

**KEYS, DISTRIBUTION, AND TAXONOMIC NOTES FOR THE LOBELIAS
(*LOBELIA*, CAMPANULACEAE)
OF ALABAMA AND ADJACENT STATES**

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ABSTRACT

The genus *Lobelia* (Campanulaceae) is represented by 22 species and one hybrid in the five-state region of Alabama, Georgia, Florida, Mississippi, and Tennessee. *Lobelia rogersii*, formerly regarded as a hybrid, is recognized here as a distinct species. Keys, distribution maps, photographs, and taxonomic notes are provided for each species.

North American species of *Lobelia* are annual or perennial herbs with alternate, simple leaves and conspicuous blue, white, red or purplish flowers (Fig. 1). The corolla is tubular, often fenestrate, bilabiate, and five lobed (Fig. 2). The upper two lobes are usually erect and the lower three lobes are typically fanned out. Five stamens are united to create a diagnostic matchstick-like structure. The longer, lower portion forms the filament tube and the upper, darker part is the anther tube (Fig. 3). The style passes through the center of the structure and the 2-lobed stigma is exerted at the top.



(1a) Photo: Wayne Barger



(1b) Photo: Dan Spaulding

Figure 1. (a) *Lobelia cardinalis*, Jackson Co., Alabama, Walls of Jericho, along stream margin, 23 Aug 2007. (b) *Lobelia georgiana*, Cleburne Co., Alabama, pond margin, 12 Oct 2014.

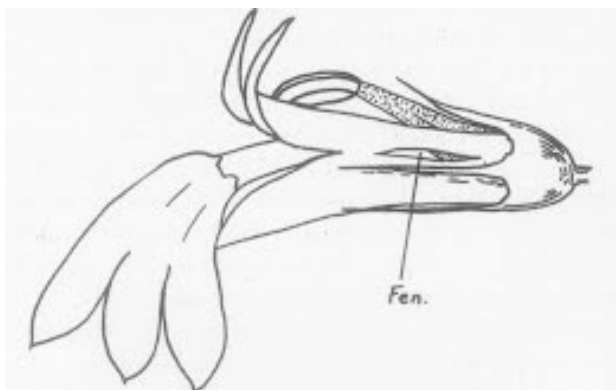


Figure 2. Fenestrated corolla tube (McVaugh 1936).

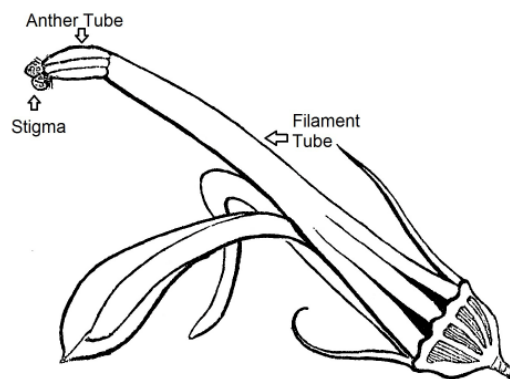


Figure 3. Anther & filament tube (Trelease 1879).

The southeastern USA has more species of *Lobelia* than any other region in North America outside of Mexico (McVaugh 1943). The majority of these Southeast taxa are concentrated within the Coastal Plain (McVaugh 1936). Of the 27 species that occur in the eastern USA, a total of 22 are found in Alabama (15 spp.) and the adjacent states of Georgia (16 spp.), Florida (14 spp.), Mississippi (10 spp.), and Tennessee (9 spp.). One hybrid, *L. ×speciosa* Sweet [*L. cardinalis* L. × *L. siphilitica* L.], has been documented from a single county in Alabama and nowhere else in the region. Lobelias often grow in moist to wet habitats, but a few species can tolerate drier conditions (Lichvar 2013).

Worldwide there are about 415 species of *Lobelia* (Lammers 2011) with their center of distribution occurring in the tropics and subtropics (Wimmer 1953). Circumscription of the family is controversial, and some authors (Alexandre 2007, Lammers 2011) place *Lobelia* and its relatives in the Campanulaceae (Bellflower Family) within the subfamily Lobelioideae, while others (Gustafsson & Bremer 1995, Hong & Wang 2014) put them in their own family, the Lobeliaceae. All lobelias in eastern North America belong to sect. *Lobelia* except for *L. homophylla* F.E. Wimm., which is in sect. *Stenotium* (Lammers 2011) and only occurs in Florida. According to Lammers (2011), sect. *Lobelia* is nearly endemic to eastern and central North America. The exceptions are *L. dortmanna* L., which occurs in northern regions of North America and Europe; *L. kalmii* L., which is found across Canada and northern USA; and *L. cardinalis*, which is native to the Americas, from southeastern Canada south through the USA, and Mexico to northern Colombia.

The genus *Lobelia* honors the memory of Mathias de l'Obel (1538–1616), a Flemish physician and botanist who published monumental works on plant classification (Shosteck 1974). The generic name was coined in 1703 by Charles Plumier (1646–1704), a French botanical explorer who discovered a new plant in the West Indies and named it after l'Obel (Lloyd & Lloyd 1909). Linnaeus (1753) retained Plumier's genus from his polynomial and created the binomial *Lobelia plumieri*. However, Plumier's original name for his maritime shrub was later transferred to a new genus and is now known as *Scaevola plumieri* (L.) Vahl, which is actually in the family Goodeniaceae. Since this species was transferred to a different genus, another type species had to be assigned. Bowden (1959a) states that Britton and Brown (1913) selected *L. dortmanna* as the type and McVaugh (1943) accepted it. However, Lammers (2011) argues that the type species is *L. cardinalis*, which was designated by Hitchcock and Green (1929), and it supersedes the earlier choice of *L. dortmanna* (Fig. 4).



Figure 4. J.E Smith 1793.

Despite the detailed studies completed in the 20th century on *Lobelia* by McVaugh (1936, 1940, 1943), Wimmer (1943, 1953, 1968) and Bowden (1959a, 1959b, 1960a, 1960b, 1961, 1964, 1982), many botanists still have had difficulty identifying species of the southeastern USA. Oddly, the taxa with showy blue flowers are the ones that have caused the most problems. Ward (1978) stated that the difficulties of identification “lie almost entirely in the group of blue large-flowered species.” Many of the troubles arise because some of the characters used in taxonomic keys are variable and not always reliable.

Another factor contributing to the misidentification of large blue-flowered species is that McVaugh (1936) did not include a supposed hybrid between *L. brevifolia* Nutt. ex A. DC. and *L. puberula* Michx. in his key. Bowden (1961) subsequently named the hybrid in honor of Rogers McVaugh and called it *Lobelia ×rogersii*, but like McVaugh, he did not create a key to separate it from closely related members of the genus. This taxon was omitted in all taxonomic keys from the time it was recognized. Because of its exclusion, *L. ×rogersii* was almost always incorrectly identified as *L. puberula*, *L. georgiana* McVaugh or *L. amoena* Michx. This study determined that *L. ×rogersii* is actually a valid species and now, for the first time, it is included in a key and can be identified. It should also be noted that a new large-flowered species, *Lobelia apalachicolensis* Spaulding, Barger, & Horne, was recently named from the Apalachicola region of the Florida Panhandle (Spaulding et al 2016). This species had been collected in the past but was originally misidentified as *L. georgiana*, *L. glandulosa* Walt., or as a hybrid between *L. georgiana* and *L. puberula*.

The keys that follow were constructed after examining numerous specimens from various herbaria in the eastern USA (ALNHS, AMAL, AUA, BBG, BRIT, FLAS, FSU, GA, GAS, JSU, MISS, MISSA, MO, NCU, TENN, TROY, TTU, UNA, USF, UWAL, UWC, VDB, VSC). Herbarium acronyms can be found in Index Herbariorum (Thiers 2016). Various treatments of *Lobelia* were utilized to assist in creating keys and determining distributions (Bowden 1959a; Godfrey & Wooten 1981; McVaugh 1936, 1943; E.B. Smith 1994; Ward 1978; Weakley & Sorrie 2010; Wimmer 1953). Maps (adapted from Lee 2012) were generated from vouchered herbarium specimens, the institutions listed above, the authors’ recently collected specimens, and the Alabama Plant Atlas (Keener et al. 2016). Maps with labeled counties for the five states covered in this study are provided in Appendix A and the names of the Level III Ecoregions (Environmental Protection Agency 2013) are found in Figure 5. Information on taxa is set up in the following format: **Number. Name** author(s) {derivation of specific epithets}. VERNACULAR NAME. Duration/Habit; Habitat; flowering dates. Comments. [*Synonyms*].

Key to *Lobelia* of Alabama and adjacent states

1. Corolla bright red, magenta, rose, or pink (white forms very rare); flowers large, 23–50 mm long (measured from base of calyx); filament-tube 13–33 mm long.
 2. Flowers crimson red (faded in dried specimens); flowers averaging 30–50 mm long; filament tubes averaging 25–30 mm long; plants fertile.....**1. *Lobelia cardinalis***
 2. Flowers magenta or pink (often drying darker); flowers averaging 23–35 mm long; filament tubes averaging 17–20 mm long; plants sterile; [a rare hybrid only found when its parents, *L. cardinalis* and *L. siphilitica*, are growing together]..... **2. *Lobelia ×speciosa***
1. Corolla blue, purple or white; flowers large or small, 7–33 mm long; filament tube 2–15 mm long.

3. Leaves chiefly basal and elongate (strap-shaped), linear to oblanceolate; upper stem leaves much reduced; [obligate wetland plants of the lower Coastal Plain].
4. Sinuses of calyx lobes with small auricles; pedicels with a pair of very small bracteoles (near base next to slender leaf-like bract); corolla tube not fenestrate (lacking lateral slits, but older flowers may be torn and appear fenestrate); filament tube 6–11 mm long; plants of the Florida Panhandle west to Louisiana..... **13. *Lobelia floridana***
4. Sinuses of calyx lobes lacking auricles; pedicels lacking bracteoles (if leaf-like bract is lobed, the lobes may resemble bracteoles); corolla tube fenestrate (with lateral slits near base between the calyx lobes); filament tube 3–4.5 mm long; plants of extreme southern Georgia and Florida (extending into the eastern portion of the Florida Panhandle).....
..... **14. *Lobelia paludosa***
3. Leaves usually evenly distributed along stem, leaf shape various; upper stem leaves typically only gradually reduced or similar in size to basal leaves.
5. Flowers relatively large, 15–33 mm long; filament tube 6–15 mm long; corolla usually fenestrate (with a slit or window on each side of the tube between the calyx lobes), except for *L. flaccidifolia*, which is usually not fenestrate.
6. Leaves mostly less than 3 cm long and very numerous, usually more than 20 (leaves also < 7 mm wide); leaf margins prominently denticulate and apex rounded; sinuses of calyx with distinct auricles that overlap and often completely cover the calyx tube; calyx lobes pectinately toothed..... **6. *Lobelia brevifolia***
6. Leaves 4–15 cm long and less numerous, usually not more than 20 (leaves narrow or broad); leaf margins variously toothed or entire and tips acute or rounded; sinuses of calyx with or without auricles; calyx lobes toothed or entire.
7. Stem leaves linear, lanceolate or oblanceolate (< 1.5 cm wide) **and** lower lip of corolla densely pubescent basally (on the upper portion near the opening of throat); calyx segments usually toothed (callose-denticulate).
8. Pedicel with inconspicuous bracteoles borne at base and often hidden by bract (bracteoles are oval to oblong with blunt tips and look similar to glandular teeth of bract, except glands are a little smaller); calyx tube long-hirsute or glabrous with wart-like bumps (pustular); pedicel short to long hirsute or glabrous; corolla tube fenestrate; upper stem leaves prominently denticulate (margins with numerous sharp, gland-tipped teeth); internodes often geniculate (zigzag); plants perennial and usually drying darker **11. *Lobelia glandulosa***
8. Pedicel with two conspicuous bracteoles borne above the base of pedicel (they are linear, somewhat foliaceous, and have acute tips); calyx tube short-pubescent or glabrous with wart-like bumps; pedicel short-pubescent or glabrous; corolla tube usually not fenestrate; upper stem leaves typically not strongly denticulate (but gland-tipped teeth are usually present); internodes not geniculate or only slightly so; plants annual and usually drying a lighter green **12. *Lobelia flaccidifolia***
7. Stem leaves ovate, elliptic, obovate, oblong or lanceolate and corolla lip glabrous **or** corolla lip pubescent basally, but leaves much wider than 1.5 cm; calyx lobes toothed or entire.

9. Underside of corolla with white longitudinal stripes (appearing pinstriped with narrow blue-violet lines with broader white stripes); bracteoles borne above the middle of pedicels just below calyx tube (bracteoles are much smaller than leafy bract, which is found at base of the petiole); calyx lobes entire and usually with some long, chaffy hairs on the margins; sinuses of calyx with small to large auricles; filament tube 12–15 mm long **3. *Lobelia siphilitica***
9. Undersurface of corolla not noticeably striped with white; bracteoles located below middle of pedicels, often near the base of leaf-like bract; calyx lobes toothed or entire and margins glabrous or ciliate with sharp-pointed hairs; sinuses of calyx lobes with or without auricles; filament tube 6–11 mm long.
10. Calyx lobes distinctly toothed (leafy bract at base of pedicel also toothed).
11. Sinuses of calyx with prominent drooping auricles, often covering half of calyx tube; calyx tube typically densely long-hirsute (occasionally glabrous) **5. *Lobelia rogersii***
11. Sinuses of calyx lacking auricles or with very small and inconspicuous ones; calyx tube long-hirsute or glabrous.
12. Stems densely pubescent throughout; margins of calyx lobes ciliate with sharp hairs; corolla densely pubescent on the outside **4. *Lobelia puberula***
12. Stems sparsely pubescent to glabrous (more pubescent at the base); margins of calyx lobes glabrous (lacking cilia); corolla mostly glabrous or occasionally sparsely pubescent in lines on the outside.
13. Lower lip of corolla usually glabrous on upper surface near throat of corolla tube, but occasionally papillate or minutely pubescent (with very short hairs); calyx tube usually glabrous, rarely with a few scattered chaffy hairs, but often with a warty texture; corolla tube glabrous; ranges from Virginia south to Florida and west to Alabama **8. *Lobelia georgiana***
13. Lower lip of corolla distinctly pubescent (with villous hairs) on upper surface near throat of corolla tube; calyx tube long-hirsute or glabrous with a warty texture (two types mixed in the same population); corolla tube glabrous or occasionally pubescent in lines; plants endemic to the Apalachicola region of the Florida Panhandle **10. *Lobelia apalachicolensis***
10. Calyx lobes mostly entire or with a few lobes that are sparingly toothed (ignore leafy bract at the base of pedicel, which is often glandular-toothed).
14. Auricles very large and conspicuous, covering almost half of calyx tube; lower corolla lip often short-pubescent basally near the throat; [calyx lobes almost always toothed, rarely entire] **5. *Lobelia rogersii***
14. Auricles smaller, less than 1/4 length of calyx tube or absent; lower lip of corolla mostly glabrous basally near the throat (exterior of tube can be pubescent).

15. Stems usually densely pubescent throughout (also within inflorescence), but occasionally sparsely pubescent to almost glabrous; calyx lobes lanceolate and mostly erect, typically not flexuous or widely spreading; margins of calyx lobes often ciliate, occasionally smooth; calyx tube densely hirsute, sparsely hirsute to glabrous; auricles present or absent; corolla tube usually pubescent on the outside, rarely glabrous..... **4. *Lobelia puberula***
15. Stems sparsely pubescent to glabrous, usually more hairy at the base; calyx lobes linear or lanceolate and often spreading or flexuous (especially the tip, which are sometimes twisted); margins of calyx lobes glabrous (lacking cilia); calyx tube smooth to warty in texture, very rarely sparsely hirsute; auricles absent to almost obsolete; corolla tube essentially glabrous.
16. Some calyx segments with a few slender, flexuous teeth (sometimes teeth can be completely lacking in an individual of a population, but typically there are a few lobes remotely toothed near base, so check several flowers); leaves typically thick with a parchment-like texture and sometimes with a bluish to gray-green sheen when dried (typically strongly glaucous underneath); uppermost leaves distinctly slender-toothed with callus or gland-tipped teeth..... **9. *Lobelia georgiana***
16. All calyx segments entire, not toothed (ignore leafy bract at the base of pedicel, which is often glandular-toothed); leaves thick or thin, whitish to greenish underneath; uppermost leaves entire or toothed (with or without callus or gland-tipped teeth).
17. Leaves usually thin and flexuous; leaf edges thin, not thickened; leaf shape elliptic, ovate or broadly lanceolate, mostly 1.5–4.5 cm broad; leaf margins toothed, shallowly crenate or almost entire; leaf apex rounded, obtuse or short-acute; flowers loosely arranged; anther tube 2.5–3.5 mm; filament tube 5–7 mm long; plants chiefly of the mountains and piedmont, rarely of adjacent coastal plain
..... **7. *Lobelia amoena***
17. Leaves thick and stiff; leaf edges frequently with a thickened lip; leaf shape lanceolate to broadly lanceolate, typically less than 2.5 cm broad; leaf margins often distinctly toothed; leaf apex regularly long-acute to acuminate; flowers usually densely arranged; anther tube close to 4 mm long; filament tube 8–11 mm long; plants chiefly of the Atlantic Coastal Plain, rarely of adjacent Piedmont..... **8. *Lobelia elongata***
5. Flowers smaller, 8–14 mm long (measured from base of calyx); filament tube, 2.5–5 mm long; corolla usually not fenestrate (except sometimes in *L. flaccidifolia*).
18. Stem leaves very narrow, most less than 5 mm wide (lowest leaves may be broader).

- 19. Leaves subulate-filiform (narrowly linear), not exceeding 0.5 mm wide (leaves often deciduous); calyx glabrous; pedicels lacking bracteoles (bracts are present); stems often spongy-thickened toward the base; rhizomes present
.....**19. Lobelia boykinii**
- 19. Leaves linear to linear-oblancoolate, 1–4 mm wide; calyx glabrous or pubescent; pedicel with bracteoles (found just above larger bracts); stems not spongy-thickened; rhizomes absent.
 - 20. Lower lip of the corolla glabrous; pedicels and calyx glabrous or pubescent with scattered straight hairs (they are spreading and often tooth-like with slightly broader bases); calyx tube short-hemispheric in fruit; basal leaves (when present) spatulate..... **20. Lobelia nuttallii**
 - 20. Lower lip of corolla pubescent inside at the base near throat of tube; pedicels and calyx often strongly antrorsely scabrid (with sharp upward pointing hairs), rarely almost glabrous (usually has a few antrorse hairs, especially on pedicel); calyx tube oval to oblong in fruit; basal leaves linear
..... **18. Lobelia canbyi**
- 18. Stem leaves broader, the largest greater than 10 mm wide.
 - 21. Lower leaves with distinct petioles; leaf bases truncate, rounded or subcordate; plants restricted to Florida and extreme southern Georgia.
 - 22. Blades of lower leaves orbicular with entire to shallowly crenate margins; lower stems trailing, forming mats and usually rooting at the nodes (upper stems erect)..... **21. Lobelia feayana**
 - 22. Blades of lower leaves ovate with deeply crenate to incised-dentate margins; lower and upper stems erect**23. Lobelia homophylla**
 - 21. Lower leaves sessile or rarely with very short petioles (< 2 mm long); leaf base narrowed, not truncate, rounded or subcordate; plants collectively widespread, not restricted to Florida or Georgia.
 - 23. Stems long hirsute; fruiting capsules strongly inflated; lower flowers with ovate-leafy bracts; inflorescence usually much branched
..... **22. Lobelia inflata**
 - 23. Stems glabrous or short-pubescent (base sometimes densely pubescent); fruiting capsules not inflated; flowers with smaller bracts; inflorescence branched or unbranched.
 - 24. Bracteoles conspicuous (somewhat foliaceous) and borne just below the middle of the pedicel (well above larger bract); calyx lobes toothed (some segments may be remotely toothed); flowers typically larger, 14–20 mm long (measured from base of calyx)
..... **12. Lobelia flaccidifolia**
 - 24. Bracteoles inconspicuous and borne at the base of the pedicel (adjacent to larger bract); calyx lobes mostly entire, rarely with a few teeth, though sometimes ciliate (ignore the leafy bract at the base of pedicel); flowers smaller, 15 mm or less long.

25. Upper stem leaves oblong or obovate with narrowed bases; leaf margins often entire with tiny glandular teeth or occasionally undulate, crenulate to shallowly dentate; base of stem often densely puberulent; plants rarely branched (if branched, then from lower two nodes, unless injured or late in season after main inflorescence has fruited); inflorescence spike-like with flowers 7–12 mm long that are borne on all sides; flowering mostly June–August
 **15. *Lobelia spicata***
25. Upper stem leaves short-ovate with broad, rounded bases (often partially clasping stem); leaf margins usually irregularly toothed with rounded teeth; plants often branched from lower and upper nodes (occasionally unbranched); inflorescence a raceme with flowers 10–15 mm long that are often borne on one side (secund); flowering mostly May–June.
26. Calyx lobes ciliate-margined with thick, sharp hairs (at least near apex); sinuses of calyx with auricles; plants of prairies and other open areas on the Coastal Plain of eastern Alabama west to Texas **16. *Lobelia appendiculata***
26. Calyx lobes with glabrous margins; sinuses of calyx lacking auricles; plants of limestone glades on the Interior Low Plateau of Tennessee and adjacent Kentucky **17. *Lobelia gattereri***

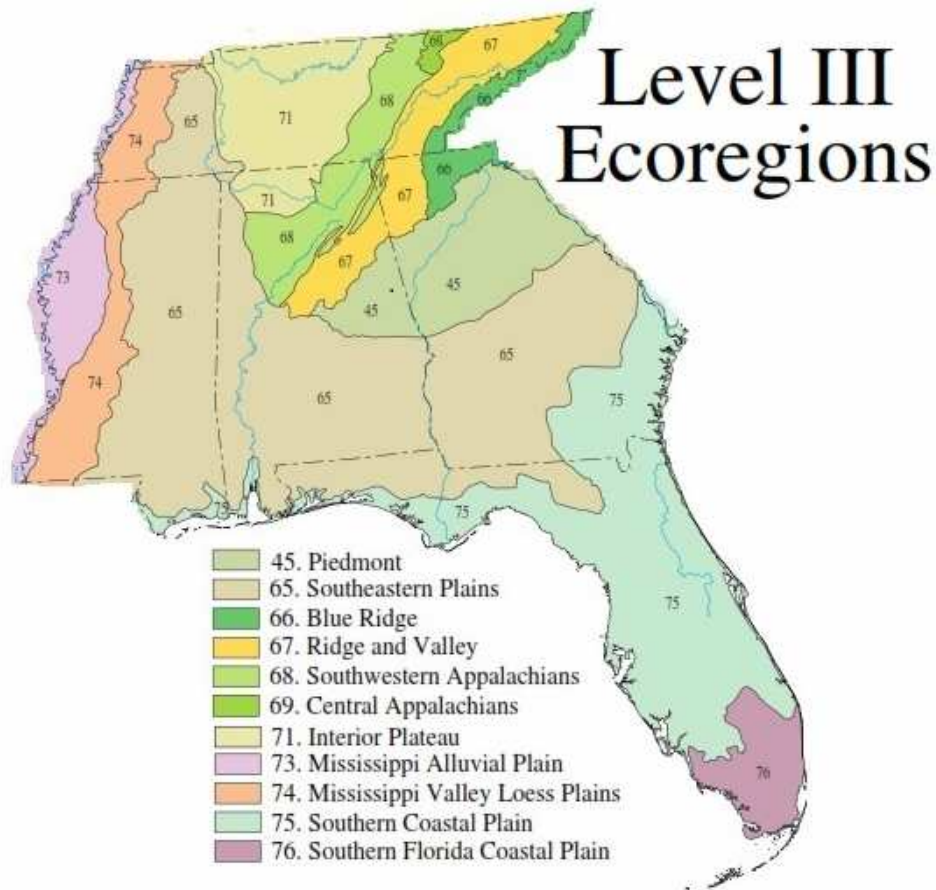
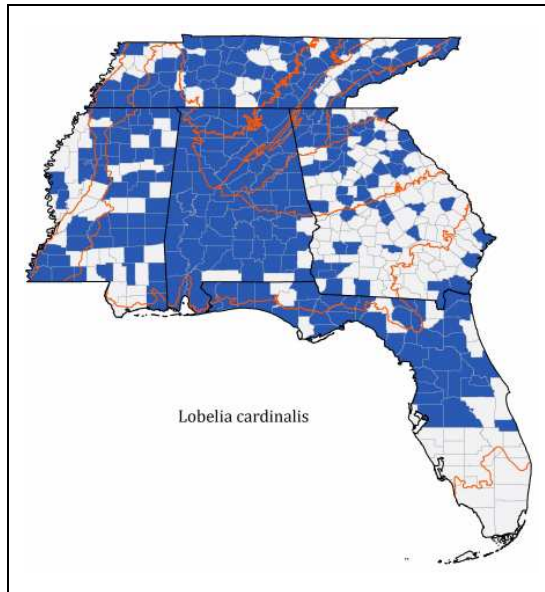


Figure 5. Ecoregions of Alabama, Florida, Georgia, Mississippi, and Tennessee (EPA 2013).

1. *Lobelia cardinalis* L. {like the Cardinal} — CARDINAL-FLOWER (Figs. 1a & 6). Perennial herb.



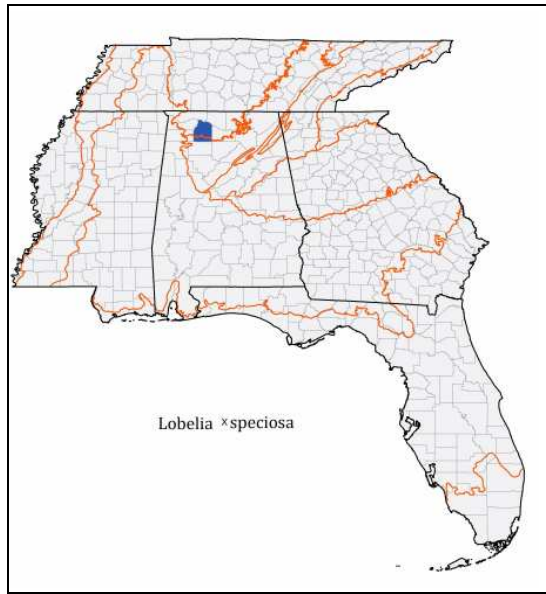
Marshes, stream margins, ditches, riverbanks, wet woodland borders, and bottomland hardwoods; late July–October. Cardinal Flower is common from southeastern Canada south through the eastern and southwestern USA, south through Mexico to northern Colombia. *Lobelia cardinalis* is entirely pollinated by hummingbirds and is closely related to the blue-flowered *L. siphilitica*, which is primarily pollinated by bumblebees (Thompson & Lammers 1997). These two species rarely hybridize in the wild due to their different pollinators and flowering times. The common name, Cardinal-Flower, refers to red robes worn by Catholic cardinals (Coffey 1993). *Lobelia cardinalis* has a long history of cultivation; the entities with broad leaves have been identified as *L. cardinalis* and the frost-tender, narrow leaved plants were called either *L. splendens* or *L. fulgens* (Thompson & Lammers 1997). The

narrow leaved form of this species was treated by McVaugh (1943) as *L. cardinalis* subsp. *graminea* and he further subdivided this subspecies into four varieties. Bowden (1964) named a variety under subsp. *cardinalis* and stated that “variety *meridionalis* seemed to me to be so distinctive that the taxon merited a name. I have never seen specimens of var. *cardinalis* that had such coarse stems, and no specimens of var. *cardinalis* were seen that had procumbent stem bases rooting along the portions next to the soil.” Variety *meridionalis* is endemic to Florida, and Ward (1978) says that it “is often much more robust, with pronounced horizontal bases and stout aerenchyma-filled stems that float or are supported in the water of spring runs and along the edges of clearer rivers.” However, Thompson and Lammers (1997) concluded “that the complex comprises a single species, *L. cardinalis*, and that this species cannot be divided into infraspecific taxa.” [*Lobelia cardinalis* subsp. *cardinalis* var. *meridionalis* Bowden; *L. cardinalis* ssp. *graminea* (Lam.) McVaugh var. *graminea*; *L. cardinalis* subsp. *graminea* var. *multiflora* (Paxton) McVaugh; *L. cardinalis* subsp. *graminea* var. *phyllostachya* (Engelm.) McVaugh; *L. cardinalis* subsp. *graminea* var. *pseudosplendens* McVaugh; *L. fulgens* Willd.; *L. splendens* Humb. & Bonpl. ex Willd.]



Figure 6. *Lobelia cardinalis*. Colbert Co., Alabama, stream margin, 22 Sept 2014. Photos: Wayne Barger.

2. *Lobelia ×speciosa* Sweet {showy} — SHOWY LOBELIA [*L. cardinalis* × *L. siphilitica*] (Fig 7).



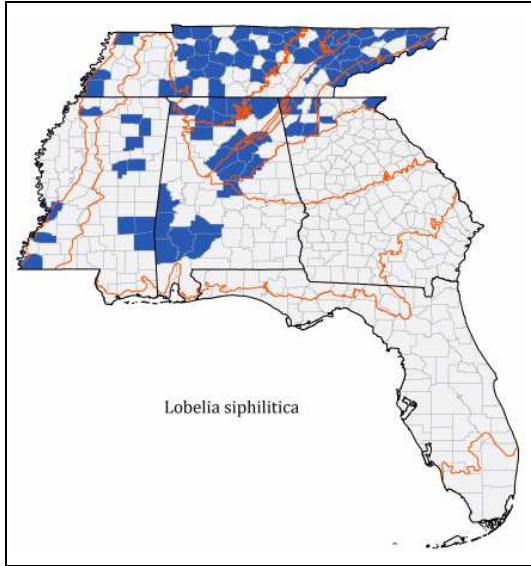
Perennial herb. Wooded floodplains; September–October. This hybrid was recently discovered in Lawrence County, Alabama by Brian Keener and was growing beside its two parents in alluvial woods. Previously it was only known from a few populations in Missouri, Illinois, and Indiana, as well as Ontario and New Brunswick (Kartesz 2016). The morphological characters of this rare hybrid are intermediate between its two parents. Artificial hybrids have been produced many times for gardens, but very few natural hybrids have been collected in the field. Bowden (1964) states that “geographical separation is probably the main factor in limiting the production of natural hybrids of this parentage. The flowering periods of the two species are different; *L. cardinalis* begins to bloom earlier than *L. siphilitica*. However, there is an overlap in the blooming periods of the two species but the changes of

interspecific hybridization are lessened by the different peaks in their flowering periods.” Flower color of wild hybrids is usually magenta (purplish-red), however horticulturalists have developed a range of colors from rose-red, carmine, pink or white. Most F₁ hybrids are diploid ($2n = 14$) and usually completely sterile, producing no seeds (Bowden 1964). However, *L. ×speciosa* can set some viable seeds if backcrossed to either parent (Bowden 1982).



Figure 7. *Lobelia ×speciosa*. Lawrence Co., Alabama, alluvial woods, 6 Oct 2012. Photos by Joan Rundles.

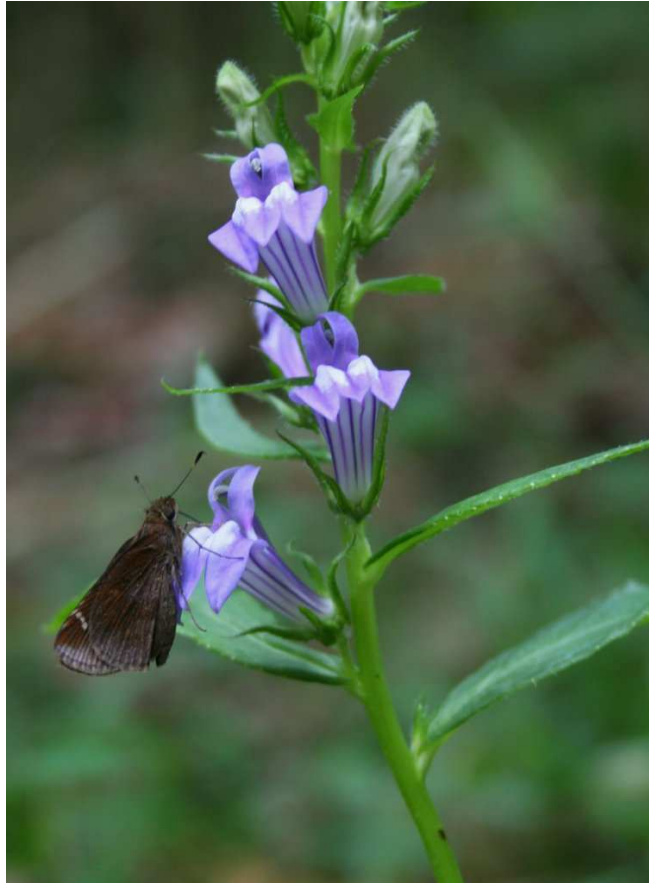
3. *Lobelia siphilitica* L. {syphilis} — GREAT BLUE LOBELIA (Fig. 8). Perennial herb. Rich woods, streambanks, alluvial woods, seeps, roadside ditches and drainages, often in neutral or calcareous soils; August–September. Native to eastern and central USA and Canada. In the southeast it is frequent in the Blue Ridge, Appalachian Plateau, Ridge & Valley, and Interior Low Plateau, but less common on the Coastal Plain. The specific epithet “siphilitica” arose from the alleged properties of the plant for curing syphilis (Shosteck 1974). *Lobelia siphilitica* often has large, leafy auricles, but a small-auricled form occurs in the southern part of its range. Specimens with smaller auricles are often mistaken for *L. amoena*, which lacks auricles and has no hairs on its calyx tube or lobes. McVaugh (1936) recognized a western variety, (var. *ludoviciana*), which was said to occur in the Midwest from central Canada and North Dakota east to Wisconsin and south to north Louisiana and Texas. This taxon typically has fewer flowers, narrower leaves, and is almost glabrous (Fig. 8g). However, after examining numerous collections throughout the range of the species, we find that the characters do not hold up. [*Lobelia siphilitica* var. *densiflora* (Rennie) F.E. Wimm.; *L. siphilitica* var. *ludoviciana* A. DC.]



south to north Louisiana and Texas. This taxon typically has fewer flowers, narrower leaves, and is almost glabrous (Fig. 8g). However, after examining numerous collections throughout the range of the species, we find that the characters do not hold up. [*Lobelia siphilitica* var. *densiflora* (Rennie) F.E. Wimm.; *L. siphilitica* var. *ludoviciana* A. DC.]



(8a) Flowers.



(8b) Pinstriped undersurface of corolla.



(8c) Small auricled form (note ciliate lobes). (8d) Typical form with large foliaceous auricles.



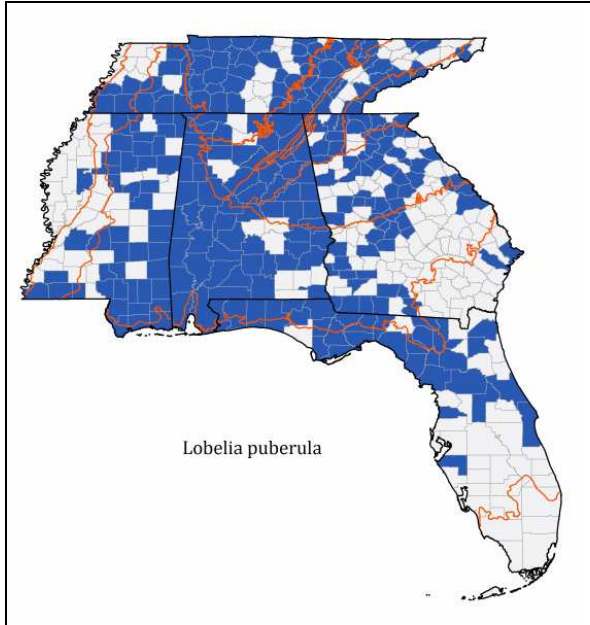
(8e) Inflorescence.

(8f) Leaves are often elliptic.

(8g) Western form.

Figure 8. *Lobelia siphilitica*. (a) Etowah Co., Alabama, 23 Sept 2014. Photo: Wayne Barger. (b) Jackson Co., Alabama, 27 Sept 2007. Photo: Wayne Barger. (c) Etowah Co., Alabama, calcareous seep, 15 Oct 2014. Photo: Dan Spaulding. (d) Shannon Co., Missouri, 15 Aug 2003. Photo: Dan Tenaglia. (e & f) Morgan Co., Alabama, 13 Sept 2014. Photo by Dan Spaulding. (g) *Clonts s.n.* (JSU), “*Ludoviciana*” form of *L. siphilitica*, Boone Co., Iowa, 16 Aug 1968.

4. *Lobelia puberula* Michx. {puberulent} — DOWNY LOBELIA (Fig. 9). Perennial herb. Open



woods, woodland borders, streambanks, wooded slopes, ditches, fields, roadsides, and other open areas; July–November. Downy Lobelia is native to eastern and south central United States, from southern Pennsylvania south to Florida, west to Texas and Missouri (Kartesz 2016). It is the most common blue-flowered Lobelia in the Southeast. *Lobelia puberula* is a polymorphic species with numerous forms (McVaugh 1936) that have been considered varieties by some authors (Fernald 1947). It was concluded by the senior author, after examining hundreds of specimens, that the various characters used to separate the varieties are variable and overlapping and not worthy of taxonomic recognition. However, one variety, *L. puberula* var. *pauciflora* Bush (Fig. 10), is so distinct it warrants recognition at species level. This taxon can be distinguished from *L. puberula* by its

densely shaggy, white-pubescence on the base of calyx and pedicel, widely spaced flowers, and lanceolate leaves. Turner (1950) elevated *L. puberula* var. *pauciflora* to *L. reverchonii* and noted that when he discovered *L. reverchonii* growing side by side with *L. puberula* in Texas, that: “Their dissimilarity was very strong, even to one unfamiliar with the species. In the area concerned, the two species seemed to be well marked and showed no signs of integration.” *Lobelia reverchonii* (as *L. puberula* var. *pauciflora*) was erroneously attributed to Alabama by McVaugh (1943) but, as of now, it is restricted to Louisiana and Texas. [*Lobelia puberula* var. *glabella* Hook.; *L. puberula* var. *laeviuscula* (Hook.) C. Mohr; *L. puberula* var. *mineolana* F.E. Wimm.; *L. puberula* var. *obtusifolia* (DC.) Fernald; *L. puberula* var. *simulans* Fernald]



(9a) Flower of common form with hairy calyx and entire calyx lobes.



(9b) Loose inflorescence form. (9c) Dense inflorescence form. (9d) Glabrous calyx form.



(9e) Toothed calyx lobe form. (9f) Broad-based calyx lobe form. (9g) Narrow-based calyx lobe form.



(9h) Corolla tube is typically pubescent.



(9i) Downy stem.



(9j) Lower lip of corolla glabrous.



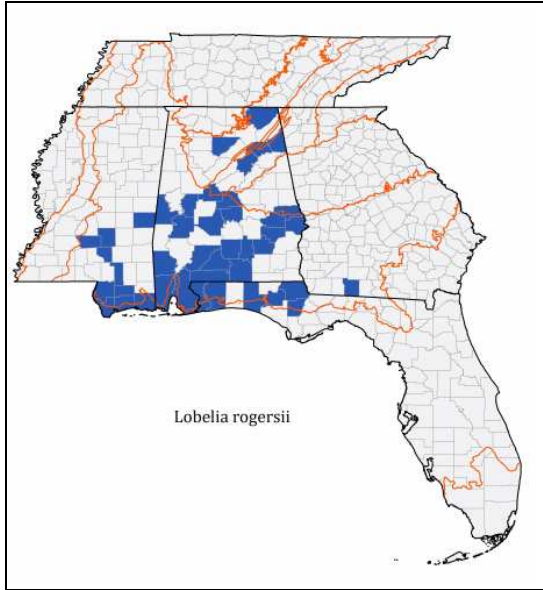
(9k) Leaves often elliptic, obovate or ovate.

Figure 9. *Lobelia puberula*. (a & b) Colbert Co., Alabama, 20 Aug 2014. Photo: Wayne Barger. (c & d) Colbert Co., Alabama, 22 Sep 2014. Photos: Wayne Barger. (e) *Cooley et al. 6908* (USF), Hernando Co., Florida, 15 Sep 1959. (f) *Mikula 4353* (AUA), Amelia Co., Virginia, 11 Sept 1949. (g–j) Calhoun Co, Alabama, 13 Oct 2014. Photos: Dan Spaulding. (k) Etowah Co., Alabama, 13 Sep 2014. Photo: Dan Spaulding.



Figure 10. *Lobelia reverchonii* (= *L. puberula* var. *pauciflora*). *Vincent & Allen 3211* (NCU), Vernon Parish, Louisiana, 4 Nov 1979.

5. *Lobelia rogersii* Bowden {in honor of Rogers McVaugh (1909–2009), American botanist and *Lobelia* expert} — MCVAUGH’S LOBELIA (Fig. 11).



Bogs, seeps, wet flatwoods, and boggy fields; July–November (occasionally earlier or later during mild winters along the coast). Native from eastern Louisiana to southwest Georgia north through Alabama. *Lobelia rogersii* has not been evaluated for its wetland status (Lichvar 2013). Based on the habitat of this species, its wetland indicator status should be Facultative-Wetland (FACW). McVaugh (1936) treated this taxon as a hybrid and listed it as *L. brevifolia* × *puberula*. Bowden (1961) officially named it *L. ×rogersii*, but noted that “natural hybrid specimens of *L. ×rogersii* occur relatively frequently because some plants are partly fertile” and later he stated it was “behaving partly as a newly formed hybrid and partly as a recently produced species of hybrid origin.” The geographic ranges of the two parents overlap in the lower coastal plain, but not

further north. Since a large portion of the distribution of this taxon occurs out of the range of *L. brevifolia*, we believe it is a new species of hybrid origin. Both Bowden and McVaugh did not include their hybrid in any taxonomic keys, which caused a lot of misidentification of *L. rogersii*. The chief characteristics of this species are large drooping auricles (they look like elongated ear lobes), toothed calyx lobes (very rarely entire), and densely short-hirsute stems (rarely sparsely pubescent or glabrous). Individuals that are almost glabrous can be confused with *L. georgiana* because both taxa usually have toothed calyx segments; however, *L. rogersii* always has large auricles and *L. georgiana* has very small auricles or none at all.



(11a) Toothed calyx lobes, large auricles and hairy calyx tube (rarely glabrous).



(11b) Lower lip of corolla near throat is often short-pubescent.



(11c) Large drooping auricles.



(11d) Inflorescence.



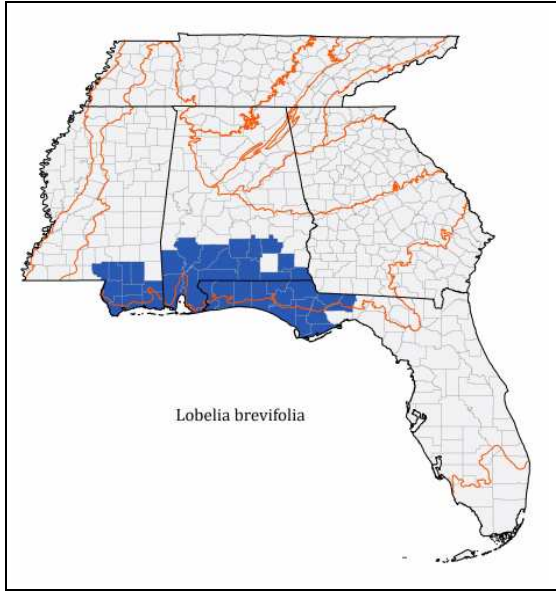
(11e) Hairy stem and flower (rarely glabrous).



(11f) Ovate-elliptic leaves.

Figure 11. *Lobelia rogersii*. (a & b) Stone Co., Mississippi, 27 Oct 2008. Photos: John R. Gwaltney <www.southeasternflora.com> (c) *Moore 1066* (AUA), Baldwin Co., Alabama, 10 Sep 1970. (d–f) Etowah, Co., Alabama, seepage slope, 24 Sep 2014. Photos: Wayne Barger.

6. *Lobelia brevifolia* Nutt. ex A. DC. {short-leaf} — SHORTLEAF LOBELIA (Fig. 12). Pine savannas,



flatwoods, ditches, and bogs; August–November. Endemic to the East Gulf Coastal Plain from the Florida Panhandle west to eastern Louisiana. Kartesz (2016) maps this species in southeastern Georgia (Echols County), but the report has not been verified. There is also an historical herbarium specimen housed at the Carnegie Museum that is supposedly from Lee County, Alabama (CM, *Earle s.n.*, Auburn, 11 Oct 1896), but the location data may be in error. The curator of the Auburn University herbarium doubts the accuracy of the label (pers. comm. Curtis Hansen). Shortleaf Lobelia is very distinct and easy to identify by its numerous, short, denticulate leaves and pectinately toothed calyx lobes. *Lobelia brevifolia* was considered to be one of the parents of *L. rogersii* (Bowden 1961), which is now believed to be a species of hybrid origin.



(12a) Flowers with pectinate calyx lobes.



(12b) Stems with numerous short leaves.



(12c) Denticulate leaf margins.



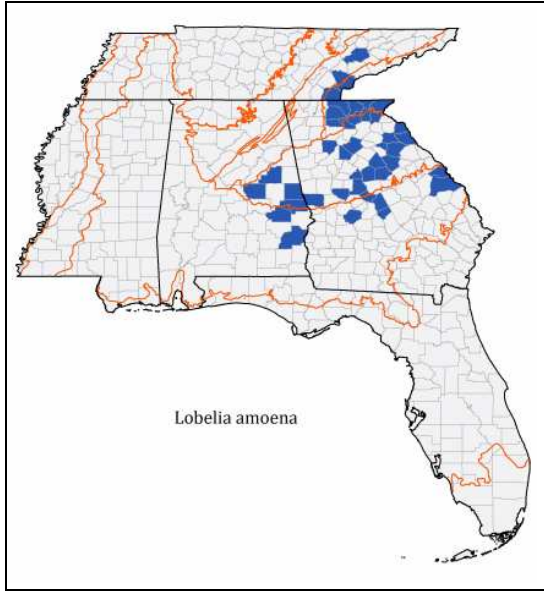
(12d) Calyx with large auricles and toothed lobes.



(12e) Corolla short-pubescent on outside of corolla and on lower lip near throat.

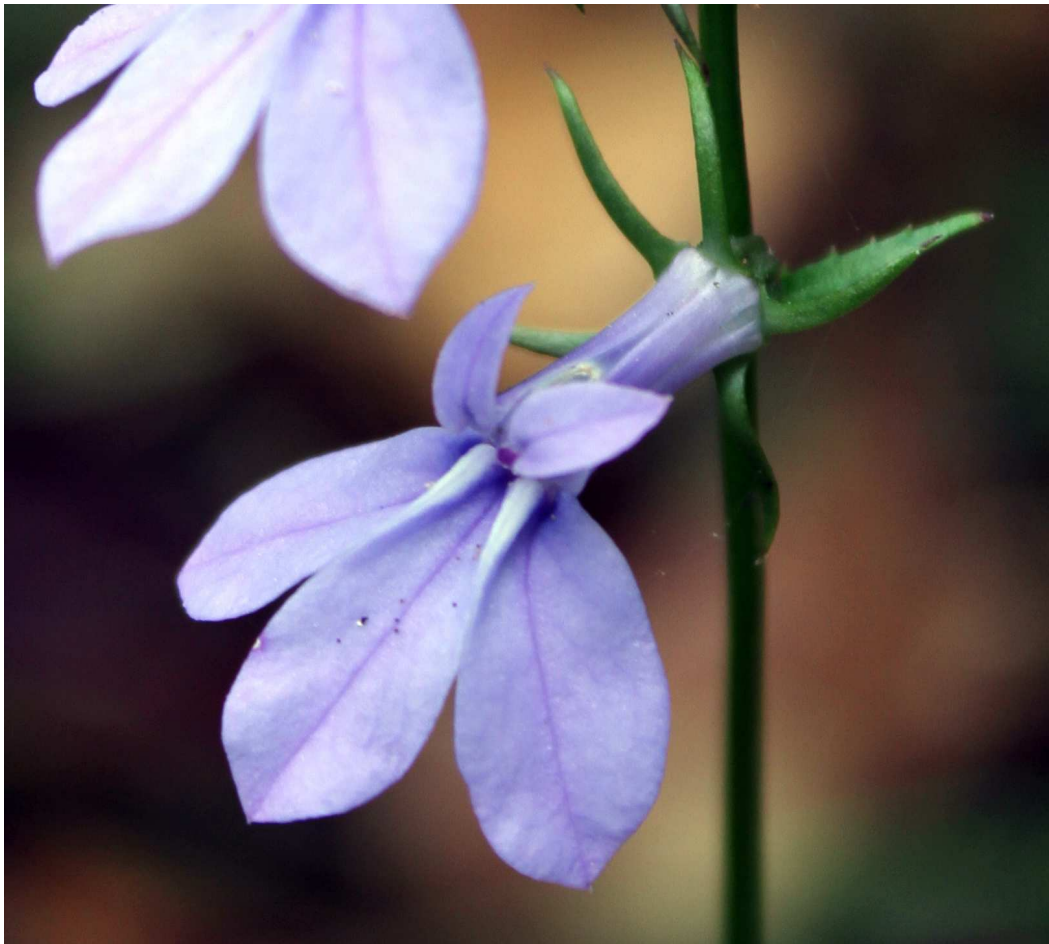
Figure 12. *Lobelia brevifolia*. (a–e) Walton Co., Florida, 20 Oct 2014. Photos: Dan Spaulding & Melanie Taylor.

7. *Lobelia amoena* Michx. {delightful} — SOUTHERN LOBELIA; PRETTY LOBELIA (Fig. 13).



Perennial herb. Stream banks, creek margins, gravelly areas along rivers, lake banks, seepage slopes, boggy woods, alluvial woods, wet rocky woods, granite outcrops, woodland seeps, base of wet cliffs, and spring margins; August–October. Native from North Carolina to east Alabama. Chiefly occurring in the Blue Ridge and Piedmont, but is occasionally found in adjacent upper Coastal Plain of Alabama, Georgia, South Carolina, and the Cumberland Plateau of Tennessee. *Lobelia amoena* is a commonly misidentified species. Individuals of *L. georgiana* with sparingly toothed calyx lobes are frequently mistaken for *L. amoena*, but *L. amoena* has calyx lobes that lack teeth and also has thinner leaves. *Lobelia amoena* is frequently confused with less pubescent forms of *L. puberula*, but *L. amoena* lacks hair on its corolla and has linear to lanceolate calyx lobes that are often spreading or flexuous.

Lobelia amoena has not been given its own wetland indicator status because it is lumped under *L. georgiana* (Lichvar 2016). *Lobelia amoena* should be Facultative-Wetland (FACW).



(13a) Glabrous flowers and linear, spreading calyx lobes lacking teeth; note that the bract is toothed.



(13b) Inflorescence loose.



(13c) Close-up of inflorescence.



(13d) Calyx is glabrous.



(13e) Cauline leaves with crenate margins.



(13f) Dried calyx.



(13g) Dried leaf.



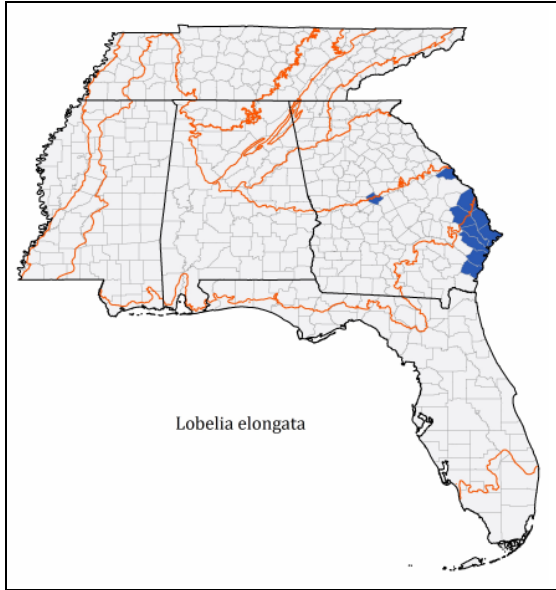
(13h) Lower stem with scattered pubescent.



(13i) Upper stem sparsely pubescent.

Figure 13. *Lobelia amoena*. (a–c) Lee Co., Alabama, 14 Oct 2014. Photos: Wayne Barger. (d) Coosa Co., Alabama, streambank, 12 Oct 2014. Photo: Dan Spaulding. (e) Lee Co, Alabama, streambank, 12 Oct 2014. Photo: Dan Spaulding. (f–i) *Spaulding 14209* (AMAL), Chambers Co., Alabama, 12 Oct 2014.

8. *Lobelia elongata* Small {elongate} — LONGLEAF LOBELIA; STREAMSIDE LOBELIA (Fig. 14).



Perennial herb. Swamps, marshes, river margins, stream margins, seeps, bogs, swales, saltmarshes, ditches, and wet woods; August–October. Native along the Atlantic Coastal Plain from Delaware south to Georgia, rarely occurring in the adjacent Piedmont. Reports of *L. elongata* from Alabama and Mississippi are all erroneous. This species is very similar to *L. amoena*, which occurs mostly in the Piedmont and Blue Ridge. *Lobelia elongata* differs from *L. amoena* by the combination of the following characters: thicker, strongly toothed, lanceolate leaves; inflorescence with densely arranged flowers; and slightly longer anther tubes (4 mm vs. 2.5–3.5 mm). *Lobelia elongata* is also sometimes confused with *L. georgiana*, which has toothed calyx lobes. *Lobelia elongata* has calyx lobes that lack teeth. Bowden (1959a) reported that a few specimens of *L. elongata* had teeth on their

calyx lobes, but these were most likely depauperate specimens of *L. georgiana*. [*Lobelia glandulosa* Walt. var. *glabra* A. DC.]



(14a) Inflorescence densely flowered and secund. (14b) Illustration showing leaves and inflorescence.



(14c) Leaves typically toothed and laceolate (but leaves can occasionally be wider).



(14d) Tight inflorescence.



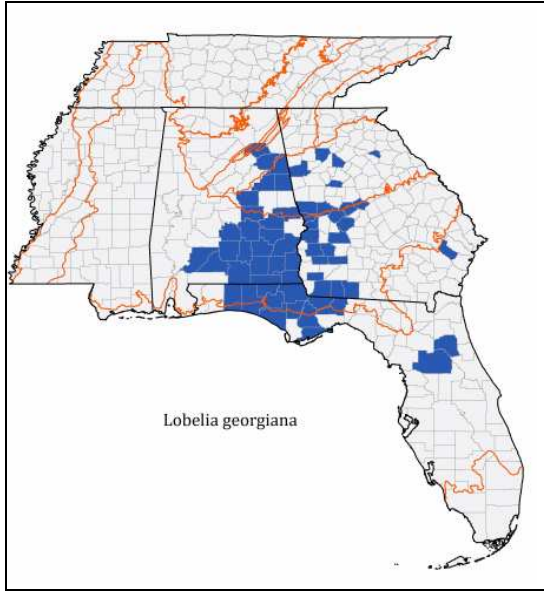
(14e) Glabrous calyx with linear lobes.



(14f) Almost glabrous stems.

Figure 14. *Lobelia elongata*. (a) Moore Co., North Carolina, acid blackwater stream, 9 Sep 2014. Photo: Bruce Sorrie. (b) Line drawing from Britton and Brown 1913. (c–f) Zebryk 767 (VDB), Chatham Co., Georgia, drainage ditch, 28 Oct 1992.

9. *Lobelia georgiana* McVaugh {of Georgia} — GEORGIA LOBELIA (Figs. 1b & 15). Perennial herb.



Bogs, ditches, bottomland hardwoods, swamps, floodplain forests, pond margins, and streambanks; August–October. Native to the Piedmont, Ridge & Valley, Blue Ridge, and Coastal Plain provinces from Virginia south to Florida and west to Alabama. Various reports from Mississippi and Louisiana are erroneous and many of these specimens are actually *L. rogersii*, which is similar because of its toothed calyx lobes, but differs by its large auricles. McVaugh (1936) cited a specimen from Knox Co., Tennessee, but stated that it was “possibly an error.” Kartesz (2016) lists this taxon for Polk and Monroe counties in Tennessee, but no vouchers are cited. *Lobelia georgiana* is closely related to *L. amoena* and is often considered a variety by some authors (McVaugh 1943). *Lobelia georgiana* usually has thicker leaves, dries more grayish-green, and has toothed calyx segments. In depauperate specimens,

the calyx lobes are sometimes only remotely toothed near the base, so several flowers should be examined closely. Some specimens of *L. georgiana* with narrow leaves can appear similar to *L. glandulosa*, but the lower corolla lip of *L. georgiana* is essentially glabrous and lacks the villous hairs that occur basally on the lower corolla lip of *L. glandulosa*. [*Lobelia amoena* Michx. var. *glandulifera* A. Gray; *L. amoena* Michx. var. *obtusata* A. Gray; *L. glandulifera* (A. Gray) Small]



(15a) Calyx lobes toothed and lacking auricles; calyx tube glabrous (very rarely with a few scattered hairs).



(15b) Inflorescence.



(15c) Gland-tipped teeth.



(15d) Leaf undersurface often whitish.



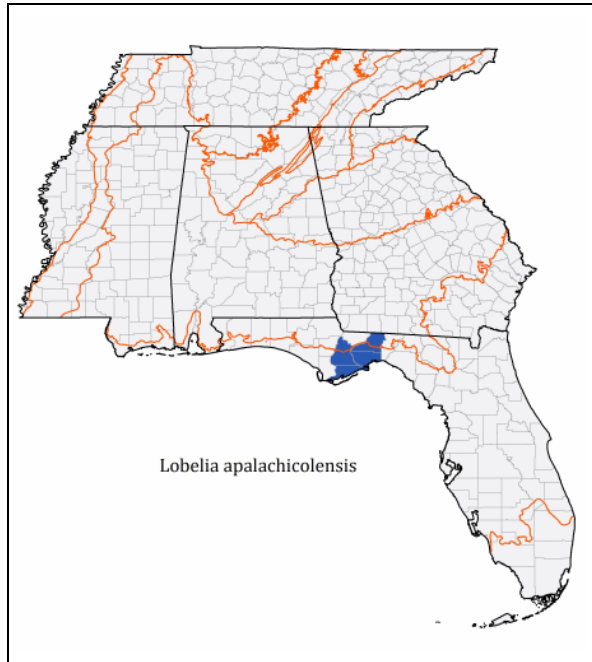
(15e) Lower corolla lip near throat essentially glabrous.



(15f) Form with scattered, tiny teeth on calyx lobes.

Figure 15. *Lobelia georgiana*. (a–c) Geneva Co., Alabama, 1 Oct 2014. Photos: Wayne Barger. (d) Barbour Co., Alabama, 10 Oct 2014. Photo: Wayne Barger. (e & f) Cleburne Co., Alabama, pond margin, 12 Oct 2014. Photos: Dan Spaulding.

10. *Lobelia apalachicolensis* Spaulding, Barger, & Horne {of Apalachicola} — APALACHICOLA



LOBELIA (Fig. 16). Perennial herb. Roadside ditches, wet pine flatwoods, and margins of shrub bogs; September–November. This new species is only known from four counties in the Apalachicola region of the Florida Panhandle (Franklin Liberty, Leon, and Wakulla counties). *Lobelia apalachicolensis* was first collected on October 16, 1954, by Robert K. Godfrey in Liberty Co., Florida from a moist ditch bordering wet woodlands. Dr. Godfrey had identified his specimen as *L. glandulifera* [= *L. georgiana*]. During this study, nine different collections of *L. apalachicolensis* were examined and most were originally determined as *L. georgiana* or *L. glandulosa*. *Lobelia apalachicolensis* is very similar to *L. georgiana* because both species have toothed calyx lobes, lack auricles, and have elliptic-ovate leaves. However, the lower lip of the corolla of *L. apalachicolensis* is distinctly pubescent basally,

and in *L. georgiana* it is glabrous to minutely papillate basally. Another species, *L. glandulosa*, is also villous at the base of the corolla lip, but differs by its linear to lanceolate leaves and usually darkens when its dried; whereas *L. apalachicolensis* has elliptical-ovate leaves and dries light green. *Lobelia apalachicolensis* can also be mistaken for individuals of *L. puberula* with toothed calyx lobes, but *L. puberula* has densely pubescent stems, corollas, and calyx lobes.



(16a) Roadside ditch habitat.



(16b) Inflorescence often partially one-sided (secund).



(16c) Close-up of flowers.



(16d) Distinctly pubescent lower lip of corolla near throat of tube.



(16e) Form with glabrous calyx tube and pedicel (the corolla tube will also be glabrous).



(16f) Form with densely pubescent calyx tube and pedicel (it can also be sparsely chaffy-hirsute).



(16g) Corolla tube is occasionally sparsely pubescent in lines (the calyx tube will usually be densely hirsute).



(16h) Stem often with scattered hairs.



(16i) Stem sometimes glabrous or essentially so.



(16j) Leaves ovate to elliptic.



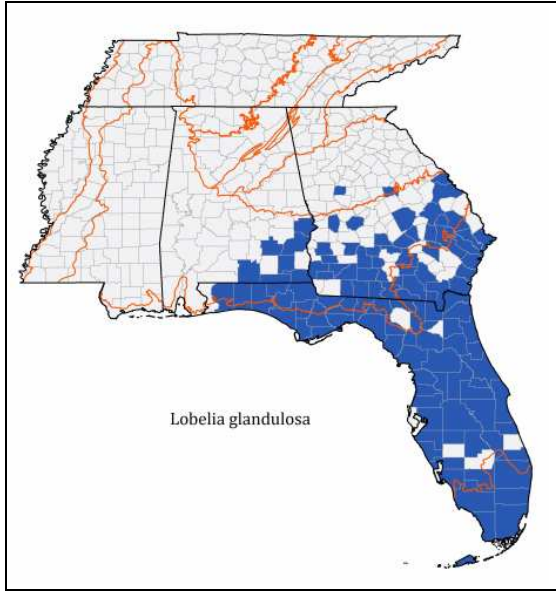
(16k) Sometimes branched below inflorescence.



(16l) Most plants over a meter tall (Dan Spaulding 1.88 m = 6' 2").

Figure 17. *Lobelia apalachicolensis*. (a–i) Liberty Co., Florida, roadside ditch, 18 Oct 2014. (j–l) Wakulla Co., Florida, roadside ditch, 19 Oct 2014. Photos by Dan Spaulding & Melanie Taylor.

11. *Lobelia glandulosa* Walt. {glandular} — GLADE LOBELIA; GLANDULAR LOBELIA (Fig. 17).



Perennial herb. Seepage slopes, bogs, ditches, roadside seeps, wet pine savannas, and flatwoods; August–November. Found chiefly on the Coastal Plain, rarely adjacent Piedmont, of North Carolina, Georgia, Florida, and southeast Alabama. This species is sometimes mistaken for *L. flaccidifolia*, but *L. glandulosa* has tiny bracteoles at the base of the petiole (Fig. 17h) rather than conspicuous ones near the middle (Fig. 18e). *Lobelia glandulosa* usually has zigzag stems and sharp-tipped leaves that are prominently denticulate with glandular teeth. The calyx lobes of *L. glandulosa* are usually toothed but they are sometimes entire. Its calyx tube is often hirsute, but not short-pubescent like in *L. flaccidifolia* (both species can have a glabrous calyx). Specimens of *L. glandulosa* that lack hair on the calyx tube were named by Fernald (1947) as var. *laevicalyx*, which can be confused with *L.*

elongata, but the corolla lip of *L. glandulosa* is densely pubescent basally near throat of tube. A new species, yet to be described, occurs in the Sandhill region of North and South Carolina inhabiting wet streamheads and seepage slopes (Sorrie 2011). This “Sandhills Lobelia” is similar to *L. glandulosa* except that it lacks hair on the lower lip of its corolla. [*Lobelia glandulosa* var. *laevicalyx* Fernald]



(17a) Whole plant.



(17b) Inflorescence.



(17c) Narrow lanceolate leaves.



(17d) White form with purple veins.



(17e) "Laevicalyx" form with no hair on warty calyx tube.



(17f) Lower lip densely pubescent basally.



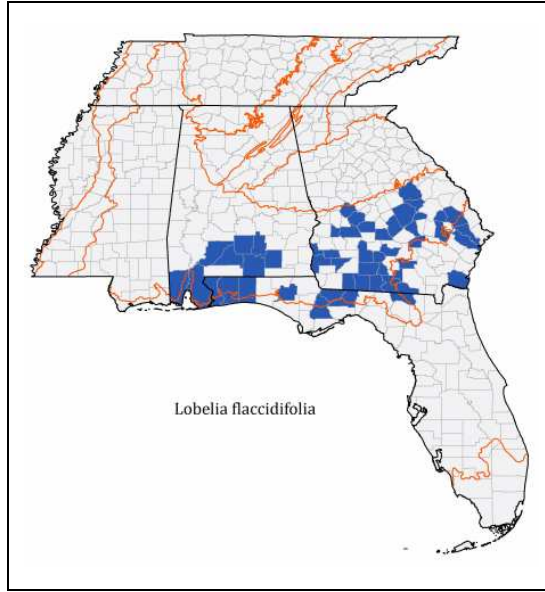
(17g) Typical form with hirsute calyx tube.



(17h) Bracteole is small and near base of pedicel.

Figure 17. *Lobelia glandulosa*. (a–c) Houston Co., Alabama, 18 Oct 2011. Photos: Wayne Barger. (d & e) Calhoun Co., Florida, 18 Oct 2014. Photos: Dan Spaulding & Melanie Taylor. (f & g) Wakulla Co., Florida, 19 Oct 2014. Photos: Dan Spaulding. (h) Barger & Holt SP#342 (AMAL), Houston Co., Alabama, 18 Oct 2011.

12. *Lobelia flaccidifolia* Small {flaccid-leaf} — FOLD-EAR LOBELIA (Fig. 18). Annual herb. Bogs, ditches, wet prairies, flatwoods, and floodplain forests; June–August. Native along the Coastal Plain of Georgia through northern Florida west to eastern Texas, but not known from Mississippi (Kartesz 2016). Small (1903) named the disjunct populations in Louisiana and Texas *L. halei*, which he described as having thicker leaves, larger flowers, and unbranched stems. McVaugh (1936) at first recognized *L. halei*, although he wrote: “There is some evidence to show that this species and the next are the same, and intergrade freely. However, *L. flaccidifolia* differs by the thinner, more oblong leaves, greater tendency to branch, smaller and more numerous flowers, and a somewhat later flowering period; in view of these differences, it seems best to keep them as separate species, at least until more material is seen.” Eventually, McVaugh (1943) decided not to recognize *L. halei*. Another species, *L. glandulosa* is often confused with is *L. flaccidifolia*, especially the thick-leaved “*halei*” form that has acute tips (the typical species has leaves with blunt tips). The most reliable way to separate these two species is by their bracteoles. *Lobelia flaccidifolia* has two conspicuous, linear bracteoles that are borne near the middle of the pedicel (Fig. 18e), whereas *L. glandulosa* has tiny, oval bracteoles borne at the base of the pedicel and often hidden by the bract (Fig. 17h). If hair is present on the calyx of either species, then they can be easily separated by the type of pubescence. *Lobelia flaccidifolia* will have short, bristly hairs and *L. glandulosa* will have long, chaffy hairs. [*Lobelia halei* Small]



L. glandulosa is often confused with is *L. flaccidifolia*, especially the thick-leaved “*halei*” form that has acute tips (the typical species has leaves with blunt tips). The most reliable way to separate these two species is by their bracteoles. *Lobelia flaccidifolia* has two conspicuous, linear bracteoles that are borne near the middle of the pedicel (Fig. 18e), whereas *L. glandulosa* has tiny, oval bracteoles borne at the base of the pedicel and often hidden by the bract (Fig. 17h). If hair is present on the calyx of either species, then they can be easily separated by the type of pubescence. *Lobelia flaccidifolia* will have short, bristly hairs and *L. glandulosa* will have long, chaffy hairs. [*Lobelia halei* Small]



(18a) Whole plant.



(18b) Flower with pubescent lower corolla lip.



(18c) Close-up of flower clusters; note toothed calyx lobes.



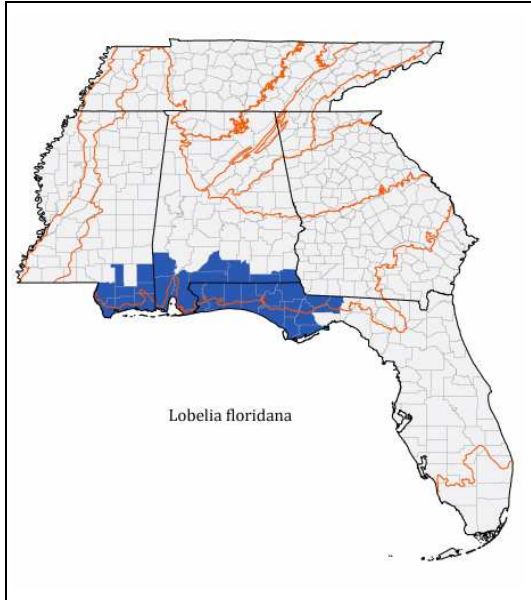
(18d) Oblong leaves of typical form.



(18e) Bracteoles and short-pubescent calyx.

Figure 18. *Lobelia flaccidifolia*. (a–d) Escambia Co., Florida, 24 Aug 2003. Photos by Kim Davis & Mike Stangeland. (e) *Diamond 16460* (AMAL), Crenshaw Co., Alabama, 2 Jun 2006.

13. *Lobelia floridana* Chapm. {of Florida} — FLORIDA LOBELIA (Fig. 19). Perennial herb. Bogs, wet pine savannas, and flatwoods; May–October.



Occurs on Gulf Coast from eastern Louisiana to the Florida Panhandle. A specimen cited by McVaugh (1936) for New Hanover Co., North Carolina, is probably misidentified. *Lobelia floridana* is very similar to *L. paludosa*, but it is usually more robust. It is typically a taller plant averaging 80–100 cm tall with longer basal leaves (10–30 cm); larger flowers (12–20 mm long, avg. 15–16 mm); and has longer filament tubes (6–11 mm long). Both species have reduced upper leaves with larger ones that are chiefly basal. The key distinguishing features separating it from *L. paludosa* are small auricles (Fig. 19c); a corolla that is not fenestrate (lacks slit-like openings on each side of the tube); and pedicels with small bracteoles at their bases (*L. paludosa* lacks them). Note: Older flowers can be torn and appear fenestrate and auricles can be disappear when plant is in fruit.

[*Lobelia paludosa* Nuttall var. *floridana* (Chapm.) A. Gray]



(19a) Inflorescence.



(19b) Close-up of flowers.



(19c) Calyx with small auricles.



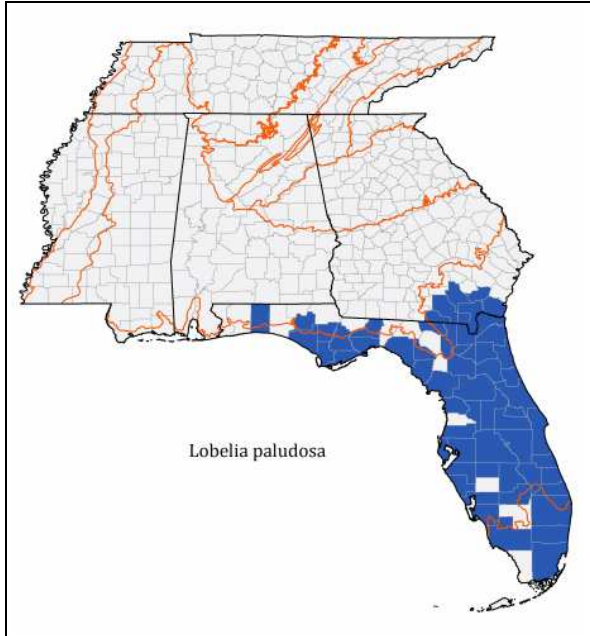
(19d) Reduced upper leaves.



(19e) Larger basal leaves (growing in water).

Figure 19. *Lobelia floridana*. (a–e) Jackson Co., Mississippi, Grand Bay Wildlife Refuge, 27 Sep 2009. Photos: John R. Gwaltney. <www.southeasternflora.com>

14. *Lobelia paludosa* Nutt. {of bogs} — WHITE LOBELIA; SWAMP LOBELIA (Fig. 20). Perennial herb.



Flatwoods, savannas, ditches, and dune swales; April–November. This species is found mostly in Florida, but ranges into adjacent southeast Georgia. *Lobelia paludosa* was erroneously reported for Alabama by Mohr (1901) and Kral et al. (2011), but all specimens determined as *L. paludosa* from Alabama were annotated to *L. floridana* by the senior author. *Lobelia paludosa* does resemble *L. floridana* because both species have leaves that are chiefly basal and strap-like, but *L. paludosa* is not as robust. Most plants average 50–60 cm tall, have smaller flowers (10–16 mm long, avg. 12–13 mm), and shorter filament tubes (3–4.5 mm long). McVaugh (1943) wrote that “In habit and vegetative characters hardly separable from *L. floridana*, but smaller.” The key characters of *L. paludosa* are a calyx with no auricles (if calyx surface is pustular it may be more difficult

to discern); pedicels that lacks bracteoles; and a fenestrate corolla tube. The fenestrate corollas are more easily seen on dried specimens and are more difficult to detect when flowers are fresh.



(20a) Inflorescence.



(20b) Close-up of flower.



(20c) Calyx lacking auricles.



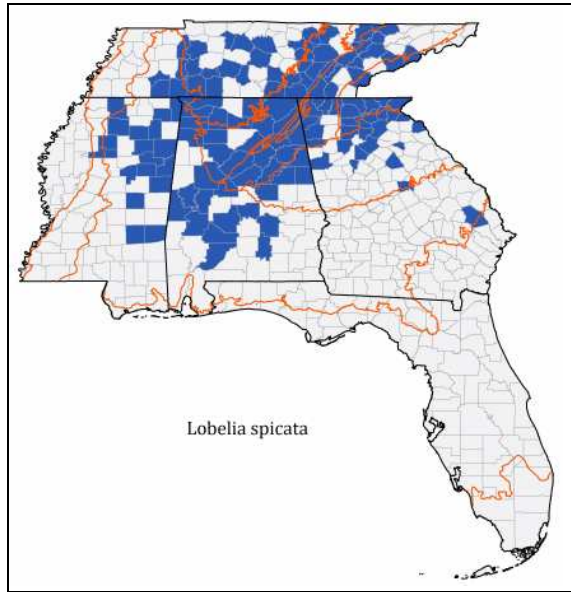
(20d) Upper, reduced leaf.



(20e) Larger basal leaves.

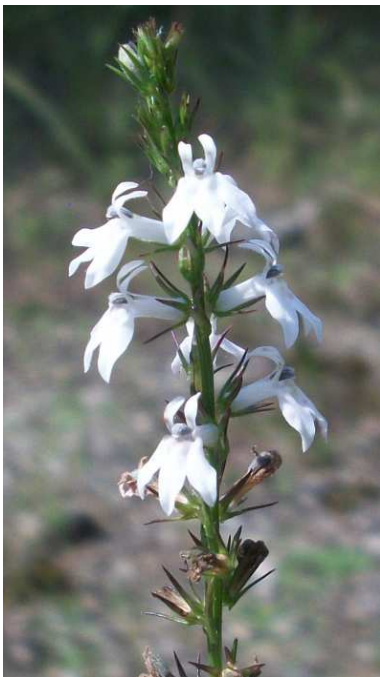
Figure. 20. *Lobelia paludosa*. (a–e) Franklin Co., Florida, Apalachicola National Forest, 2 May 2015. Photos: John R. Gwaltney <www.southeasternflora.com>

15. *Lobelia spicata* Lam. {spiked} — PALE-SPIKE LOBELIA (Fig. 21). Perennial herb. Open woods,



fields, prairies, roadsides, rocky hillsides, creek banks, glades, and barrens; June–August. Native to midwestern and eastern USA and adjacent Canada. In the USA this species ranges from eastern Montana to Maine, south to Georgia and west to East Texas (Kartesz 2016). The common name, Pale-Spike Lobelia, was given because the flowers are often white, but they can sometimes be blue. *Lobelia spicata* is a highly variable taxon and is actually one polymorphic species. The characters used to separate various varieties, listed in McVaugh (1936), intergrade within populations, making these infraspecific taxa arbitrary. The most common variety in the Deep South (var. *leptostachya*) often has filiform auricles with knobbed tips (Fig. 21f), but in some individuals these auricles are not well-developed and the plants resemble the typical variety (var.

spicata), which usually lacks auricles. One variety has larger basal leaves and smaller cauline leaves (var. *scaposa*) and another variety has strongly rough-pubescent stems and calyx lobes (var. *hirtella*). But all of these characters are variable from one plant to the next and many specimens cannot be reliably keyed out to any variety. One of McVaugh's varieties (var. *campanulata*) was distinguished by its white anthers, but was excluded by Bowden (1959) because it was male-sterile. [*Lobelia leptostachys* A. DC.; *L. spicata* var. *campanulata* McVaugh; *L. spicata* var. *hirtella* A. Gray; *L. spicata* var. *leptostachys* (A. DC.) Mack. & Bush; *L. spicata* var. *scaposa* McVaugh]



(21a) Spike-like inflorescence.



(21b) Leaves are often oblong.



(21c) Lower stem densely puberulent.



(21d) "Scaposa" form with larger basal leaves and decreasingly smaller cauline leaves.



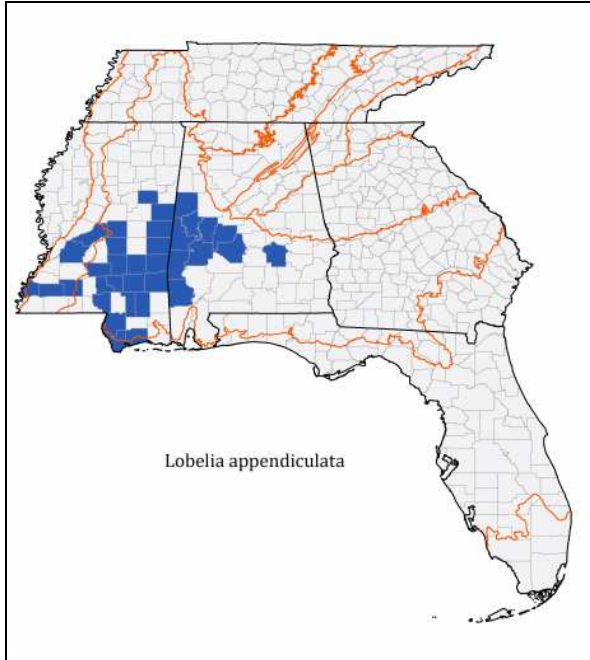
(21e) "Hirtella" form with scabrous calyx.



(21f) "Leptostachya" form with long auricles.

Figure 21. *Lobelia spicata*. (a–c) DeKalb Co., Alabama, Limestone barren, 16 Aug 2014. Photos: Dan Spaulding. (d) Atkinson & Whetstone 1568 (JSU), Pearson Co., North Carolina, 2 Jun 1976. (e) Sharp & Underwood 157 (TENN), Campbell Co., Tennessee, 4 Jul 1933. (f) Spaulding et al. 13819 (AMAL), Calhoun Co., Alabama, 1 Aug 2013.

16. *Lobelia appendiculata* DC. {appendaged} — PALE LOBELIA; EAR-FLOWER LOBELIA (Fig. 22).

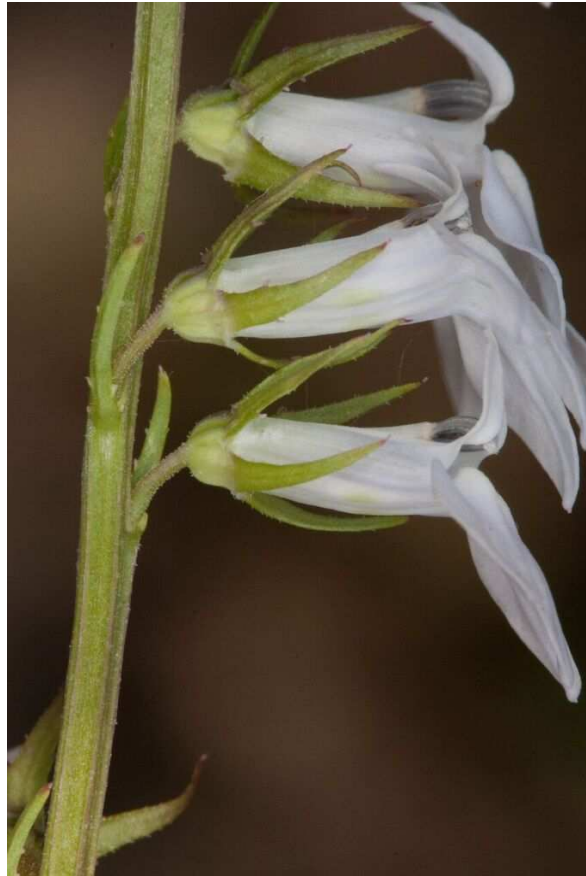


Annual or biennial herb. Roadsides, fields, prairies, and grassy openings in woods; May–July. This species is found in the Black Belt region of Mississippi and Alabama, but ranges west to east Texas and north to southeast Kansas. The epicenter of this species is the lower Midwest (Kartesz 2016). McVaugh (1936) reported this species from Hancock Co., Illinois, but it's likely an error. The corolla of Pale Lobelia is frequently white, but they are also sometimes blue. *Lobelia appendiculata* is often misidentified as *L. spicata*, but can be easily distinguished by its short-ciliate margined calyx lobes, its tendency to have secondary branches, and its short-ovate leaves with rounded bases. Specimens from Louisiana, Texas and Arkansas have the typical foliaceous auricles and conspicuously ciliate calyx lobes (Fig. 22e). In Mississippi and Alabama, *L. appendiculata* usually has smaller auricles and

the calyx lobes are usually not strongly ciliate (Fig. 22c). *Lobelia gattereri* is similar to *L. appendiculata* but completely lacks auricles and has glabrous calyx lobes.



(22a) Inflorescence mostly secund.



(22b) Close-up of inflorescence (small auricle form).



(22c) Close-up of calyx (small auricled form) with ciliate margined lobes.



(22d) Leaf bases rounded; stems often branching.



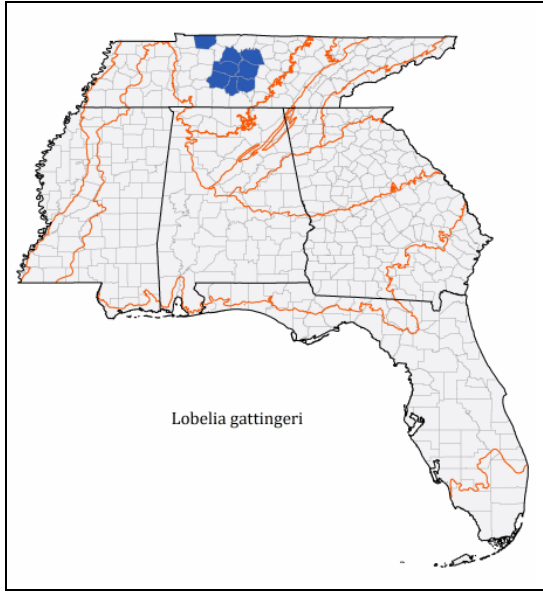
(22e) Large auricle form with strongly ciliate calyx.



(22f) Leaves with irregularly toothed margins.

Figure 22. *Lobelia appendiculata*. (a–d) Rankin Co., Mississippi, 16 Jul 2013. Photos by John R. Gwaltney. <southeasternflora.com> (e & f) Haynes 10379 (AMAL), Claiborne Parish, Louisiana, 1 Jun 2003.

17. *Lobelia gattingeri* A. Gray {for pioneer botanist of Tennessee, Augustin Gattinger, 1825-1903}



— GATTINGER'S LOBELIA (Fig. 23). Annual herb. Calcareous barrens and cedar glades; late April–early August (peak flowering time is May through June). This species is endemic to the Interior Low Plateau Province and is only known from eight counties in Tennessee and, according to Kartesz (2016), two counties in Kentucky. Baskin & Baskin (1979) observed that plants tend to vary greatly in size even in the same population (7.5 to 38 cm in height). They state that “since a population usually consists of plants behaving as winter annuals as well as summer annuals, and perhaps occasionally as biennials, there are large differences in sizes of flowering plants.” It is the larger plants that usually have one or more secondary branches (Fig. 23c). This species is very similar to *L. appendiculata*, but differs by lacking auricles and having no cilia on its calyx lobes (Fig. 23a). McVaugh (1936) stated that

“due to the very restricted range of the latter, and the fact that relatively few intermediate plants have been seen, it seems best for the present to maintain both as good species,” but later McVaugh (1943) reduced *L. gattingeri* to a variety of *L. appendiculata*. Bowden (1959a) said that “specimens of *L. gattingeri* have distinctive morphological characteristics and I regard the taxon as a species.” The inflorescence of both species have racemes that are partially secund, which means flowers are borne mostly on one side of the flowering stalk (Fig. 19d). In a similar species, *L. spicata*, the inflorescence is spike-like and the flowers are borne on all sides. Mohr (1901) erroneously reported *L. gattingeri* from Alabama, yet it is possible that this species may one day be found in limestone glades of north Alabama. [*Lobelia appendiculata* A. DC. var. *gattingeri* (A. Gray) McVaugh]



(23a) Calyx lacking auricles and cilia.



(23b) Leaf base semi-clasping and secondary branch from leaf axil.



(23c) Herbarium specimen showing secondary branching.



(23d) Inflorescence secund.



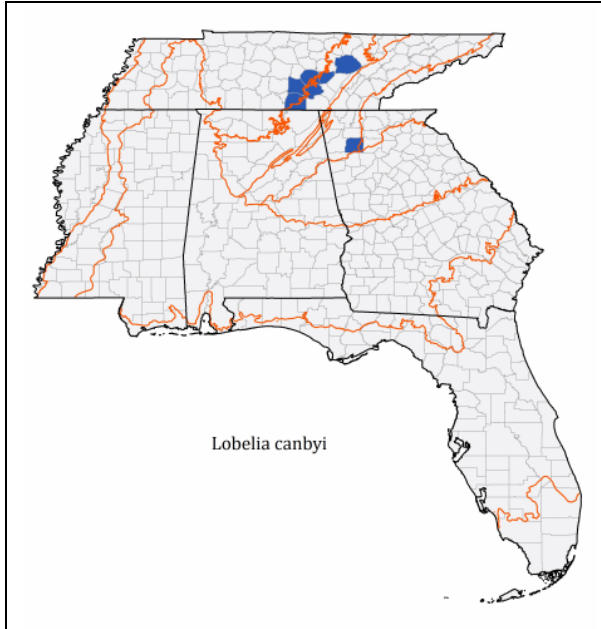
(23e) Close-up of flowers.



(23f) Leaf bases rounded.

Figure 23. *Lobelia gattereri*. (a–c) Kral 84796 (BRIT), limestone glade, Wilson Co., Tennessee. (d–f) Bedford Co., Tennessee, Limestone glade, 11 May 2014. Photos by Jack Carmen.

18. *Lobelia canbyi* A. Gray {for its discoverer, Delaware botanist William Canby, 1831-1904} —



CANBY'S LOBELIA (Fig. 24). Perennial herb. Sandy swamps, wet barrens, pine savannahs, limesink ponds, cypress-gum ponds, Carolina bays, and pocosins; July–November (peak flowering time is in August and September). Native on the Atlantic Coastal Plain from New Jersey to Georgia and disjunct in the mountains in a few counties of Tennessee, Georgia, and North Carolina. A report from Thomas Co. in southwest Georgia (Kartesz 2016) was in error and the specimen was annotated to *L. nuttallii*. *Lobelia canbyi* resembles *L. nuttallii*, but *L. canbyi* is strongly antrorsely scabrid on its pedicels and calyx. The lower corolla lip of Canby's Lobelia is also always pubescent at the base near the throat, while *L. nuttallii* has a completely glabrous corolla lip. *Lobelia canbyi* has not been collected in Alabama, but occurs in adjacent Franklin Co., Tennessee.

Lobelia boykinii is also similar but has subulate-filiform leaves, rhizomes, and a glabrous calyx.



(24a) Narrow leaves.



(24b) Close-up of inflorescence.



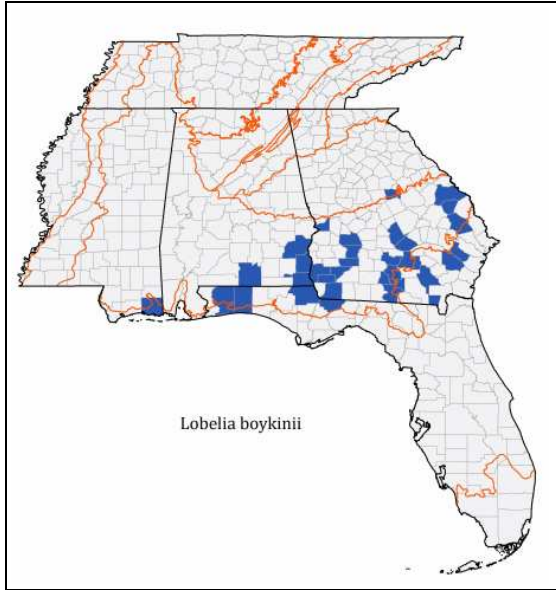
(24c) Lower lip of corolla pubescent at throat.



(24d) Calyx antrorsely scabrous.

Figure 24. *Lobelia canbyi*. (a & b) Coffee Co., Tennessee, 20 Jul 1985. Photos: Jack Carmen. (c & d) Craven Co., North Carolina, 27 Aug 2006. Photos: Jeffrey S. Pippen. <www.jeffpippen.com>

19. *Lobelia boykinii* Torrey & A. Gray ex DC. {for its discoverer, Samuel Boykin, 1786–1848} —



BOYKIN'S LOBELIA (Fig. 25). Rhizomatous, perennial herb. Wet depressions, herbaceous wetlands, sloughs, bogs, pineland swamps, and cypress ponds; May–early August. Endemic to the Atlantic and Gulf Coastal Plain. Disjunct in New Jersey and Delaware, then ranges from North Carolina southward through the Florida Panhandle to Mississippi. There is a report from New Hampshire (Center for Plant Conservation 2006), but this record has not been confirmed and is likely erroneous. Royo et al. (2008) reported that the degradation of non-alluvial coastal plain wetlands in the eastern USA has contributed to the decline of *L. boykinii*, which is now listed globally as critically imperiled (G2). While many lobelias are found in wetlands, *L. boykinii* is an obligate wetland plant and truly aquatic. Seeds germinate in late summer and develop rosettes that usually over

winter in standing water (McAvoy & Wilson 2014). Diagnostic characters of this species are subulate-filiform leaves, rhizomes, and often spongy-thickened bases of stems.



(25a) Aquatic habit



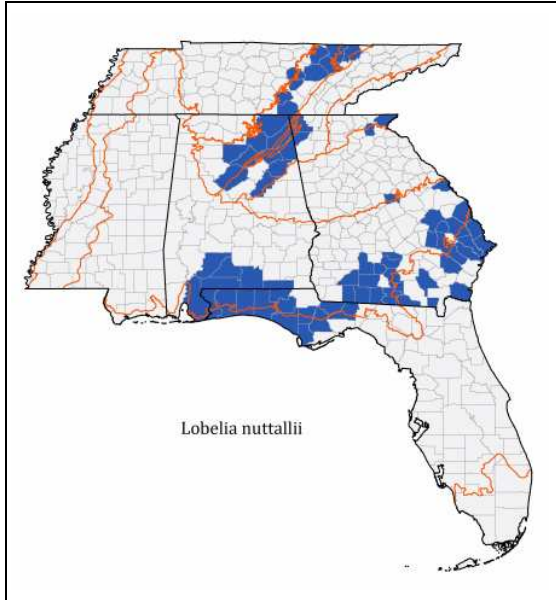
(25b) Close-up of flowers



(25c) subulate leaves

Figure 25. *Lobelia boykinii*. (a) Sussex Co., Delaware, coastal plain pond, 25 Jul 2013. Photos by Ronald Wilson. (b) Henry Co., Alabama, open wet depression, 16 May 2012. Photo by Wayne Barger. (c) Henry Co., Alabama, open wet depression, 5 May 2011. Photo by Wayne Barger.

20. *Lobelia nuttallii* J.A. Schultes {for its discoverer, English botanist Thomas Nuttall, 1786–1859}



— NUTTALL'S LOBELIA (Fig. 26). Perennial herb. Bogs, ditches, wet pine savannas, flatwoods, seeps, and depressions in sandstone outcrops; April–October (peaks May–August). Nuttall's Lobelia is native to the eastern USA from New York south to Alabama (Kartesz 2016). This species occurs on the Coastal Plain, with disjunct populations in the Appalachians. *Lobelia kalmii* is similar, but has bracteoles borne near the middle of the pedicel rather than at the base. *Lobelia kalmii* occurs in calcareous swamps in northern USA and adjacent Canada (Kartesz 2016). *Lobelia canbyi* is also often confused with *L. nuttallii*. Both taxa have narrow leaves and small flowers, but *L. nuttallii* differs by having no hair on lower lip of its corolla (Fig. 26c); pedicels that are glabrous or with bristly hairs (Fig. 26d); and basal leaves that are wider than cauline leaves (Fig. 26e).



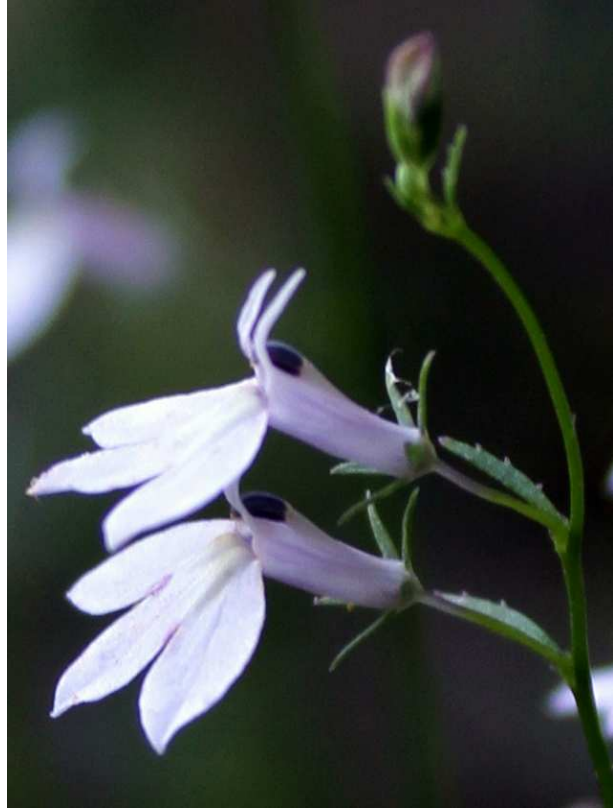
(26a) Inflorescence.



(26b) Cauline leaves are narrow.



(26c) Corolla with smooth lower lip.



(26d) Side view of flowers.



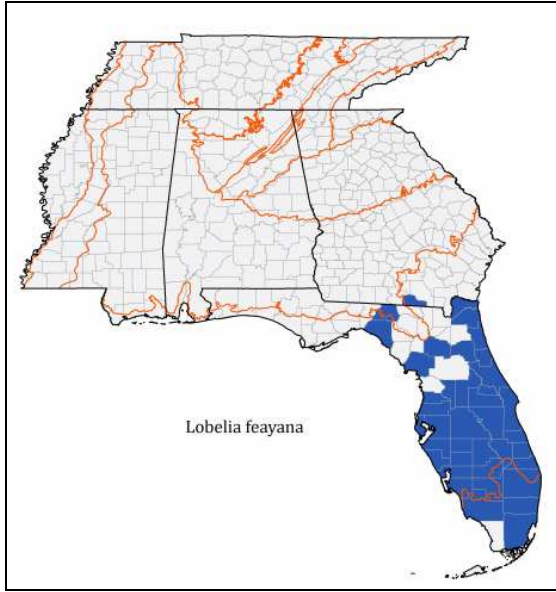
(26e) Broad basal leaves.



(26f) Calyx tube with bristly hairs (also glabrous).

Figure 26. *Lobelia nuttallii*. (a) DeKalb Co., Alabama, sandstone glade, 23 Jul 2014. Photo by Jack Carmen. (b–d) Etowah Co., Alabama, seepage bog, 24 Sep 2014. Photos by Wayne Barger. (e) *Kral 91178* (AMAL), Monroe Co., Alabama, 27 May 2001. (f) *Kral 94039* (AMAL), Grady Co., Georgia, 12 May 2003.

21. *Lobelia feayana* A. Gray {in honor of physician and botanist, William T. Féay (1803–1879), of Savannah, Georgia} — BAY LOBELIA, FEAY'S LOBELIA (Fig. 27). Annual herb. Ditches, low roadsides, moist lawns, swales in dunes, and wet pine savannas; December–May (peak flowering time is February through April). This taxon has long been thought to be endemic to Florida but a collection was made by Vernon E. McNeilus from Echols County, Georgia in 1992 (housed at TENN). *Lobelia feayana* is the only decumbent species in the southeast and it is easily recognized by its distinct suborbicular leaves with obvious petioles (Fig. 24d) and small bluish-purple flowers. McVaugh (1936) said that “this species is very close to *L. nuttallii*, from which it differs by the weaker shorter stems, usually roundish lower leaves, general smoothness, including pedicel and calyx (in contrast to *L. nuttallii*, which is often prickly), and the more elongate calyx.”



(27a) Photo: Mary Keim



(27b) Photo: Mary Keim



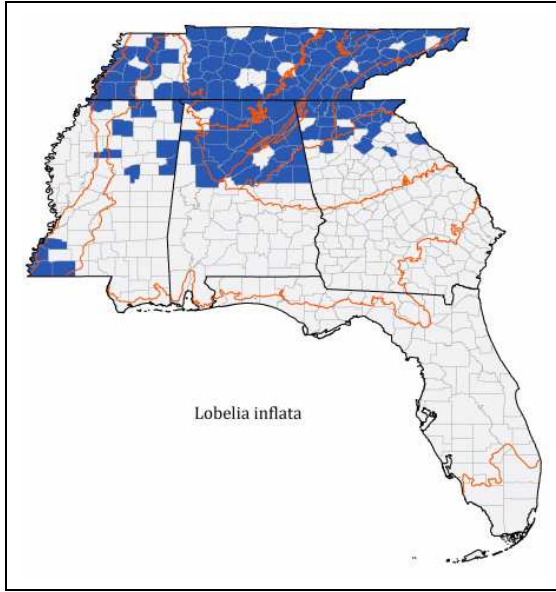
(27c) Photo: Wayne Matchett



(27d) Photo: Bob Upcavage

Figure 27. *Lobelia feayana*. (a & b) Orange Co., Florida, Orlando Wetlands Park, 10 Mar 2012. (c) Orange Co., Florida, Tosohatchee WMA, 9 Apr 2016. (d) Orbicular leaves with petioles, south Florida, 29 Jul 2009.

22. *Lobelia inflata* L. {inflated} — INDIAN-TOBACCO; INFLATED LOBELIA; PUKE-WEED; VOMIT-WEED (Fig. 28). Annual or biennial herb.



Roadsides, pastures, fields, open woods, and disturbed areas; June–November. *Lobelia inflata* is native to eastern North America, from southeastern Canada south through the eastern USA west to Kansas (Kartesz 2016). The only state *L. inflata* has not been collected from in the eastern USA is Florida. This species is easily identified by its shaggy-haired stems and small flowers with a calyx that becomes swollen (inflated) in fruit. Native Americans were reported to have used the plant as a tobacco substitute (Shosteck 1974), hence the common name. Indian-tobacco acts as a narcotic and was used medicinally to treat lung ailments, but also was popular with members of the counterculture who smoked it or brewed it into a tea to get high (Dobelis 1986). Deaths have been reported from overdoses, and symptoms include nausea, vomiting, headache, collapse, and convulsions (Kingsbury 1964). [*Lobelia inflata* var. *simplex* (Raf.) Millsp.]



(28a) Plant with basal branches.



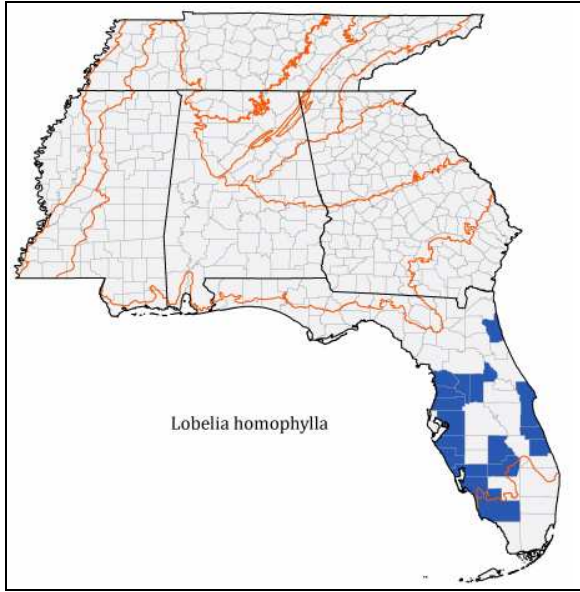
(28b) Small flowers & inflated fruit.



(28c) Close-up of shaggy stem.

Figure 28. *Lobelia inflata*. (a & b) Jackson, Co., Alabama, woodland border, 3 Jul 2007. Photos: Wayne Barger. (c) Keener 1151 (AMAL), disturbed area on edge of woods, Blount Co., Alabama, 3 Jul 1998.

23. *Lobelia homophylla* F.E. Wimm. {with one kind of leaf} — PINELAND LOBELIA (Fig. 29).



Annual herb. Bottomland forests, hardwood hammocks, floodplains, pine flatwoods, river banks, low roadsides, moist grassy areas, and ruderal sites; February–November (flowers most often in March and April). *Lobelia homophylla* is endemic to peninsular Florida. This species has small, bluish-purple, non-fenestrate corollas. Another annual from Florida, *L. feayana*, is sometime mistaken for Pineland Lobelia because both species have leaves with long petioles, but *L. homophylla* can be distinguished by its upright stems and ovate leaves with crenate, coarsely toothed or incised margins. *Lobelia homophylla* has also been misidentified as *L. cliffortiana* L., which is native only to Cuba, Hispaniola, and Jamaica (McVaugh 1940). Rosatti (1986) said that *L. cliffortiana* “is very similar to *L. homophylla* but differs in its sometimes

lanceolate or elliptic upper leaves, usually larger flowers, and more-than-half-inferior capsules.” *Lobelia homophylla* has capsules that are nearly superior. Ward (1978) stated that *L. cliffortiana*, a native of the New World Tropics, “has been attributed to Florida apparently on the basis of confusion with the very similar *L. homophylla*.” Small (1933) reported *L. cliffortiana* as a weed in wet places, waste places, and cultivated ground on the Coastal Plain from Florida to Texas, but this report is most likely in error since no specimens have been seen in the USA.



Figure 29. *Lobelia homophylla*. Manatee Co., Florida, 1 Mar 2003. Photos by Jason Sharp.

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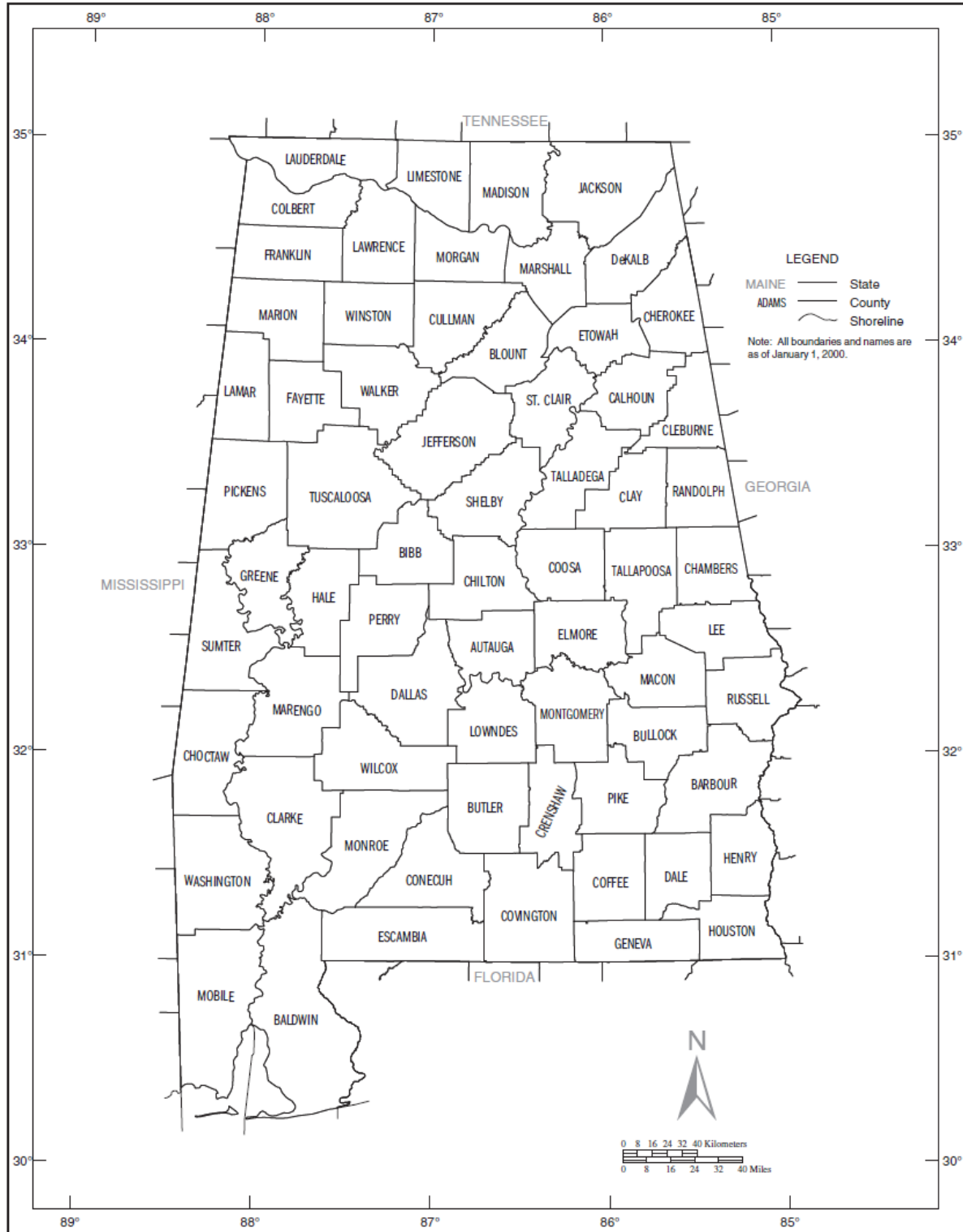
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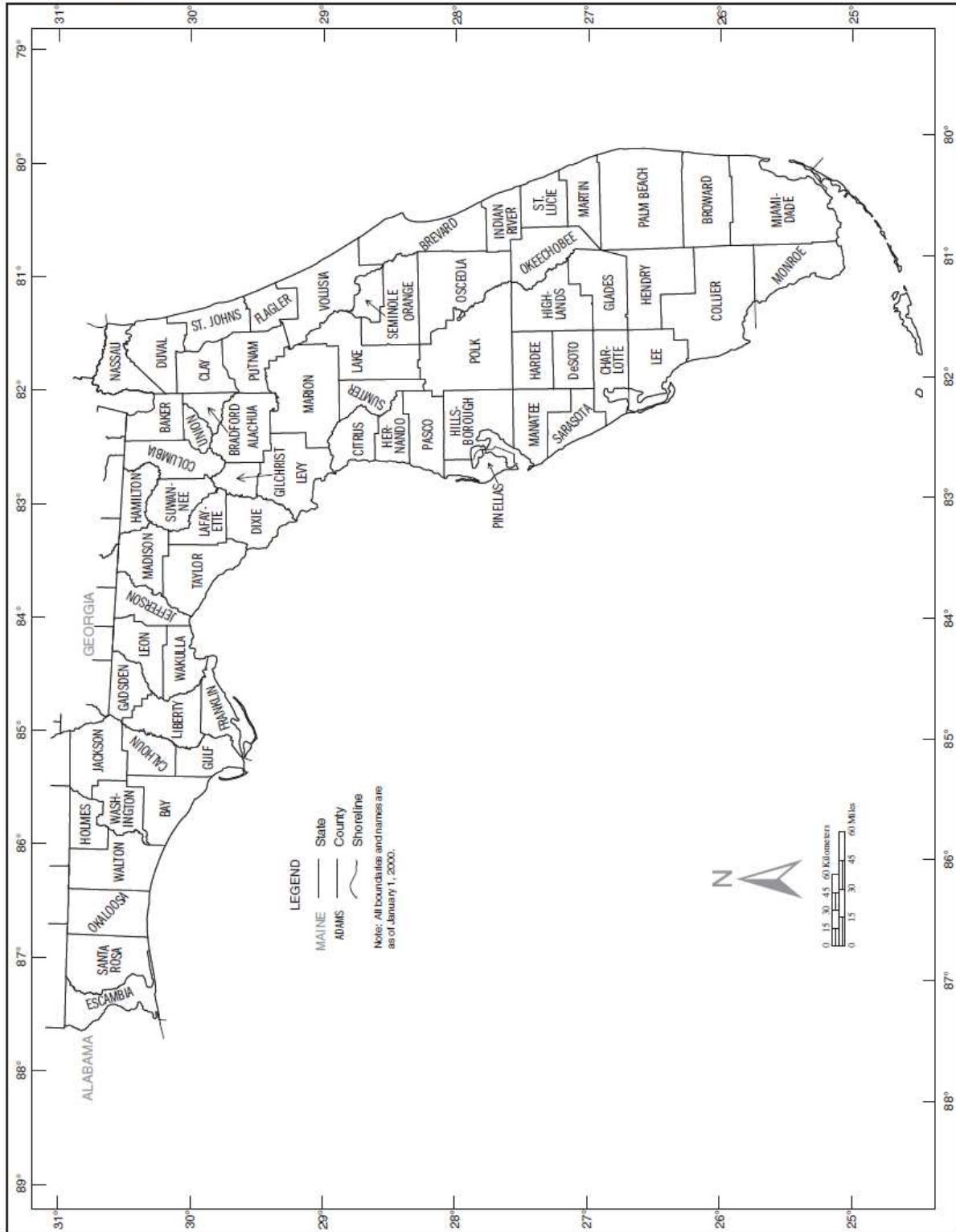
APPENDIX A: County Maps of Alabama, Florida, Georgia, Mississippi, and Tennessee.

ALABAMA - Counties



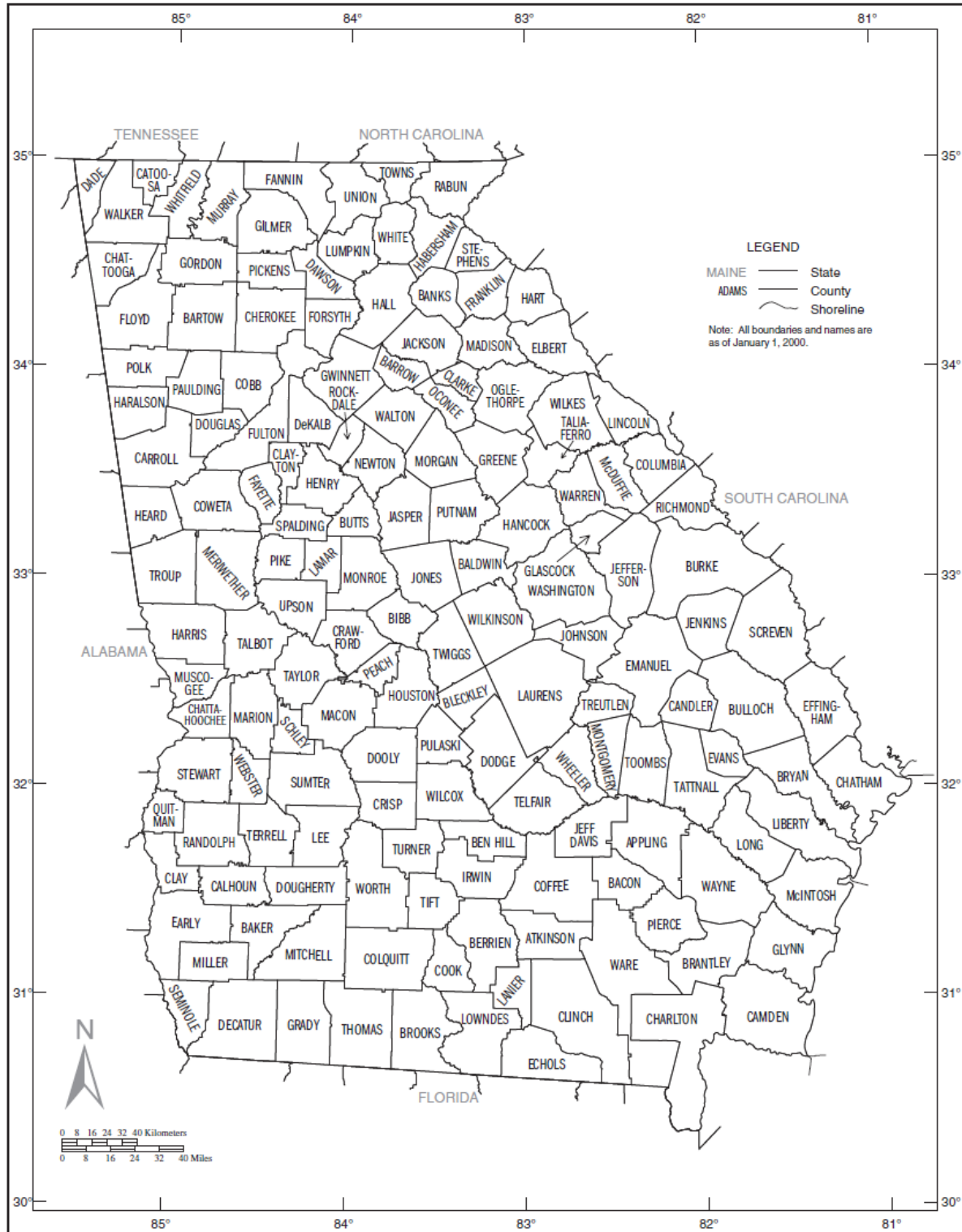
U.S. Census Bureau, Census 2000

FLORIDA - Counties

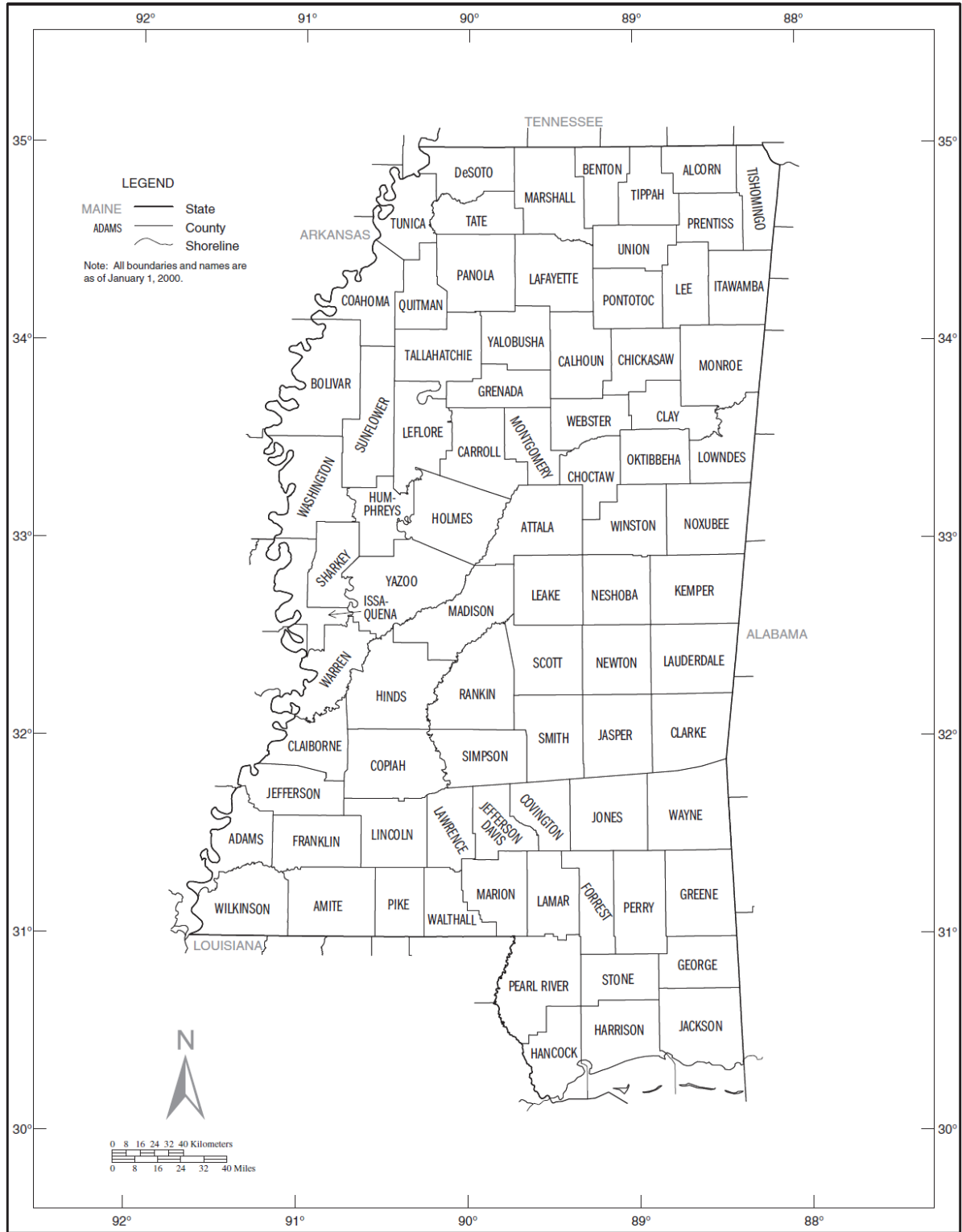


U.S. Census Bureau, Census 2000

GEORGIA - Counties



MISSISSIPPI - Counties



U.S. Census Bureau, Census 2000

