GA).



Figure 12. *Bigelovia australis*. Pinellas Co., Fla., Anderson 3471 (USF).



Figure 13. *Bigelovia australis*. Polk Co., Fla., vanHoek & Petty 691 (USF).



Figure 14. *Bigelovia australis*. Duval Co., Fla., Nash 2597 (US).





Figure 15. *Bigelowia australis*. Flagler Co., Fla., Hansen et al. 6668 (USF).



Figure 16. *Bigelowia australis*. Union Co., Fla., Murrill 774 (US).



Figure 17. *Bigelovia australis*. Volusia Co., Fla., Slaughter 13,410 (USF). Compare with Fig. 7, *B. nudata*, also from Volusia Co.



Figure 18. *Bigelovia australis*. Volusia Co., Fla., Nelson 4444 (USCH). Compare with Fig. 7, *B. nudata*, also from Volusia Co.



Figure 19. *Bigelovia nudata*. A. St. Johns Co., Fla., 9 Nov 2018. B. Clay Co., Fla., 5 Aug 2020. C. St. Johns Co., Fla., 14 Sep 2019. D. St. Johns Co., Fla., 7 May 2020. All photos by Eric Powell, iNaturalist.



Figure 20. *Bigelowia nudata*. A. Berkeley Co., S.C., "picbor," 28 Sep 2017. B. Santa Rosa Co., Fla., Grayson Sasser, 20 Sep 2019. C. St. Johns Co., Fla., Eric Powell, 7 May 2020. D. Santa Rosa Co., Fla., Grayson Sasser, 20 Sep 2019. E. Nassau Co., Fla., Erick Powell, 3 Oct 2020. F. Harrison Co., Miss., Alison Northrup, 22 May 2020. All photos, iNaturalist.



Figure 21. *Bigelovia nudata*. Jones Co., Mississippi, 1 Aug 2018. Photo by Lillie, iNaturalist.



Figure 22. *Bigelovia nudata*. St. Johns Co., Florida. 1 Aug 2018. Photo by Eric Powell, iNaturalist. Compare with Fig. 25, *B. australis*, also from St. Johns Co.





Figure 23. *Bigelovia australis*. A. Charlotte Co., Fla., Jay Horn, 31 Oct 2019. B. Collier Co., Fla., Jay Horn, 17 Jul 2019. C. Collier Co., Fla., Jay Horn, 25 Nov 2020. D. Lee Co., Fla., gschmidt911, 6 Sep 2020. All photos, iNaturalist.



Figure 24. *Bigelovia australis*. Charlotte Co. Florida. Photo by Jay Horn, 31 Oct 2019, iNaturalist.



Figure 25. *Bigelovia australis*. St. Johns Co., Florida. Photo by Eric Powell, 2 Aug 2017, iNaturalist. Compare with Fig. 22, *B. nudata*, also from St. Johns Co.



Figure 26. *Bigelowia australis*. Variation in caudex/rhizome structures.



Figure 27. *Bigelowia australis*. Variation in caudex/rhizome structures: left, lateral offsets from corm-like caudex; right, plants connected by short rhizomes. Photos by Alan Weakley, NCU.



Figure 28. *Bigelovia nudata*. Variation in caudex/rhizome structures.



Figure 29. *Bigelovia nudata*. Calhoun Co., Fla., Orzell & Bridges 20749 (USF).

### ACKNOWLEDGEMENTS

I'm grateful for the excellent, documented photos on iNaturalist and available through Creative Commons and for the hundreds of specimens images accessed through SERNEC and the website of the U.S. National Herbarium (US). Many thanks to Alan Weakley for comments on the manuscript.

### LITERATURE CITED

- Anderson, L.C. 1970. Studies on *Bigelowia* (Astereae, Compositae). I. Morphology and taxonomy. Sida 3: 451–465.
- Anderson, L.C. 1972. Studies on *Bigelowia* (Asteraceae). II. Xylary comparisons, woodiness and paedomorphosis. J. Arnold Arb. 53: 499–514.
- Anderson, L.C. 1977. Studies on *Bigelowia* (Asteraceae). III. Cytotaxonomy and biogeography. Syst. Bot. 2: 209–218.
- Nesom, G.L. 2006. *Bigelowia*. Pp. 95–96, in Flora of North America North of Mexico, Vol. 20. Oxford Univ. Press, New York and Oxford.
- Shinners, L.H. 1971. *Bigelowia nudata* var. *australis* (L.C. Anderson) Snihiners, comb. nov. (Compositae. Sida 4: 274.
- Weakley, A.S. 2020. *Bigelowia*. Page 1452, in Flora of the Southeastern United States (Edition of 20 October 2020). Univ. of North Carolina at Chapel Hill Herbarium (NCU).