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TAXONOMIC REVISION OF *EUTHAMIA* (ASTERACEAE)

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ABSTRACT

Based primarily on a morphology study, 13 species are recognized here — *E. caroliniana*, *E. floribunda* (1902; synonym = *Solidago hirtipes* 1946), *E. galetorum*, *E. graminifolia*, *E. gymnospermoides* (synonym = *E. media*), **Euthamia lanceolata** (L.) Nesom, **comb. nov.** (synonym = *E. graminifolia* var. *nuttallii*), *E. leptocephala*, *E. occidentalis*, **Euthamia oklahomensis** Nesom, **sp. nov.**, *E. pulverulenta*, *E. remota*, *E. scabra*, and **Euthamia weakleyi** Nesom, **sp. nov.** (previously identified mostly as *E. hirtipes*). Diagnostic species descriptions and county-level distribution maps are provided and taxa are illustrated with images of specimens and details. Short keys distinguish species that occur in sympatry. Specimens are cited in detail for new taxa and where useful for clarity. *Euthamia remota* is lectotypified.

In the most comprehensive taxonomic treatment of *Euthamia*, Sieren (1981) recognized eight species. The most recent summary of the whole genus (Haines 2006) found five and also differed from Sieren in the placement of synonyms. Sorrie and Weakley (2020) have recognized eight species for the southeastern USA. The present treatment recognizes 14 species in the genus, based primarily on a morphology study but with the benefit of previously reported chromosome counts (see below) and preliminary molecular studies (Szubryt 2017; Szubryt et al. 2020).

Euthamia is recognized by its herbaceous, rhizomatous habit, narrowly elongate and glandular-punctate cauline leaves (lacking a basal rosette or persistent basal leaves), corymboid clusters of small, sessile-glomerate or short-pedicellate heads with tiny yellow rays. Cypselae are small, strigose, eglandular, plump and slightly compressed, without evident nerves; the pappus is a single series of slender barbellate bristles. All species are mostly restricted to the central and eastern USA and southern Canada, except (1) *E. occidentalis*, which occurs widely over the western USA, British Columbia, and into Baja California, Mexico, and (2) *E. graminifolia*, which occurs in southwestern Canada and from Minnesota to North Dakota and southward along the eastern margin of the Rocky Mountains into New Mexico. *Euthamia* is part of a group that includes *Amphiachyris*, *Aquilula*, *Bigelowia*, *Gundlachia*, *Gutierrezia*, *Gymnosperma*, *Medranoa*, *Thurovia*, and *Xylothamia* (constituting tribe Astereae subtribe Gutierreziinae; Nesom 2020).

Morphological distinctions among *Euthamia* species recognized here often are subtle — in some cases little or barely any obvious morphological differentiation has accompanied geographical separation. Prominent infraspecific variation occurs in leaf and inflorescence morphology. Understanding of species definitions in *Euthamia* is hardly possible without knowledge of geography — reference to the maps narrows the possibilities in identification and keys are provided for species in sympatry. The detailed maps are possible through specimen images online and sent to me by collection managers (see Acknowledgements) and through on-site study at various herbaria.

Although the number of species recognized here may appear high relative to prior treatments, the newly described *Euthamia oklahomensis* and the newly revived *E. floribunda* are the only taxa not previously included in influential accounts. *Euthamia weakleyi* (as *E. hirtipes*, misapplied) and *E. lanceolata* both have been treated at specific or varietal rank. *Euthamia pulverulenta* has sometimes been regarded as synonymous with *E. gymnospermoides*. Many opportunities exist toward a better understanding of the evolution of these plants.

CHROMOSOME NUMBERS

Tentatively, *Euthamia* species are diploid except for *E. weakleyi* (hexaploid) and *E. gymnospermoides* (tetraploid). A chromosome number has not been reported for *E. floribunda*, *E. oklahomensis*, *E. pulverulenta*, and *E. scabra*.

All publications known to me where chromosome counts have been reported are listed in "Literature Cited - Chromosome Counts."

Euthamia occidentalis. 2*n* = 18. Reports from California, Colorado, Oregon, and Utah.

Euthamia graminifolia and **E. lanceolata**. 2n = 18. Many reports, all 2n = 18. Reports are from geographic regions in which typical *E. graminifolia* and *E. lanceolata* (= var. *nuttallii*) occur: Delaware, Illinois, Maine, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, and Wisconsin; southeastern Manitoba, New Brunswick, Nova Scotia, Ontario, and Quebec.

Euthamia galetorum. 2*n* = 18. Report from Nova Scotia (Semple et al. 1984 – Halifax Co., Tenmile Lake, *Semple & Keir 4826*, not seen, ID surmised from the locality).

Euthamia caroliniana. 2*n* = 18. Reports from Florida, Georgia, Massachusetts, New Jersey, North Carolina, Pennsylvania, South Carolina, and Virginia.

Euthamia weakleyi. 2*n* = 54. Reports from North Carolina (Sieren & Merrit 1980 – New Hanover Co., shell hummock, Pleasure Cove Marina just S of the Intracoastal Waterway, *Sieren 1954c*, WNC, voucher not seen; but from exactly the same locality, 19 Oct 1979, *Sieren 1894*, VSC!) and South Carolina (Beaudry 1963 – Charleston Co., voucher not seen), and Florida (Semple et al. 2019 – Dixie Co., *Semple 11709*, USF image; Beaudry 1963 – Franklin Co., voucher not seen; Kapoor & Beaudry 1966 – Gulf Co., voucher not seen). Counts from Franklin and Gulf counties were from plants identified in the publications as *E. leptocephala*.

Euthamia leptocephala. 2*n* = 18. Reports from Texas (Semple et al. 1993 – Navarro, Newton, and Polk cos., all vouchers seen) and Arkansas (Sherif et al. 1983 – Jackson Co., *Smith 3646*, UARK image; Semple & Chmielewski 1987 – Yell Co., *Semple 8291*, MT image, reported as *E. gymnospermoides*). Hexaploid counts are from *E. weakleyi*. A count from Beaudry (1969) has been listed as "n = 18" but in the original publication it is "2n = 18," thus all counts for *E. leptocephala* sensu stricto are diploid.

Euthamia gymnospermoides. 2*n* = 36. Reports of 2*n* = 36 from Arkansas (Benton Co. – Sherif et al. 1983, *Smith 3650*, AUA, NLU, UARK — images) and Illinois (Champaign Co. – Sieren 1981, *Sieren 109*, ILL! — railroad prairie just W of St. Joseph). A diploid count reported for *E. gymnospermoides* in Arkansas (Semple & Chmielewski 1987) is from a plant of *E. leptocephala*.

Euthamia remota. 2*n* = 18. Report from Michigan (Barry Co., SE of Orangeville – Semple et al. 1984, *Morton GP44*, not seen, identification as reported by Semple et al. and as surmised from the locality). Other collections of *Euthamia remota* have been made from near Orangeville — e.g., *Pierce 1429* (MICH, NY), *Pierce 1432* (MICH, NY), *Voss 8200* (MICH) — images seen for all.

Distribution maps and illustrations are grouped and presented following Literature Cited.

EUTHAMIA (Nutt.) Cass. in Cuvier, Dict. Sci. Nat. ed. 2. 37: 471. 1825. *Solidago* subg. *Euthamia* Nutt., Gen. N. Amer. Pl. 2: 162. 1818. *Solidago* sect. *Euthamia* (Nutt.) DC., Prodr. 5: 341. 1836. *Euthamia* (Nutt.) Nutt., Trans. Amer. Philos. Soc. ser. 2, 7: 326. 1840. (nom. superfl.). *Solidago* subg. *Euthamia* (Nutt.) House, Bull. New York State Mus. 254: 694. 1924 (nom. superfl.). **LECTOTYPE** (Britton & Brown 1913, p. 398): *Euthamia graminifolia* (L.) Nutt. (≡ *Chrysocoma graminifolia* L.).

See Reveal (1991) for a discussion of *Euthamia* at generic rank. Nuttall was ambivalent in his original assignment of rank to *Euthamia* ("A subgenus, or rather genus, reciprocally allied to *Solidago* and *Chrysocoma*.") but he subsumed it under *Solidago* rather than numbering it separately among the other genera. Cassini noted that "Le genre *Euthamia* de M. Nuttal est placé au commencement des Solidaginées vraies" — Reveal cited the authority of the name at generic rank as "(Nutt.) Nutt. ex Cass." but Index Nominum Genericorum (as followed here) has "(Nutt.) Cass.," as does the Flora of North America treatment (Haines 2006). Because of the illogic in conceiving of a subgenus of *Solidago* as "reciprocally allied to *Solidago* and *Chrysocoma*" and because later in the same 1818 manuscript Nuttall used the bionomial "Euthamia tenuifolia," Strother (2000) observed that the correct name should be simply *Euthamia* Nutt. See Nesom (1999) and Gandhi (1999) for additional comments on authorship and validation of the generic name.

Erigeron sect. *Submultiflori* G. Don in Loudon, Hort. Brit., 343. 1830. **LECTOTYPE**: *Erigeron carolinianus* L. (≡ *Euthamia caroliniana* (L.) Greene ex Porter & Britt.).

1. **EUTHAMIA OCCIDENTALIS** Nutt., Trans. Amer. Philos. Soc., n.s. 7: 326. 1840. *Solidago occidentalis* (Nutt.) Torr. & Gray, Fl. N. Amer. 2: 226. 1842. *Aster baccharodes* Kuntze (nom. nov.), Rev. Gen. Pl. 1: 316. 1891. **TYPE**: [**Washington**]. Banks of Columbia & Wahlamet, no date, *T. Nuttall s.n.* (holotype: PH! image; probable isotype: GH image; possible isotype: K image). Protologue: "Hab. Banks of the Oregon and Wahlamet, and Lewis' River, in the Rocky Moutains; chiefly on sand and gravel bars, as well as islands."

The PH sheet has an original label by Nuttall, as "Euthamia *occidentale, Banks of Columbia & Wahlamet." The GH sheet has a blue "Herb. A. Gray" label with "Wahlamet, Nuttall" apparently in Gray's script. The K sheet has an original Nuttall label, as "Euthamia occidentale, R. Mts." Sieren (1981) designated the GH collection as lectotype, but the PH sheet appears to be Nuttall's original.

Euthamia californica Gand., Bull. Soc. Bot. France 65: 41. 1918. **TYPE**: **California**. Santa Clara Co.: Palo Alto, abundant in places on and near the marshes, 1 Sep 1902, *C.F. Baker 1517* (holotype: LY; isotypes: GH image, NY image, US image).

Euthamia linearifolia Gand., Bull. Soc. Bot. France 65: 41. 1918. **TYPE**: **Washington**. Klickitat Co.: Bingen, bottomlands, 7 Sep 1907, *W.N. Suksdorf 6108* (holotype: LY; isotype: WTU image; probable isotype: NY image).

Stems 50–200 cm high, glabrous, often resinous distally, sometimes glaucous. **Leaves** 3–5-veined, 4–12 cm long, 3–10 mm wide, surfaces glandular-punctate but usually not resinous, otherwise glabrous, margins scabrous. **Inflorescence** usually interrupted-elongate or rounded, uncommonly strongly corymboid; heads sessile-glomerate to short-pedicellate. **Involucres** 3.5–5 long. **Ray flowers** 15–30. **Disc** flowers 7–15(–18), corollas 3–4 mm long. Map 1.

The capitulescence of *Euthamia occidentalis* was described by Sieren (1981) as "virgate-rounded, narrow, elongate, often interrupted" but plants with a distinctly flat-topped capitulescence are sporadically encountered (e.g., Arizona, New Mexico, Utah, Baja California) — see variants in Figs. 1-4). Plants sometimes grow to 2 meters in height and have been described as a "subshrub" by some collectors. Stems often are reddish or purplish proximally and the thickened rhizome is

distinctive (Fig. 5). Sieren (1981, p. 573) noted that *E. occidentalis* is "quickly identified by its large size, its paniculate inflorescence, and its very acute to acuminate innermost phyllaries."

Euthamia occidentalis has been noted to occur in Alberta (e.g., Sieren 1981; Cronquist 1994) but I have not seen a voucher nor is it included for Alberta by Canadensys.net.

2. **EUTHAMIA GRAMINIFOLIA** (L.) Nutt., Trans. Amer. Philos. Soc., ser. 2, 7: 325. 1840. *Chrysocoma graminifolia* L., Sp. Pl. 2: 841. 1753. *Solidago graminifolia* (L.) Salisb., Prodr., 109. 1796. *Aster graminifolius* (L.) Kuntze, Revis. Gen. Pl. 1: 316. 1891. **LECTOTYPE** (Sieren 1981): **CANADA**. No other locality data, *P. Kalm s.n.*, Herb. Linn. No. 337.17 (S-LINN, Figs. 6a, 6b). Protologue: "Habitat in Canada. Kalm." Kalm traveled in Jul-Oct 1749 from Niagara Falls to the area of Montreal and Quebec City, where only glabrous plants (*E. graminifolia* sensu stricto) occur.

Solidago lanceolata α [var.] *major* Michx., Fl. Bor. Amer. 2: 116. 1803. *Solidago graminifolia* var. *major* (Michx.) Fernald, Rhodora 46: 330. 1944. *Euthamia graminifolia* var. *major* (Michx.) Moldenke, Phytologia 12: 478. 1966. **TYPE**: **CANADA**. No other collection data, *A. Michaux s.n.* (holotype: P 00742869, Fig. 7). Protologue: "Foliis rarioribus, latiuscule linearibus: quae CHRYSOCOMA *graminifolia*. LINN. .... Hab. α in Canada." In Jun-Nov 1792 Michaux traveled from Montreal to Quebec to Tadoussac, then up the Saguenay River to Lac Saint-Jean, and then on northward to Lake Mistassini and slightly west of it.

Fernald (1944) noted that "The only Canadian material under *S. lanceolata* in the Michaux Herbarium at Paris is a well preserved sheet from Lake St. John [Quebec], selected by M. Metman as the type of var. α *major*." But the Michaux collection cited here as holotype appears to be authentic original material and it is marked by a herbarium label as "**TYPE**." Michaux was in Canada from June to November 1792, traveling from the St. Lawrence River northward to Lake Saint-Jean and then on to Lake Mistassini.

Solidago graminifolia var. *septentrionalis* Fernald, Rhodora 17: 12. 1915. **TYPE**: **CANADA**. **Newfoundland**. Valley of Exploits River, Grand Falls, N bank of river below the falls, ledges and talus, 12 Aug 1911, *M.L. Fernald and K.M. Wiegand 6306* (holotype: GH image; isotypes: F image, NY image, US image, YU image). Fernald later (1944) placed this name in synonymy under *Solidago graminifolia* var. *major* (Michx.) Fernald.

Euthamia fastigiata Bush, Amer. Midl. Naturalist 5: 164. 1918. *Solidago fastigiata* Bush, Amer. Midl. Naturalist 5: 164. 1918. **TYPE**: **North Carolina**. [Buncombe Co.]: Near Biltmore, sandy bottoms along the French Broad River, 23 Aug 1897, *Biltmore Herbarium 993b* (holotype: MO; isotypes: GH image, ILL!, MICH image, NCU!, NDG fide Sieren, US image, NY 75054 fide Sieren, PH!). At the end of his brief discussion of *Euthamia fastigiata*, sp. nov., Bush noted the following: "For those who prefer the name *Solidago* for these species, I offer *Solidago fastigiata* Bush, n. sp., as the name of this plant."

Solidago bracteata Bush, Amer. Midl. Naturalist 5: 173. 1918. *Euthamia bracteata* Bush, Amer. Midl. Naturalist 5: 172. 1918. **Type**: **Colorado**. [Fremont Co.]: Cañon City, 1872, *T.S. Brandegee 3072, B532* (holotype: MO, Fig. 15). Both numbers ("3072" and "B532") are on the label. *Solidago bracteata* as an alternative name was provided by Bush "for those who consider Euthamia as only a subgenus of *Solidago*."

Solidago perglabra Friesner, Butler Univ. Bot. Stud. 3: 61. 1933. **TYPE**: **Indiana**. Porter Co.: 4 mi N of Valparaiso, dry bank of Mink Lake, 5 Sep 1931, *R.C. Friesner 3542* (holotype: BUT image; isotype: LL, Fig. 8).

Solidago graminifolia var. *grahamii* J. Rousseau, Naturaliste Canad. 69: 107, fig. 4. 1942. **TYPE**: **CANADA**. **Quebec**. Ile d'Anticosti, sur la berge du ruisseau McGilvray (entre la riviére à La Loutre et la riviére Jupiter) avec *Solidago anticostensis,* 27 Aug 1940, *J. Rousseau 51456A* (holotype: MTJB, not seen).

Solidago graminifolia forma *gemmans* LePage, Naturaliste Canad. 81: 260. 1954. **TYPE**: **CANADA**. **Ontario**. Along the Albany River, 12 Aug 1952, *E. Dutilly and A. LePage 30387* (holotype: CAN image, Fig. 9).

The types of forma *gemmans* and forma *bulbipara* (apparently collected in close proximity) have bulbils in the distal leaf axils — neither was in flower. Both collections were made at the northern extremity of the range of *E. graminifolia*. Vestiture and leaf shape are of typical *E. graminifolia*, but these two collections are so unusual and distinct in biology, perhaps representing a distinct evolutionary entity, that it may prove justifiable to recognize them at specific rank.

Solidago graminifolia forma *bulbipara* LePage, Naturaliste Canad. 88: 52. 1961. **TYPE**: **CANADA. Ontario**. On the Kenogami River, 14 mi above Mamma-matawa, 3 Aug 1960, *E. Dutilly and A. LePage 38343* (holotype: CAN image).

Stems 70–150 cm high, glabrous, not resinous. **Leaves** mostly oblong-lanceolate, 2.5–10(–15) cm long, 3–10 mm wide, 3(–5)-veined, the main pair of laterals whitish and distinctly raised, surfaces glabrous, glandular-punctate, not resinous, margins minutely scabrous. **Inflorescence** interrupted-corymboid; heads sessile- to subsessile-glomerate, less commonly pedicellate. **Involucres** subcylindric to campanulate, 4–5 mm high. **Ray flowers** (9–)13–20. **Disc flowers** (3–)8–14. Maps 2, 3, 4.

In *Euthamia graminifolia*, inflorescence axes often are thin, elongate, and bracteate, resulting in a distinct aspect. In Wisconsin and Michigan, where this form is common, such plants may suggest the appearance of *E. remota*, but at least some of the individual heads of *E. remota* are pedicellate and the lower and middle leaves are not broad and distinctly 3-nerved like those of the *E. graminifolia* form. This form may be characteristic of whole populations (see Fig. 10 a-d, from Argenteuil Co., Quebec). In Becker and Clearwater cos., Minnesota, the long-pedunculate form is the only one collected — plants of nearby counties show only the typical "var. major" leaf morphology, with heads on short peduncles and broad leaves extending up to the heads. In counties of the northern third of Michigan, the long-pedunculate form apparently is the only one. The long-pedunculate form of *E. graminifolia* is common in collections from across Quebec and into New England and New York, Pennsylvania, Virginia, and West Virginia.

***Euthamia graminifolia* sensu stricto in South Carolina, North Carolina and Virginia, representative collections**. **North Carolina**. Alleghany Co.: Whitehead, off Blue Ridge Pkway along the southern gated portion of Mahogany Rock Rd (State Rd 1115), ca. 0.5 mi S of the BRP jct, woodland margin, 7 Aug 2009, *Poindexter 09-897* (BOON, NCU); Barrett, Glade Creek Township, along Blue Ridge Pkway ca. 0.5 m S of Saddle Mtn Church Rd (State Rd 1461), old field on W side of the BRP, 25 Aug 2009, *Poindexter 09-980* (BOON-2 sheets, NCU). Buncombe Co.: Type collection of *Euthamia fastigiata*; Ridgecrest, 30 Aug 1931, *Ferrell s.n.* (URV). Caldwell Co.: Along Maple Sally Rd (Forest Service 187) 1/4 mi E of Forest Service 187a, ca. 1/2 mi W of Maple Sally Creek and 1 mi N of Loose Mtn, Pisgah Natl Forest, open road bank in pine-oak forest, 14 Jul 2000, *Danley 6836* (WCUH-2 sheets). Haywood Co.: Beech Gap, Blue Ridge Pkwy at mile 423.2 R, edge of road, 21 Sep 1977, *Govus 360* (WCUH); Frying Pan Gap, Blue Ridge Pkwy at mile 409.6 R, northern red oak community, 7 Oct 1977, *Govus 390* (WCUH). Mitchell Co.: Spruce Pine, Riverside Park along Toe River, end of Tappan St off Summit & Highland Avenues, across river from downtown area, 10 Oct 2019, *Basinger s.n.* (UNCC). **South Carolina**. Pickens Co.: Above Lake Carlton Reservoir and N of Carlton Mtn, Nine Times Area, area of granite outcrops, 27 Oct 2005, *Pittman 10270518* (USCH). **Virginia**. Alleghany Co.: Ca. 4 mi NE of Alleghany, just below Forest Rd 69, rocky stream bottom

(Jerry's Run) in mixed hardwoods-hemlock-white pine, 17 Aug 2004, *Wieboldt 11473* (VPI). Amherst Co.: Rte 607 (Robinson Gap Rd) 2.3 mi below Gap, damp soil, 15 Aug 1967, *Freer 7204* (NCU). Bath Co.: Rte 600 on Buck Creek, dry roadside bank, 1 Sep 1961, *Freer 2614* (LYN); 8 mi NW of Goshen, 4 mi off Va Hwy 39 on Va Hwy 640, low woods border, 25 Aug 1970, *Gupton 4187* (NCU). Bland Co.: 1 mi W of Bastian, field, 21 Aug 1978, *Harvill 37950* (FARM). Craig Co.: Paint Bank, open swale, 15 Sep 1983, *Harvill 42234* (FARM). Culpeper Co.: Just W of Fauquier-Culpeper county line, on US Rte 15-29, pasture, 12 Sep 1965, Ahles 61710 (NCU). Dickenson Co.: Just S of W Dante, open swale, 25 Sep 1976, *Harvill 33922* (FARM). Highland Co.: Bearcamp Mountain, ca. 6 km NW of Hightown, grass-dominated summit, 26 Sep 2007, *Townsend 3847* (VPI). Madison Co.: 5.4 mi SE of Stanley, Shenandoah Natl Park, S of Skyline Drive, dry upland slope in Big Meadows, 29 Aug 1990, *Fleming 5172* (VPI). Page Co.: Ca. 9.8 km W of Luray, Scothorn Gap, in grass and sedge-dominated pond border, 21 Aug 2007, *Townsend 3789* (VPI). Rockbridge Co.: 2.3 mi below Robinsons Gap on Rte 607, damp soil, 15 Aug 1967, *Freer 7204* (VPI). Rockingham Co.: Near Grottoes, damp acid sandy openings at foot of Blue Ridge, 12 Sep 1969, *Stevens 1509* (VPI). Shenandoah Co.: S of Little Fort Rec Area, rocky open slope near Peters Run Bog, 30 Jul 1973, *Harvill 29225* (FARM). Wise Co.: Blackwood community, jct of Hwys 674 and 23, around a sluggish branch feeding North Fork Powell River, 30 Aug 1970, *Uttal 7688* (PH, VPI); vic. of Mtn Lake Biological Station, successional slopes of recently drained lake margin, 12 Aug 2015, *Whitten 4556* (FLAS).

Rocky Mountain plants are similar to others of western *Euthamia graminifolia* but the disjunct geography (Map 3) suggests that they are evolutionarily distinct. From eastern Minnesota eastward, plants of *E. graminifolia* usually produce 4–10 disc flowers, compared to 7–13 in more western localities, including the Rocky Mountains. Bush's name *Euthamia bracteata* is long-validated for the western plants. The southward extension along the Front Range in Colorado into New Mexico begins in the Black Hills of South Dakota — an isolated population system occurs in the Laramie Mountains of Platte Co., Wyoming.

***Euthamia graminifolia* in the Rocky Mountains. Wyoming**. Platte Co.: 6 mi SW of Glendo, Horseshoe Creek, stream bank, 4800 ft, 25 Aug 2001, *Dorn 8965* (RM); Platte Cañon, near Guernsey, 4500 ft, 27 Aug 1896, *A. Nelson 2764* (ILL, NY, RM); Laramie Mts, 13 Aug 1898, *Nelson 5054* (ILL); Laramie Mountains, ca 23 air mi NW of Wheatland, ca 11 air mi ENE of Laramie Peak, Cottonwood Creek above the falls, stream bank and bench 5500 ft, 18 Jul 1989, *B.E. Nelson 17135* (RM) and *17136* (RM); ca 15.5 air mi SE of Laramie Peak; ca 13.5 air mi NW of Wheatland, along North Laramie River, stony sandbar, 4800 ft, 19 Jul 1989, *B.E. Nelson 17275* (BRY, RM). **Colorado**. Alamosa Co.: Alamosa, river bank, 7 Sep 1930, *Ramaley 12700* (COLO, CU); Alamosa, sandy soil, 13 Aug 1932, *Ramaley 14074* (COLO, CU, RM); Alamosa, bottom land, in shade of willows, 30 Jul 1936, *Ramaley 15760* (COLO, CU). Conejos Co.: Near Los Ceritos, moist ground along river, 7500 ft, 8 Sep 1956, *Harrington 8518* (CSU). Denver Co.: Denver, Jul-Aug 1890, *Eastwood s.n.* (CU). Fremont Co.: Cañon City, frequent along banks of Arkansas River, 5350 ft, 27 Aug 1964, *Anderson 2786* (BRY); Cañon City, 1872, *Brandegee 532* (PH-2 sheets); Red Rock Park off Co. Rd 9, N of Cañon City, muddy soil in channel but not submerged, bare surrounding ground, 7200 ft, 8 Sep 2011, *Broadbent 1146* (COCO); Piedmont Valley on Hwy 115, 2 mi S of Hwy 50, alluvial soil adj. to Arkansas River, 5000 ft, 5 Sep 1985, *Harding 47* (COCO); 3 mi SE of Cañon City, moist slough area adj. to orchard, 5400 ft, 14 Sep 1976, *Madsen s.n.* (COCO); Water Gap Trail S of Cañon City, streambed of Grape Creek, 5480 ft, 13 Sep 2005, *Parker 55* (COCO); type collection of *Euthamia bracteata*. Jefferson Co.: Pine Valley Ranch Park, S shore of Pine Lake, scattered to common along lake shore, 7000 ft, 3 Aug 2003, *Senser 88* (KHD); Pine Valley Ranch Park, S bank of the North Fork South Platte River, just E of Pine Lake, accessed from the parking lot via the bridge spanning the North Fork, E of Pine Lake, locally scattered on the river bank on a disturbed site in damp humic soil, 6875 ft, elsewhere found in damp habitats bordering Pine Lake, 16 Aug 2004, *Smookler 341* (RM); Pine Valley Ranch Park, NW corner of Pine by an outlet extending N from the lake, in a wet meadow bordering the outlet, 6870 ft, 16 Aug 2004, *Smookler 351* (BRY, KHD). Pueblo Co.: 4 mi SW of Pueblo, Arkansas River bottoms, deep alluvial gravels of distributary of St. Charles River, creek banks of limestone, 4 Sep 1943, *Ewan 15320* (NO); ca. 5 mi E of Pueblo and less than 0.5 mi S of Arkansas River,

along Baxter Rd (Rd 233), 4620 ft, 25 Sep 2002, *King 12354* (NY). Rio Grande Co.: Monte Vista, bottoms of Rio Grande, 7600 ft, 21 Aug 1968, *Demaree 59060* (COLO); Monte Vista, by stream, 16 Jul 1934, *Ramaley 14268* (CHRB, COLO, CU, RM). **New Mexico**. Colfax Co.: Vicinity of Ute Park, wet thicket, 2200-2900 m, 6 Sep 1916, *Standley 14425* (NY). **South Dakota**. Custer, Fall River, Meade, and Pennington counties — except for *E. gymnospermoides* from Custer and Pennington cos., *E. graminifolia* is the only species of *Euthamia* in this area.

3. EUTHAMIA LANCEOLATA (L.) Nesom, **comb. nov.** *Solidago lanceolata* L., Mant. Pl. 1: 114. 1767. **LECTOTYPE** (Semple in Jarvis & Turland 1988): **USA**. No other locality data, *D. van Royen 80*, Herb. Linn. No. 998.11 (LINN image, Figs. 11, 12). Protologue: "Habitat in America septentrionali? Dav. Royen." The allusion to van Royen is to his herbarium, as he never visited North America. The identity of the Linnaean type is the same as "var. nuttallii."

Euthamia nuttallii Greene, Pittonia 5: 73. 1902. *Solidago graminifolia* var. *nuttallii* (Greene) Fernald, Rhodora 10: 92. 1908. *Euthamia graminifolia* [unranked] *nuttallii* (Greene) W. Stone, Pl. South. New Jersey, 752. 1912. *Solidago nuttallii* (Greene) Bush, Amer. Midl. Naturalist 5: 168. 1918. *Euthamia graminifolia* var *nuttallii* (Greene) Sieren, Rhodora 83: 564. 1981. **LECTOTYPE** (Sieren 1981): **District of Columbia**. Washington, D.C., Sep 1896, *E.L. Greene s.n.* (NDG 00054 image, Fig. 13; isolectotype: NDG 00053 image).

NDG 00053 and 00054 both were annotated by Greene as "type." Shinners in 1946 annotated 00054 as "lectotype" — Sieren (1981) indicated Shinners's choice and effectively published the lectotypification.

Euthamia hirtella Greene, Leafl. Bot. Observ. Crit. 1: 180 181. 1906. *Solidago hirtella* (Greene) Bush, Amer. Midl. Naturalist 5: 160. 1918. **LECTOTYPE** (Sieren 1981): **Indiana**. [Lake Co.]: Lakeville, 29 Sep 1903, *E.L. Greene s.n.* (NDG 00050, Fig. 14; isolectotype: NDG 00049 image).

NDG 00049 and 00050 both were annotated by Greene as "type." Shinners in 1946 annotated 00050 as "lectotype" — Sieren (1981) indicated Shinners's choice and effectively published the lectotypification.

Stems 40–150 cm high, hirtellous to hirsutulous, especially distally. **Leaves** mostly 5–12 cm long, 5–10 mm wide, 3(–5)-veined, the main laterals whitish and distinctly raised, both surfaces hirtellous to hirsutulous, glandular-punctate, not resinous. **Inflorescence** corymboid; heads sessile-glomerate. **Involucres** 3.6–4.2 mm high. **Ray flowers** (11–)15–27(–35). **Disc flowers** 4–10(–13), corollas 1.5–2 mm long. Maps 3, 4.

These plants have previously been identified mostly as *Euthamia graminifolia* var. *nuttallii*. The sharp geographical boundaries of *E. lanceolata*, however, and its partial sympatry with typical *E. graminifolia*, suggest that it is justifiably recognized as a separate species. This distinction is particularly noticeable in Wisconsin, where the western boundary of *E. lanceolata* is abrupt and within a region of sympatry with *E. graminifolia*, and in the Appalachian Mountains, where *E. graminifolia* occurs but *E. lanceolata* does not.

In Vermont, New Hampshire, and Maine, stem and leaf vestiture of *Euthamia lanceolata* is relatively sparse (influence of *E. graminifolia*?), but it still is possible to discern two entities in its sympatry there with typical *E. graminifolia*. The same is true in Pennsylvania, where differences are subtle, but the overall pattern of distribution, as interpreted here, indicates that two entities are present.

Euthamia lanceolata in North Carolina occurs in montane localities in Henderson and Jackson counties, where its origin is perhaps connected with conspecific populations in Tennessee. Henderson Co.: Ca. 1 mi E of East Flat Rock, bog, local coastal plain habitat, 7-8 Sep 1953, *Channell 2614* (DUKE, NCSC, PAC); East Flat Rock, sandy roadside off Hwy 176 across from G.E. warehouse, 31

Jul 1979, *Douglass 420* (CLEMS); East Flat Rock along US Hwy 176, 7 Aug 1954, *Freeman 54342* (UNCA). Jackson Co.: Balsam Mountain Preserve off Hwy 23/74, Highline Rd at Lot 50, 3539 ft, 4 Aug 2011, *Lance s.n.* (WCUH).

As noted by Yatskievych (2006), the scattered, west-extending populations of *Euthamia lanceolata* (as *E. graminifolia* in his treatment) in Missouri occur mostly in localities along the Missouri River—Atchison Co.: *Bush 11984* (MO). Cass Co.: *Henderson 95-754* (MO). Chariton Co.: *Steyermark 26428* (MO). Saline Co.: *Henderson 94-1137* (MO). St. Charles Co.: *Kellogg 1311* (MO).

4. EUTHAMIA FLORIBUNDA Greene, Pittonia 5: 74. 1902. *Solidago polycephala* Fernald (nom. nov.), Rhodora 10: 93. 1908 [not *Solidago floribunda* Phil. 1894]. *Solidago graminifolia* var. *polycephala* (Fernald) Fernald, Rhodora 17: 12. 1915. *Solidago floribunda* (Greene) Bush (nom. illeg.), Amer. Midl. Naturalist 5: 167. 1918 [not *Solidago floribunda* Phil. 1894]. *Euthamia graminifolia* var. *polycephala* (Fernald) Moldenke, Revist. Sudamer. Bot. 6: 29. 1939. **TYPE**: **New Jersey**. [Cumberland Co.]: Port Norris, 1890, *J.H. Holmes 452* (holotype: US, Fig. 16). Protologue: "Marshes of Delaware Bay at Port Norris in southern New Jersey."

Solidago X hirtipes Fernald, Rhodora 48: 65. 1946. *Euthamia hirtipes* (Fernald) Sieren, Phytologia 23: 304. 1972. *Euthamia graminifolia* var. *hirtipes* (Fernald) Taylor & Taylor, Sida 10: 176. 1983. **TYPE**: **Virginia**. Sussex Co.: Roadside thicket ca. 1.5 mi N of Waverly, 13 Sep 1945, *M.L. Fernald & R.W. Long 15015* (holotype: GH, Figs. 18, 20-22; isotypes: NCSC image, NY image, PH! and image, US-Figs. 19, 20-22).

Stems 60–100 cm, sparsely to moderately hirtellous on and between the ridges; axillary shoots usually present. **Leaves** linear-oblong to linear-lanceolate, 1–4 mm wide, 1- or obscurely 3-nerved, both surfaces sparsely to densely hirsutulous, midveins (abaxial and adaxial) hirsute, glandular-punctate, not resinous, margins minutely ciliate-scabrous. **Inflorescence** corymboid, usually densely flowered, at least the outer heads pedicellate. **Involucres** narrowly turbinate, 3–4 mm high. **Ray florets** (5–)7–13(–16). **Disc florets** 3–7, corollas 2.5–3 mm long. Map 10.

Flowering (Jul–)Aug–Nov. Sand pits and ditches, canal banks, fresh and salt water marshes, disturbed wet areas, agricultural field edges, roadsides, sandy meadows, pine barrens.

Fernald (1908, p. 93) noted that *Euthamia floribunda* is distinguished from [var. Nuttallii] by "its tiny involucre (3–3.5 mm long, with very conspicuous appressed deltoid green tips to the bracts" and (1915, p. 13) that it "seems to be a small-headed extreme nearest allied to var. *Nuttallii* (Greene) Fernald." He observed that it is an "apparently local plant of New Jersey, eastern Pennsylvania and Maryland." Robinson and Fernald (1908) included it (as *Solidago polycephala*), describing it with "leaves elongate, thin, puberulous; branches of the corymb very hirtellous, their small bracts wide-spreading or deflexed." Britton and Brown (1913) included *Euthamia floribunda*, describing it as "finely roughish-pubescent, at least above" and with "its glutinous [involucral] bracts puberulent," from "Fields and borders of marshes, southern New Jersey, and recorded from eastern Pennsylvania." I have not been able to find the record from Pennsylvania. Gleason (1951) also included *E. floribunda*, in perhaps its last appearance in a floristic account. Neither Cronquist (1980) nor Gleason and Cronquist (1991) included it, even as a synonym.

Sieren (1981), followed by Taylor and Taylor (1983) and others, have used *Euthamia hirtipes* as the name for the species described below as *Euthamia weakleyi*. First, however, the types of *E. floribunda* (the earlier name) and *E. hirtipes* are virtually identical, and second, *E. weakleyi* is not the same entity as *E. floribunda*/*hirtipes* Axillary shoots along much of the stem length, hirsutulous stems and leaf surfaces, and smaller heads of *E. floribunda* contrast with *E. weakleyi* and plants identifiable as *E. floribunda* sensu stricto are geographically restricted.

Euthamia floribunda with typical vestiture is distinctive but as identified here, it includes plants with vestiture less dense than on the types and some others. *Euthamia caroliniana* sometimes is sparsely hirtellous, and some collections identified as *E. floribunda* may prove to belong instead with *E. caroliniana*. All of these, however, appear to be geographically restricted, suggesting the existence of some kind of genetic unity.

Fernald noted in the protologue (1946) that "I am looking upon X *Solidago hirtipes* as probably derived from *S. microcephala* [here as *E. caroliniana*] and *S. graminifolia* var. *Nuttallii*," and shortly after that (Fernald 1950), he again referred to it as "a probable hybrid." Its morphology supports Fernald's hypothesis and, for the most part, it does not occur outside of the geographic range of *Euthamia lanceolata* (= var. *nuttallii*). On the other hand, it has not been collected in places where the two putative parents occur together and might be expected to hybridize.

Additional collections. **Delaware**. Kent Co.: W of Del Rte 10 (Willow Grove Rd), W of side of Meredith Branch, shallow pond pits and wet areas, 6 Sep 1988, *Maffia & Seyfried CEP88-223* (DOV); along a sand pit lane, along Meredith Branch heading toward Rd 208 (Mahan Corner Rd), sandy-gravelly soil, 8 Sep 1988, *Maffia & Seyfried CEP88-548* (DOV); along ditch lane of E side of Rd 216 (Big Ditch Rd), S of Rd 206, (Westville Rd), 18 Sep 1989, *Seyfried CEP89-837* (DOV). New Castle Co.: S of Newark, 21 Sep 1965, *Palmer 44* (DOV); along the Chesapeake and Delaware Canal, E of Summit Bridge Road along the N bank of canal, open area adjacent to dirt road that parallels the canal, 23 Sep 2012, *Roberts 12-01* (LSU; SERNEC "Notes: In DNA studies this specimen is part of the Atlantic/Florida clade; 1. the leaves have pustules; 2. shoots with some pubescence; 3. heads glomerulate, mostly sessile; 4. resembles E. leptocephala in some features but sequence is different; 5. Is this E. hirtipes?"); White Clay Preserve, W of Thompson Station Rd and N of Hopkins Rd, fresh water marsh, 30 Jul 1987, *Seyfried et al. CEP87-1178* (DOV). Sussex Co.: Town of Fenwick Island, Lighthouse Rd, Del Rte 54 at Dukes Ave, 7 Sep 2001, *Longbottom 5049* (DOV); Dagsboro, US Rte 113, Dupont Blvd, Savannah Square Shopping Center, sediment control area between parking lot and hwy, 21 Sep 2013, *Longbottom 20403* (NY image). **Maryland**. Caroline Co.: [no other locality data], Sep 1888, *Smith 1349* (ILL). Wicomico Co.: S of the town of Pittsville, Powell Rd at Rohn Ditch, along power line on S side of road, 9 Sep 2005, *Longbottom 6645* (DOV). Somerset Co.: Along Cornstack Rd 1/2 mi S of George Massey Rd, Chesapeake Forest Land, ditch on W side of road, 6 Oct 2015, *Longbottom 23780* (NY image). **New Jersey**. Atlantic Co.: Somers Point, dry roadside, 17 Sep 1916, *Mackenzie 7384* (NY). Burlington Co.: Atsion, sandy soil near RR tracks, 24 Aug 1967, *Reynolds 177* (NCU). Cape May Co.: Green Creek, abandoned field, 31 Aug 1936, *Johnson s.n.* (CHRB). Cumberland Co.: Port Norris, 1890, *Holmes 378* (CHRB). Ocean Co.: Colliers Mills, Jackson Twp, 26 Aug 1975, *Laport s.n.* (CHRB). **North Carolina**. Carteret Co.: Fort Macon Reservation, near Atlantic Beach, 16 Oct 1937, *leClair s.n.* (NCU-2 sheets). Gates Co.: 0.5 mi N of Holly Grove on NC Hwy 32, flat pine-oak woods border, 16 Oct 1958, *Ahles 51387* (NCU). Hyde Co.: Ocracoke Island, S side of schoolhouse, summer 1931, *Mathews s.n.* (NCU); Lake Mattamuskeet, near jct NC Hwy 94 and US Hwy 264, ditch, 18 Oct 1958, *Radford 42597* (NCU). Pasquotank Co.: N of Elizabeth City, 0.2 mi N of Knobbs Creek on US Hwy 17-158, filled-in marsh, 15 Oct 1958, *Ahles 51161* (NCU). Perquimans Co.: 3.6 mi SSE of New Hope, wooded roadside, 14 Oct 1958, *Ahles 51152* (NCU). **Pennsylvania**. Bucks Co.: Eddington, dry open thicket along Pa. RR, 23 Sep 1956, *Long 81961* (PH). **Virginia**. Accomack Co.: 1.6 mi SE of Painter, low woods border, 1 Sep 1962, *Ahles 57636* (NCU); 0.8 mi SE of Quinby, brackish marsh, 1 Sep 1962, *Ahles 57667* (NCU). Gloucester Co.: SE of Glenns, along Carvers Creek at Va Hwy 198, 4 Nov 1990, *Bradley 24172* (GMUF). Greensville Co.: Ca. 4 mi SE of Emporia, peaty and argillaceous clearing, 19 Sep 1938, *Fernald & Long 9467* (LL, PH) but not *9469* (PH). Mecklenburg Co.: RR right-of-way on Bracey Railroad, 28 Aug 1967, *Seaman 5729* (NCU). Nansemond Co.: NW of Whaleyville, sandy roadside thicket S of Piney Grove School, 17 Sep 1937, *Fernald & Long 7677* (PH). Princess Anne Co.: S of Rudy Inlet, Rifle Range, open sands back of dunes, 6 Sep 1935, *Fernald & Long 5094* (PH). Southampton Co.: N of Sunbeam, sandy soil of swale, 29 Sep 1968, *Harvill 20826* (NCU). Suffolk Co.: Near Suffolk, sandy swampy areas, 8 Oct 1967, *Hathaway 14505* (LYN).

5. EUTHAMIA GALETORUM Greene, Leafl. Bot. Observ. Crit. 2: 152. 1911. *Solidago graminifolia* var. *galetorum* (Greene) House, Bull. New York State Museum 243: 45. 1923. *Solidago galetorum* (Greene) Friesner, Butler Univ. Bot. Stud. 3: 58. 1933. **LECTOTYPE** (Sieren 1981): **CANADA**. **Nova Scotia**. [Annapolis Co.]: Shore of Lake Pleasant, 6 Aug 1910, *E.L. Greene s.n.* (NDG 00059, Figs. 23, 24; isolectotypes: NDG 00045 and 00046 images). 00059 was annotated by Shinners in 1946 as "lectotype" but the choice was not published until Sieren's study.

As a synonym of his *Solidago galetorum*, Friesner (1933, p. 58) listed "*Euthamia graminifolia* [unranked] *galetorum* (Greene) House, Bull. New York State Mus. 254: 694. 1924." House, however, published the combination in *Solidago*, not *Euthamia*, and in any case, use of the epithet 'galetorum' at varietal rank within *E. graminifolia* has not been validated.

Solidago tenuifolia var. *pycnocephala* Fernald, Rhodora 23: 293. 1922. **TYPE**: **CANADA**. **Nova Scotia**. Yarmouth Co.: Wet lower peaty and cobbly beach of Salmon (Greenville) Lake, 13 Aug 1920, *M.L. Fernald et al. 22743* (holotype: GH-Fig. 25; isotypes: NY-Fig. 26, PH image, US image, YU image).

Stems 3–12 cm, glabrous; axillary shoots present. **Leaves** linear-oblong to linear-lanceolate or linear-oblanceolate, 1–4 mm wide, 1- or obscurely 3-nerved, surfaces glabrous, glandular-punctate, resinous or not, margins smooth to minutely scabrous. **Inflorescence** irregularly corymboid, usually few-headed; heads pedicellate. **Involucres** broadly campanulate, 3–3.5 mm high. **Ray florets** (7–)10–16(–19). **Disc florets** (7–)10–19. Map 5.

Flowering Aug–Sep(–Oct). Gravelly and sandy lake and pond shores, dune hollows, bogs.

Euthamia galetorum is distinct in its often unbranched main axis, axillary shoots, glabrous stems and leaves, 1- or weakly 3-veined leaves, relatively small inflorescence of pedicellate heads, campanulate involucres, and large number of disc florets per head, as well as its geography and ecology.

The collections in the series by Fernald & Long from south of Cliff Pond in Barnstable Co., Massachusetts, show variation in growth habit, especially in inflorescence size and development of axillary shoots. The larger plants are similar to *Euthamia caroliniana* except for the larger heads and may reflect hybridization. Typical, small-headed *E. caroliniana* occurs in Barnstable County (e.g., Monomoy, thickets and dunes near lighthouse, 28-29 Sep 1971, *Bailey & Svenson 3847* (NEBC) and in Bristol County. Similar variability in *E. galetorum* (as identified here) occurs in Bristol Co., Massachusetts (where also atypical in habitat), but not in the population system of Maine and New Hampshire, where *E. caroliniana* is absent.

In his description of the Nova Scotian *Solidago tenuifolia* var. *pycnocephala* (here = *E. galetorum*), Fernald (1921, p. 294) observed intermediacy between it and what he interpreted to be typical *Euthamia tenuifolia* (here = *E. caroliniana*). As interpreted here, however, *E. caroliniana* does not occur in Nova Scotia and Fernald apparently was observing populational variability in *E. galetorum*.

USA collections. Maine. Cumberland Co.: N end of Sebago Lake, shore, 29 Aug 1972, *Boufford 8180* (MISS) and *8280* (NCU); Harrison, anonymous pond, sandy shore, 29 Aug 1925, *Pease 19639* (NEBC). Oxford Co.: Fryeburg, Round Pond, 20 Aug 1964, *Bean s.n.* (NHA); Fryeburg, Lovewells Pond, N side, growing with its feet in water, 3 Sep 1971, *Eastman s.n.* (UVMVT); Fryeburg, Lovewells Pond, N side, wet shore line, 4 Sep 1972, *Eastman s.n.* (NEBC, UVMVT); near Farrington's, Lovell, Kezar Lake, wet sandy shore, 30 Aug 1918, *Pease 17293* (NEBC-2 sheets); Brownfield, beach of Pleasant Pond, 10 Aug 1921, *Pease 18122* (NEBC); Fryeburg, Kezar Pond, sandy shore, 30 Aug 1925, *Pease 19626* (NEBC); Fryeburg, Lovewell Pond, form growing on beaches, 2 Sep 1930, *Pease 20731* (MASS); Fryeburg, Round Pond, abundant on wet, sandy shelving shore in sandy area of *Quercus ilicifolia-Pinus*

rigida, 20 Aug 1964, *Rossbach 6162* and *6163* (NCU). York Co.: Limington, Sand Pond, sandy beach, deeply inundated in 1916, 29 Aug 1916, *Fernald et al. 14707* (GH-3 sheets, PH); Limington, small pond W of Sand Pond, inundated beach, 29 Aug 1916, *Fernald et al. 14708* (GH, PH). **Massachusetts**. Barnstable Co. (representative): Cotuit, 5 Sep 1894, *Burlingame s.n.* (BRU); Bourne, Cataumet, 18 Aug 1914, *Collins 2985* (NEBC); shores of Long Pond, 19 Sep 1903, *Eaton s.n.* (NCU); Brewster, E of Griffith's Pond, dry open hillsides, 12 Sep 1918, *Fernald 17508* (NEBC); East Brewster, peaty shore of pond N of Flat Pond, 26 Oct 1919, *Fernald 19176* (PH); Wellfleet, boggy swale by Great Pond, 18 Aug 1927, *Fernald & Fogg 693* (PH); Brewster, quagmire S of Cliff Pond, 27 Aug 1918, *Fernald & Long 17496*, *17498*, *17499*, *17500* (NEBC); Brewster, Cliff Pond, sandy beach, 27 Aug 1918, *Fernald & Long 17495* (NEBC); Sandy Neck, wet (mostly inundated) dune hollows, 26 Aug 1919, *Fernald & Long 19197* (PH); Bourne, S of Deep-Bottom Pond, wet sandy and peaty borders of quagmire-ponds, 21 Aug 1919, *Fernald & Long 19198* (GH); Falmouth, Crooked Pond, dryish or moist gravelly and sandy beach, 23 Aug 1919, *Fernald & Long 19199* (NEBC); Falmouth, a few hundred feet NE of Thomas Landers Road, ca. 2.25 mi E of the Rte 28 overpass, relatively dry, sandy gravel in an open, developing meadow on a N-facing slope in a old quarry, 14 Oct 2006, *Goldman 3870* (NY); Falmouth, Long Pond, pond margin, 29 Jul 1911, *Pennell 3275* (PH); Cape Cod, pond back of Hyannis, 5 Aug 1928, *Svenson & Griscom 12547* (NCU); Cape Cod, Cataumet, 15 Sep 1901, *Williams s.n.* (GH). Bristol Co. (representative): Dartmouth, swamp, 14 Sep 1923, *Cheever & Knowlton s.n.* (NEBC); Westport, pasture, 15 Sep 1923, *Cheever & Knowlton s.n.* (NEBC); Mansfield, Maple Street, glacial gravelly soil, wooded area, 22 Sep 1990, *Palser s.n.* (CHRB). Middlesex Co.: Wilmington, Silver Lake, 17 Sep 1887, *Dame s.n.* (NEBC); Tewksbury, sandy margin of Round Pond, 18 Sep 1909, *Fernald s.n.* (NEBC); Westford, shore of Grassy Pond, Sep 1911, *Fletcher s.n.* (NEBC); Westford, Grassy Pond, 7 Aug 1913, *Fletcher s.n.* (NEBC); Wayland, sandy shore of pond, 12 Sep 1915, *Hunnewell 3907* (NEBC); Westford, Grassy Pond, 25 Aug 1917, *Hunnewell s.n.* (NEBC); Holliston, Lake Winthrop, sandy shore, 12 Sep 1920, *Hunnewell 7072* (NEBC); Sherborn, sandy pond shore, 7 Oct 1923, *Hunnewell 8895* (NEBC); Wilmington, border of "Silver Lake," 1859, *Rickan s.n.* (NEBC); Wilmington (Silver Lake), rare, 1 Aug 1902, *Tilton s.n.* (NEBC). Norfolk Co.: Norfolk, sandy pond shore, 7 Oct 1923, *Hunnewell 8905* (NEBC). Plymouth Co. (representative): Bridgewater, sandy soil, 25 Sep 1915, *Bean 15936* (NEBC); East Wareham, Sandy Pond, sandy shore, 14 Sep 1928, *Blake 10753* (FSU, GH); Pembroke, Furnace Pond, 6 Sep 1920, *Churchill s.n.* (NEBC); Bristol, shores of Long Pond, 19 Sep 1903, *Eaton s.n.* (NCU); Plymouth, dry sands about Great South Pond, 6 Sep 1918, *Fernald et al. 10563* (PH). **New Hampshire**. Carroll Co.: Ossipee, Pequawket Bog, ca. 9.9 ha peatland complex between Long Sands Rd and Pequawket Trail Rd, off NH Rte 25 and SE of Ossipee Lake, rare along wet sandy shore at N end of pond, Apr-Oct 1991, *Fahey PB-369* (SAT); Lake Ossipee, shore, Sep 1911, *Farlow s.n.* (NEBC); Center Ossippee, Ossipee Lake, S shore in damp sand, 31 Aug 1975, *Hellquist 11019* (LSU); Ossipee Lake, wet sandy shore, 3 Aug 1943, *Knowlton s.n.* (NEBC); Lake Ossipee, abundant on beach, 10 Aug 1921, *Pease 18121* (NEBC); Lake Ossipee, sandy shore, 23 Aug 1923, *Pease 19237* (NEBC); Ossipee Lake, Deer Cove, sandy shore, pond-shore form, 2 Sep 1936, *Seymour 4849* (NEBC); Ossipee Lake, Freedom, sandy strand, 3 Sep 1936, *Weatherby 6892* (NEBC). **Rhode Island**. Washington Co.: Block Island, between Chagum Pond and Wash Pond, dune hollows and damp sands, 22 Aug 1913, *Fernald et al. 10553* (GH); Block Island, open field, 1 Sep 1965, *Marks s.n.* (GH); South Kingstown, Rountree Camp, W end of White Pond, rocky shoreline, 5 Aug 2004, *Tucker 13778* (ILLS); Westerly, Avondale, argillaceous border of small pond, 31 Aug 1919, *Ware & Fernald s.n.* (NEBC).

6. EUTHAMIA CAROLINIANA (L.) Greene ex Porter & Britt., Mem. Torrey Bot. Club 5: 321. 1894. *Erigeron carolinianus* L., Sp. Pl. 2: 863. 1753. *Solidago caroliniana* (L.) Britton et al., Prelim. Cat. N.Y. Pl., 26. 1888. **LECTOTYPE** (Reveal & Jarvis 2009, p. 979): [icon, Fig. 33] "Virga aurea Carol. Linariae Monsp. foliis" in Dillenius, Hort. Eltham. 2: 412, t. 306, f. 394. 1732. Lectotypification attributed to Torr. & Gray, Fl. N. Amer. 2: 180 (1841) by Jarvis 2007. **EPITYPE** (Reveal & Jarvis 2009, p. 979): **South Carolina**. No other locality data, 1723, *M. Catesby s.n.* (OXF 87315, Sherardian Herb. no. 1877, Fig. 34). Protologue: "Habitat in Carolina." A label in Sherard's script on the Catesby specimen has this: "Sent from South Carolina by Mr. Mark Catesby, 1723. Coma aurea Carolin. foliis tenuissimis,

multiflora." OXF 87353, the same species as 87315, has "Sent from So. Carolina by Mr Mark Catesby 1724."

The lectotype of *Erigeron carolinianus*, an illustration based on a greenhouse-grown plant, shows an individual with such apparent abnormalities that it seemingly cannot be placed to genus. Fernald (1944) regarded it as ultimately unidentifiable, noting that Dillenius himself had thought it to be a "monstrosity." Asa Gray, however, had studied collections at OXF and concluded (1882, p. 198) that the description and illustration were based on a sheet bearing an abnormal individual of the species previously identified as *Euthamia tenuifolia*. Reveal (1991) noted this: "Fernald (1944) reported that Stuart K. Harris, who studied notes made by Asa Gray concluded that Gray had seen two sheets associated with *Erigeron carolinianus* at Oxford: The first was a sheet of three deformed specimens (Sherardian Herb. No. 1878, OXF, annotated "Est Solidago tenuifolia minus evoluta" by Gray; cited & Vines, 1907, but not by Clokie, 1964) and the second was a Catesby sheet (Sherardian Herb. No. 1877, OXF). Fernald correctly remarked that the Catesby sheet could not be considered original material for the Linnaean name, but then ignored the sheet Gray said consisted of the very elements Dillenius had used his illustration." "Had he not done so, Fernald would have realized, as had Gray, that the monstrosities Dillenius illustrated were deformed individuals of *Euthamia* raised from seeds that were, in all likelihood, vouchered by the Catesby specimen collected in South Carolina in 1723. There is no question that the specimens on Sherardian Herbarium sheet 1878 are individuals of what is now known as *E. tenuifolia* (Pursh) E. Greene."

Solidago lanceolata var. *minor* Michx., Fl. Bor.-Amer. 2: 116. 1803. *Euthamia minor* (Michx.) Greene, Pittonia 5: 78. 1902. *Solidago minor* (Michx.) Fernald [nom. illeg.], Rhodora 10: 93. 1908 [not *Solidago minor* Mill. 1768]. *Solidago michauxii* House (nom. nov.), Bull. New York State Mus. 254: 695. 1924 [replacing *Solidago minor* Fernald 1908]. **TYPE**: **South Carolina**. [Charleston Co.]: No other collection data, *A. Michaux s.n.* (holotype: P 0742870 image). Protologue: "foliis crebrioribus, anguste linearibus; axillis foliosis: subglutinosa. ... In pascuis circa Charlstown."

Solidago tenuifolia Pursh, Fl. Amer. Sept. 2: 540. 1814 ["1813"]. *Euthamia tenuifolia* (Pursh) Nutt., Trans. Amer. Philos. Soc., ser. 2, 7: 325. 1840 [not sensu Greene 1902]. **LECTOTYPE** (Sieren 1981): **Virginia**. [probably Chesapeake/Suffolk]: Pine barrens near Dismal Swamp, 1806, *F. Pursh s.n.* (PH 00039999! and image, Figs. 35-37; probable isolectotype: K 000890793 image).

Euthamia tenuifolia ß (var.) *microcephala* Nutt., Trans. Amer. Philos. Soc. 7: 326. 1841. **TYPE**: Not designated. Protologue: "Leaves very slender, capituli generally pedicellate, smaller. Alabama." Original material not located.

Euthamia tenuifolia y (var.) *glutinosa* Nutt., Trans. Amer. Philos. Soc. 7: 326. 1841. **TYPE**: Not designated. Protologue: "Capituli turbinate, pedicellate, resinously agglutinated. … East Florida." **TYPE**: A William Baldwin collection at PH annotated by Nuttall (apparently, though in tiny script unusual for him), as "E. *glutinosa n. var."[?], (herb Schw) sub nom. 'S. lanceolata' [ain[?]] Bald? (laid in)" is likely to be the plant that he had at hand (probable holotype: PH 26820! and image; perhaps better considered as lectotype).

Euthamia microcephala Greene, Pittonia 5: 79. 1902. *Solidago microcephala* (Greene) Bush, Amer. Midl. Naturalist 5: 176. 1918. **TYPE**: **Georgia**. Sumpter Co.: Leslie, dry field, 6 Sep 1900, *R.W. Harper 594* (holotype: US image).

Euthamia microphylla Greene, Pittonia 5: 79. 1902. *Solidago microphylla* (Greene) Bush, Amer. Midl. Naturalist 5: 177. 1918. **LECTOTYPE** (Sieren 1981): **Mississippi**. [Jackson Co.]: Ocean Springs, 9 Oct 1898, *S.M. Tracy 4751* (NDG 00051 image; isolectotypes: MO!, NDG 00052 image, OS, US image).

Stems 20–80 cm tall, glabrous; axillary shoots usually present. **Leaves** linear, 2–7 cm long, 1–2.5 mm wide, 1-veined or obscurely 3-veined, conspicuously to obscurely glandular-punctate and resinous, otherwise glabrous, margins minutely scabrous. **Inflorescence** corymboid, flat to strongly convex or rounded, sometimes becoming fragmented or multi-layered; heads usually pedicellate but sometimes sessile-glomerate. **Involucres** 3–4.5 mm. high. **Ray flowers** 5–12(–16). **Disc flowers** (2–)3–6(–10). From Virginia to Florida and Alabama, **ray** (5–)6–9, **disc** (2–)3–9. Map 6.

Variation in habit and inflorescence of *Euthamia caroliniana* is shown in Figs. 38-45. The species is broadly sympatric with *E. weakleyi* but there is no evidence of gene flow between them (except perhaps on Sapelo Island, Georgia, see comments below), nor is there any indication of such with *E. leptocephala* in its small area of sympatry. As noted above, *E. floribunda* has been hypothesized (as *Solidago hirtipes*) to be a hybrid between *E. caroliniana* and *E. lanceolata*, which are sympatric in the area where *E. floribunda* occurs.

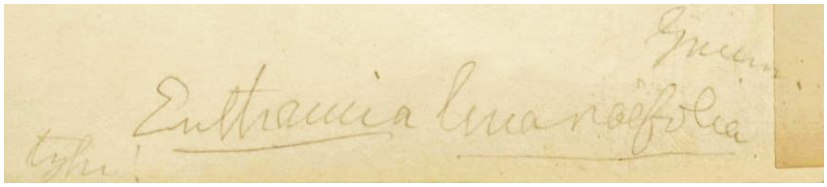
Plants generally identified as *Euthamia caroliniana* in the Northeast (Connecticut northward and eastward, and possibly including Nassau and Suffolk counties, New York), and as mapped here, have a different habit, more flowers per head, and possibly are a different (undescribed) species. These apparently are the basis for the recognition by Sorrie & Weakley (2020) of *E. tenuifolia* (Pursh) Nutt. as apart from typical *E. caroliniana* — the existence of this entity is belatedly recognized here, thanks to the stimulus from Bruce Sorrie and the taxonomic status of these plants is under study by him (pers. comm., July 2021). In the interpretation here, the type of *Solidago tenuifolia* Pursh is a plant of *E. caroliniana* sensu stricto, with narrow leaves and small, few-flowered heads.

7. EUTHAMIA REMOTA Greene, Pittonia 5: 78. 1902. *Solidago remota* (Greene) Freisner, Butler Univ. Bot. Stud. 3: 62. 1933. *Solidago graminifolia* var *remota* (Greene) Harris, Rhodora 45: 413. 1943. **LECTOTYPE** (**designated here**): **Indiana**. [Lake Co.]: Miller's [Miller Beach], swales, 18 Sep 1897, *L.M. Umbach s.n.* (US, Fig. 46; isolectotypes: CLEMS image; MICH-2 sheets images).

Protologue: "Much like the last [*Euthamia tenuifolia*] in aspect, but larger, sometimes 2 feet high, the narrowly linear leaves of decidedly firmer texture and not blackening when dry, ascending rather than spreading, never deflected; stem fastigiately branched above the middle, the outer branches about as long as the other but commonly sterile, the others rather sparsely floriferous, the heads not glomerate; involucres broadly turbinate, not notably imbricated, only the short outer bracts green-tipped; rays uncommonly conspicuous for the genus.

Plant of the rolling prairie country about Lake Michigan, not rare from northern Indiana to southern Wisconsin, where it has always passed for *Solidago tenuifolia*, Pursh, though abundantly distinct from all the eastern and southern members of that aggregate."

Greene did not designate a type and there is no potential original material at NDG (Barbara Hellenthal, pers. comm. 2021). The Umbach collection, however, has a pencil annotation in Greene's hand (see below), apparently indicating that he intended to use it as the type for the unpublished name "Euthamia linaraefolia" (not *Euthamia linearifolia* Gandoger 1918). It is a good match for the protologue of *Euthamia remota* and as original material it is selected here as the lectotype.



Stems 30–60 cm tall, glabrous, usually with axillary shoots. **Leaves** 4–7 cm long, 2–4 mm wide, 1- or obscurely 3-veined, surfaces glabrous, glandular-punctate, usually resinous, margins minutely scabrous. **Inflorescence** usually strongly interrupted, clusters few-headed; heads pedicellate

or sometimes both pedicellate and subsessile within a cluster. **Involucres** campanulate, 4–5 mm long. **Ray flowers** 5–10(–12). **Disc flowers** (4–)5–9, corollas 2.5–4 mm long. Map 7.

Flowering Aug–Sep(–Oct). Sandy, sandy-gravelly, and sandy sedge-peat shores of lakes and intermittent wetlands, usually kept bare by occasional inundation, rarely in shallow water, interdunal flats and swales, dry and drying lake beds, sandy roadsides.

As typified here, *Euthamia remota* is the species identified as such by Friesner (1933) and Voss (1996). Reznicek et al. (2011) and Voss & Reznicek (2012) used the name *Euthamia caroliniana* for the Michigan plants, emphasizing similarities in glabrous vestiture, linear leaves, axillary leaves and shoots, and pedicellate heads, and their mapped Michigan distribution of the species is similar to the one here. Plants of *E. remota*, however, differ in their pedicellate and larger heads (with slightly more flowers), smaller and discontinuous inflorescences (Figs. 47-50), distinctive habitat (more similar to that of *E. galetorum*), and obviously in their long disjunction from *E. caroliniana*. A close relationship with *E. caroliniana* is plausible.

Euthamia remota is almost completely sympatric with *E. gymnospermoides* — a difference in ploidy (*E. remota*, 2x; *E. gymnospermoides*, 4x), if consistent, perhaps provides an isolating mechanism. Reznicek et al. (2011) noted apparent intermediacy between the two in Michigan and such also is seen in Illinois (pers. observ.), but such instances may reflect populational variability and convergence rather than hybridization.

1. Stems without axillary shoots; heads mostly sessile; inner phyllaries linear-oblong, convex, indurate and opaque ..... **Euthamia gymnospermoides**
1. Stems usually with axillary shoots; heads usually pedicellate; inner phyllaries broadly obong-ovate, flat, relatively thin and translucent ..... **Euthamia remota**

8. EUTHAMIA GYMNOSPERMOIDES Greene, Pittonia 5: 75. 1902. *Solidago gymnospermoides* (Greene) Fernald, Rhodora 10: 93. 1908. *Solidago graminifolia* var. *gymnospermoides* (Greene) Croat, Ann. Missouri Bot. Garden 57: 250. 1970. **TYPE**: **Oklahoma**. [Creek Co.]: Sapulpa, Indian Territory, 6 Oct 1894, *B.F. Bush 252* (holotype: NDG 00048 image; isotypes: GH- 2 sheets images, MO!, NY-Fig. 54, US-Figs. 52, 53).

Euthamia camporum Greene, Pittonia 5: 74. 1902. *Solidago camporum* (Greene) A. Nels. in Coult. & A. Nels., Man. Bot. Rocky Mts., 507. 1909. *Solidago graminifolia* var. *camporum* (Greene) Fernald, Rhodora 17: 12. 1915. **TYPE**: **Colorado**. [Logan Co.]: Sterling, banks of the Platte, 1896, *E.L. Greene s.n.* (holotype: NDG 00057, Figs. 59, 60).

Euthamia media Greene, Pittonia 5: 74. 1902. *Solidago media* (Greene) Bush, Amer. Midl. Naturalist 5: 167. 1918. *Solidago graminifolia* var. *media* (Greene) Harris, Rhodora 45: 413. 1943. **TYPE**: **Illinois**. [Henderson Co.]: Vicinity of Oquawka, 1876, *H.N. Patterson* (holotype: NDG 00058, Figs. 61, 62; isotypes: F image, MO!).

Euthamia chrysothamnoides Greene, Pittonia 5: 76. 1902. *Solidago chrysothamnoides* (Greene) Bush, Amer. Midl. Naturalist 5: 172. 1918. **TYPE**: **Arkansas**. [Nevada Co.]: Prescott, 25 Aug 1882, *G.W. Letterman s.n.* (holotype: US, Fig. 55; isotype: MO!).

Solidago moseleyi Fernald, Rhodora 10: 93. 1908. **TYPE**: **Ohio**. Erie Co.: Oxford Prairie, 5 Sep 1898, *E.L. Moseley s.n.* (holotype: GH, Figs. 57, 58; isotype: MO!).

Euthamia glutinosa Rydb., Brittonia 1: 102. 1931. **TYPE**: **Kansas**. [Kiowa Co.]: Black Hills, SE of Belvidere, 15 Sep 1897, *L.F. Ward s.n.* (holotype: NY image; isotype: US image).

Stems 30–150 cm high, glabrous, often resinous; axillary shoots absent. **Leaves** (midstem) 5–8(–10) cm long, (1.5–)2–5(–7) mm wide, 1- or 3-veined (to weakly 5-veined), the laterals darkened and subsurface or low, surfaces glabrous or the midvein (adaxial and abaxial) sometimes sparsely

hirsutulous, obscurely to prominently punctate-glandular, not resinous to heavily resinous; margins minutely scabrous. **Inflorescence** corymboid; heads usually in a narrow layer, sessile to subsessile or outer or all sometimes short-pedicellate. **Involucres** 3–5 mm long. **Ray flowers** (6–)7–14. **Disc flowers** (2–)3–8(–9), corollas 2.5–4 mm long. Map 8.

Euthamia gymnospermoides and *E. media* have been considered separate species (Freisner 1933; Deam 1940; Jones 1963) but more recently as conspecific (e.g., Sieren 1981; Barkley 1986; Haines 2006; Yatskievych 2006, Wisconsin Flora 2021). Croat (1970) found no clear distinction between *E. media* and E. *gymnospermoides* — his comparative samples were from Kansas, Nebraska, Iowa, and Missouri.

Neither has the current study been able to meaningfully separate *Euthamia gymnospermoides* and *E. media*. "Gymnospermoides"-like plants with linear, 1-nerved, glutinous leaves and glutinous involucres occur nearly throughout the range of the species. "Media"-like plants have broader, consistently 3-nerved leaves and are not glutinous or only weakly so. The type of *Euthamia camporum*, as in E. *media*, has relatively broad, 3-nerved leaves, and consistently broader leaves appear to be characteristic of populations along the western margin of the species range (Wyoming to Texas, especially in Texas). Sieren (1970, 1981) was not able to consistently distinguish *E. camporum*, but Correll & Johnston (1971) identified plants of the Texas panhandle and west-central counties as *E. camporum* rather than *E. gymnospermoides*, emphasizing the broad leaves.

The single collection of *Euthamia gymnospermoides* mapped from Kentucky is this: Graves Co.: 1.4 mi on the Paducah-Wadesboro Rd from Hardmoney Rd, open, swampy woods, 8 Sep 1972, *Athey 2101* (EKY, FSU). *Euthamia lanceolata* and *E. leptocephala* also occur in Graves County.

The single collection mapped from North Dakota is this: Ransom Co.: 12 mi E of Lisbon, low, flat prairie, moist sandy soil, 9 Sep 1969, *Stephens 36639* (NCU).

The southward-disjunct plants in Tennessee are documented by these: Coffee Co.: 3 mi SE of Manchester, Manchester Prairie on Rte 41, 11 Oct 1958, *DeSelm & Beaudry 1954* (TENN); SE side of Manchester, May Prairie State Natural Area, 1.2 mi SE of jct Interst Hwy 24 and Hwy 41 (Exit 114), SW edge of seasonally wet prairie, 19 Oct 2010, *Estes 11789* (APSC, NCU); May Prairie, 30 Aug 1991, *Jones 6929* (EKY); 2.5-3.5 mi SE of Manchester on Hwy 41, Manchester "prairie," 6 Oct 1969, *Kral 37525* (GA, VDB); ca. 3 mi S of Manchester, May Prairie, E side of US Hwy 41, 28 Sep 1984, *Medley 12152* (APSC); 1 mi SE of Manchester, N side of Hwy 41, open, midsection of wet prairie, 9 Oct 1961, *Quarterman et al. s.n.* (VDB); 1 mi SE of Manchester, N side of Hwy 41, NE margin of the prairie, 9 Oct 1961, *Quarterman s.n.* (VDB). Lawrence Co.: Ethridge, low prairie, 17 Sep 1960, *DeSelm s.n.* (TENN); N of Ethridge, flat, wet barrens, 22 Jul 1954, *Shanks 18460* (TENN). Lincoln Co.: 5.5 mi W of Huntland on Hwy 64, oak barren, 27 Aug 1970, *Kral 40724* (VDB).

Collections of *Euthamia gymnospermoides* cited here (and mapped) from Canada suggest that it may be common in southeastern Ontario (in the St. Lawrence Lowlands region). **Ontario**. Bruce Co.: Stokes Bay, sandy beach, 20 Aug 1934, *Krotkov 9535* (CHRB); McIntosch, roadside, 4 Sep 1972, *Evers 109100* (ILLS). Essex Co.: Tilbury North Township, Lighthouse Cove area, near S shore of Lake St. Clair and Thames River mouth, small patch along RR with prairie associates, 26 Sep 1996, *Oldham 19603* (MICH).

9. EUTHAMIA PULVERULENTA Greene, Pittonia 5: 75. 1902. *Solidago texensis* Friesner [nom. nov.], Butler Univ. Bot. Stud. 4: 196. 1940 [not *Solidago pulverulenta* Nutt. 1818]. *Solidago gymnospermoides* var. *callosa* Harris [nom. nov.], Rhodora 45: 413. 1943. **TYPE**: **Texas**. [Harris Co.]: Hockley, 1890, *F.W. Thurow 12* (holotype: US, Figs. 66-68; isotypes: GH image, US image).

Stems 40–60 cm tall, glabrous, without axillary shoots. **Leaves** linear, 3–7 cm long, 0.5–2(–5, rarely) mm wide, 1-veined, surfaces glabrous, punctate-glandular, often strongly resinous, margin and abaxial midvein hispidulous, margins scabrous. **Inflorescence** of sessile heads in few-flowered clusters or pedicellate heads in a much branched and more diffuse inflorescence. **Involucres** 5–6 mm long. **Ray flowers** 7–14. **Disc flowers** (3–)4–7, corollas 4–4.5 mm long. Map 9.

Flowering Sep–Nov. Coastal prairie, prairie remants along roadsides and railroads, sandy roadsides, pastures and vacant lots, canal spoilbanks, sandy ditches, low woods of slash pine and longleaf pine.

Euthamia pulverulenta is endemic to southeastern/eastern Texas and southwestern Louisiana. A collection from Chambers Co., Texas, identified by Singhurst et al. (2009) as *Euthamia caroliniana*, is *E. pulverulenta*. *Euthamia gymnospermoides* is tetraploid and it seems likely that *E. pulverulenta* is also, given their morphological similarity and essentially parapatric distribution.

The GH isotype of *Euthamia pulverulenta* was annotated by C.S. Taylor in 1982 with this note: "Plants from Hockley, TX [Harris Co.], were grown in Durant, OK, beside local and Manhattan, Kansas, plants [of *E. gymnospermoides*]. There was no distinction between plants from these different locations" (vouchers of Taylor's common garden plants were not made or are not available). Shinners (1951), Correll and Johnston (1971), and Sieren (1981) recognized *E. pulverulenta* as a separate species, but Gandhi and Thomas (1989) and Szuybryt et al. (2020) have regarded it as synonymous with *E. gymnospermoides*.

Emphasized here in the recognition of *Euthamia pulverulenta* as distinct from *E. gymnospermoides* are its consistently linear to filiform leaves and its separate geography and ecology. Only a few collections have leaves wider than 2 mm (e.g., Cameron Co.: *Tharp & Johnston s.n.*, TEX; Galveston Co.: *Rosen 5499*, TEX; Matagorda Co.: *Carr 17167*, TEX; Nueces Co.: *Cory 36856*, TEX). Nevertheless, in view of the variability in leaf morphology accepted here for *E. gymnospermoides*, (including the broad-leaved *E. camporum* and narrow-leaved *E. moseleyi*, *E. chrysothamnoides*, and the type) skepticism about the evolutionary and taxonomic distinction of *E. pulverulenta* is justified. Molecular analyses of Szubryt (2017) show *E. pulverulenta* and *E. gymnospermoides* phylogenetically intermixed, even without strong indication that geographic differentiation has occurred.

Plants of *Euthamia pulverulenta* with typical inflorescence morphology (heads in sessile clusters) occur throughout the range (e.g., Figs. 69–71). Scattered through the range also are plants different in aspect, with more numerous and pedicellate heads in a more highly branched inflorescence (e.g., Figs. 72–75) with bracteal leaves reduced in size. The lack of a geographic pattern of these variants and intermediacy with more typical plants suggests that this is infraspecific variation. Such polarity in inflorescence morphology also occurs in *E. gymnospermoides*, where heads are consistently mostly sessile to subsessile and closely clustered, but short-pedicellate heads occur sporadically.

In plants from the easternmost part of its range (in Louisiana), leaves sometimes are scabrous-margined and with a slightly hirsutulous midvein. It seems likely that these reflect genetic interaction with *Euthamia scabra*, or it is possible that these are more accurately identified as *E. scabra*.

10. EUTHAMIA OKLAHOMENSIS Nesom, **sp. nov. TYPE**: **Oklahoma**. Pushmataha Co.: Ca. 5.5 mi W of Antlers, bog, 1 Sep 1976, *J. Taylor 23370* (holotype: BRIT!; isotype: OKL).

Similar to *Euthamia lanceolata* in its hairy midrib and lateral veins, different in its mostly glabrous stems sometimes with axillary shoots, subsurface lateral foliar veins, smaller number of ray flowers ([11–]15–25[–35] in *E. lanceolata*), shorter involucres and disc corollas, and disjunct geography. Distinct from *E. leptocephala* in its shorter involucres and disc corollas and its leaves with hairy veins and consistently glandular-punctate surfaces. Distinct from *E. gymnospermoides* in its scabrous stems, hairy leaves, and shorter involucres and disc corollas.

Stems 50–140 cm tall, glabrous to sparsely and minutely hispidulous-scabrous on the ridges near the inflorescence; axillary shoots occasionally produced distally. **Leaves** relatively even-sized up to the inflorescence, narrowly lanceolate, sparsely and sometimes faintly glandular-punctate adaxially but epunctate abaxially, sometimes also apparently slightly pustulate (as in *E. leptocephala*), not resinous or rarely slightly so, midstem 5–8(–10) cm long, 3–5 mm wide, proximal 5–7 mm wide, 3(–5)-nerved, lateral nerves (distal leaves) dark, not raised, adaxial midvein moderately to densely hirsutulous, laterals sparsely hirsutulous, abaxial veins sparsely hispidulous, margins coarsely scabrous-ciliate. **Inflorescence** interrupted-corymboid, not strongly flat-topped or 1-layered; heads sessile to subsessile. **Involucres** campanulate, 3.5–4 mm high; phyllaries elliptic-lanceolate, usually resinous, green-glandular at the apex. **Ray flowers** 10–12(–18). **Disc flowers** 5–7, corollas 2–2.2 mm long. Map 13. Figures 97-106.

Flowering (April) August-October. Bogs and wet areas, sloughs, open riparian forest. Known only from southeastern Oklahoma, at the southwestern tip of the Ouachita Mountain uplift.

These plants have previously been identified (by me and others)

As *Euthamia leptocephala* — but leaves with punctate surfaces and hairy surfaces are out of place in that species, and the geographic distribution of *E. leptocephala* apparently does not overlap with that of *E. oklahomensis*. The faint foliar pustules sometimes produced, however, and the geography suggest that *E. leptocephala* may be involved in the origin of *E. oklahomensis*.

As *Euthamia graminifolia* var. *nuttallii* (here = *E. lanceolata*) — but the closest localities of var. *nuttallii* (Illinois, Kentucky, Tennessee) are nearly 400 miles northeast of the cluster of *E. oklahomensis* populations. Var. *nuttalli* has more densely hairy stems and leaves and the heads have a greater number of ray flowers.

Euthamia oklahomensis is compared in the diagnosis to *E. gymnospermoides* and *E. leptocephala* as those two also are in southeastern Oklahoma. But plants most similar to *E. oklahomensis* are those of *E. scabra* — they overlap in almost all features, yet the geography and ecology are different and underlying the taxonomic here is the assumption that their evolutionary origins are independent. Tentatively, rhizome morphology of *E. oklahomensis* (see Fig. 99), with persistent, densely arranged fibrous roots, is more like *E. lanceolata* and *E. graminifolia* than *E. scabra* and *E. weakleyi*, but rhizomes are collected too infrequently in the genus to allow a more definite statement.

Additional collections. **Oklahoma**. Choctaw Co.: 11 mi NW of Hugo, ca. 2.5 mi N of Speer, W of railroad track, bog and adjacent area, 22 Aug 1976, *Taylor 23216* (BRIT); 1.5 mi N of Speer, moist roadside, 14 Sep 1976, *Taylor 23623* (BRIT-2 sheets). Latimer Co.: ca. 7.5 km NW of Wilburton, Robbers Cave State Park, along Fourche Maline Creek, between Lake Wayne Wallace and Lake Carlton, open riparian forest, 24 Sep 2011, *Fishbein 6822* (ARIZ, BRIT, OKLA); 1.1 mi W of Talihina, slew, 14 Oct 1951, *Waterfall 10541* (OKLA, SMU). Pushmataha Co.: 10.5 mi N and 1 mi W of Soper, bog, 22 Apr 1975, *Taylor 20449* (BRIT, NY).

11. EUTHAMIA SCABRA Greene, Pittonia 5: 80. 1902. *Solidago scabra* (Greene) Bush, Amer. Midland Naturalist 5: 177. 1918. **TYPE**: **Mississippi**. [Harrison Co.]: Biloxi, 24 Oct 1897, *S.M. Tracy 1750* (holotype: NDG, Figs. 76-79; isotype: PH! image).

Stems 4–13 dm tall, sometimes with axillary shoots; stems and primary rhizomes relatively thick (cf. *E. caroliniana*), stems sparsely hirtellous on the ridges near the nodes. **Leaves** (mid-cauline) mostly 3–6 mm wide, surfaces punctate, often resinous, margins minutely ciliate to hirsute-hispid-ciliate, abaxial midvein hirsutulous, at least near the base, sometimes hirtellous. **Inflorescence** corymboid, often multi-layered. **Involucres** 3-4 mm long, glabrous, resinous. **Ray flowers** (7–)10–18. **Disc flowers** (4–)5–8. Map 10.

The type of *Euthamia scabra* has prominently hirsute stems and leaves (margins and surfaces), but most of the collections cited here are less densely hairy. Particularly in the inflorescence, stems are hirsute-ridged and leaves are hirsute along the adaxial midvein with a tendency for hirsute-ciliate margins. *Euthamia scabra* is similar in overall appearance to *E. weakleyi* but *E. scabra* has a tendency to produce a denser and more layered inflorescence and its hirsute/hirtellous vestiture is diagnostic. Differences between the two are subtle, but among collections cited here are vouchers from Szubryt (2017) and Szubryt et al. (2020), where molecular data show them to be phylogenetically distinct, although several collections suggest that the two may hybridize along the Gulf Coast of Florida in their limited area of sympatry.

Samples from Mobile Co. and Baldwin Co., Alabama, and Wakulla Co., Florida, are characterized by Szubryt et al. as "hybrids" with "highly polymorphic sequences," hypothesized to be scabra-weakleyi hybrids, although the presence of *E. weakleyi* in Mobile and Baldwin cos. is not established. Szubryt et al. did not map (their Fig. 5) E weakleyi in any Alabama counties.

Wakulla Co.: *Urbatsch 11235* (LSU, not seen) is the voucher for the hybrid profile; *Urbatsch 11236* (LSU not seen, listed as voucher for a 'hybrid' molecular profile) is noted in collection data to have vestiture of *E. scabra*. From the same immediate locality, *Urbatsch 11232* and *11234* are vouchers (LSU not seen) for *E. weakleyi*.

Baldwin Co.: *Urbatsch 11231* (LSU) is noted in collection data as a voucher for "E. hirtipes" but with the comment "some DNA characters favor E. scabra but more favor E. hirtipes" — it is cited in Szubryt et al. as the voucher for the hybrid profile. I saw this specimen (on loan to NCU) and identified it as *E. scabra*. *Urbatsch 8011* (LSU, TENN, US) from Baldwin Co. is identified as *E. scabra*; no Baldwin Co. collection at LSU is identified as E. 'hirtipes.'

Mobile Co.: a voucher of "hybrid profile" from Mobile Co. is not cited in Szubryt (2017) or Szubryt et al. (2020). *Urbatsch 11040* (LSU) is cited as a DNA voucher from Mobile Co. for *E. scabra* in Szubryt (2017) but not in Szubryt et al. (2020).

Euthamia scabra is mapped here in coastal and near-coastal localities in Louisiana (Jefferson, Lafourche, and St. Bernard parishes), following identification of the documenting vouchers as *E. scabra* by Szubryt et al. (2020; Supplemental Data -- Occurrence Matrix). I identified *Givens 2849* (the ILL duplicate) from Lafourche Parish as *E. weakleyi*; geographically and ecologically, localities in these counties seem a better fit with *E. weakleyi*.

Otherwise, I have seen (first-hand) collections of *Euthamia scabra* from all the mapped counties of Mississippi and Louisiana, as indicated in the citations below — other collections from images or voucher citations for Louisiana and Mississippi are included on the assumption that the two species are not sympatric in those states; some collections have been idenfied as *E. scabra* by Urbatsch. Field work and first-hand study of all collections with scabra/weakleyi aspect along the Gulf Coast are critically needed for an understanding of the geography and biological interaction of the two species.

Euthamia scabra and *E. weakleyi* both are morphologically distinct from *E. leptocephala* in their punctate leaf surfaces (vs. smooth-pustulate in *E. leptocephala*) as well as phylogenetically distinct, fide molecular data. *Euthamia scabra* sometimes is similar in aspect to *E. caroliniana* because of abundantly produced axillary shoots, narrow leaves, and small heads, and it sometimes is difficult to distinguish from E. *pulverulenta*.

Phylogenetic analyses of Szubryt (2017, her Figs. 1, 2, 3) and Szubryt et al. (2020, their Fig. 3) show *E. scabra* only distantly related to *E. caroliniana* but roughly in a sister relationship to *E. pulverulenta*/*gymnospermoides*. Szubryt (2017) — ETS, ITS, and combined analyses — shows collections of morphological *E. pulverulenta* (identified as *E. gymnospermoides*) phylogenetically intermixed with *E. scabra* and collections of morphological *E. scabra* phylogenetically intermixed with *E. pulverulenta*.

Collections of *Euthamia scabra* (blue text = seen in this study; "voucher" = molecular vouchers in Szubryt thesis (2017), Szubryt et al. (2019), or noted as a voucher in collection data via SERNEC, none seen; "image" = seen as an image via SERNEC. **Alabama**. Baldwin Co.: Perdido FW Tract, SE of Bay Minette, dry sandy roadside, 30 Oct 2007, *Barger Perd-151* (JSU image); northern tip of Big Island, King's battery mound on peninsula S of confluence of Blakely and Apalachee rivers, 12 Dec 1980, *Lelong 11917* (USAM-3 sheets images); Fairhope, Holiday Inn off US Hwy 98, woodland border, 28 Oct 2008, *Spaulding 13078* (JSU image); W of Gulf Shores on Hwy 180 just before mile marker 9, S side of road, 25 Nov 2001, *Urbatsch 8011* (LSU image, TENN image, US image); ca. 35 mi ESE of Mobile along Interst. Hwy 10, N side of hwy, edge of baygall in Perdido River drainage, 28 Oct 2015, *Urbatsch 11231* (LSU; notes**:** "some DNA characters favor E. scabra but more favor E. hirtipes"); E of Gulf Shores at milepost 27 along Hwy 180, savanna, 16 Oct 1982, *Whetstone 12875* (JSU image); Foley, along Hwy 59 and the Louisville & Nashville RR, 200 yards S of the Town & County Motel, 20 Oct 1977, *Wilhelm 4226* (MOR image); 2 mi NW of Spanish Fort, Bay Minette W of Ala Rd 225 (accessed from General Canby Dr), brackish marsh, 30 Nov 2002, *Zebryk 8099* (UNA image). Mobile Co.: Mobile, Hampton Inn I-10 Bellingrath Gardens location, 5478 Inn Drive, open catchment area, frequently inundated, 25 Nov 2016, *Damrel 6829* (CLEMS image); Dauphin Island, Cadillac Ave., wet ditch near pine forest, 6 Nov 1965, *Deramus D800* (NCU, UNA image); Mobile, Ann Street, low barrens, Oct 1919, *Graves 1368* (MO, US image); Dauphin Island, Audubon Bird Sanctuary, dampish soil bordering small ditch at lake boardwalk/pier overlook, 28 Oct 2012, *Horne 1935* (JSU image); Dauphin Island, W side of water tower S of 3-way intersct with LeMoyne Dr and Bienville Blvd, edge of low woods, 2 Nov 2013, *Horne 2456* (JSU image); Battleship Park, brackish moist sands, 22 Oct 1969, *Kral 38291* (MO); ca. 5 mi N of Alabama Port, sandy pine flatwoods, 8 Nov 1980, *Kral 66612* (JSU image, TROY image, VDB); S side of Mobile, Industrial Rd, ca. 4 mi E of Bellingrath Rd, sandy peat of pine savanna, 24 Oct 1999, *Kral 89052* (MO, NLU image); Deer River area S of Mobile, Navy Dept along Mobile Bay, moist sandy open areas by docks, 25 Oct 1999, *Kral 89062* (LSU image, MO, NLU image, VSC image); NW corner of Mobile Municipal Park, most open border of small stream, 21 Nov 1968, *Lelong 4996* (USAM image); Mobile, low places, 14 Nov 1872, *Mohr s.n.* (US image); Mobile, borders of fields and thickets, 26 Oct 1878, *Mohr s.n.* (UNA image); Mobile, Oct 1897, *Mohr s.n.* (UNA image); Dauphin Island, northern shore, occasional along dunes adjacent to beach, 6 Nov 1999, *Moore 4262* (DOV, DUKE image); Grand Bay Savannah site along Henderson Camp and University roads near Bayou La Batre and Grand Bay, wet pine savannah on state lands, 3 Oct 1998, *Spaulding 10419* (JSU image); Dauphin Island, E end of island, pine woods area W of the wildlife sanctuary, 25 May 1973, *Taylor 13368* (LSU image); Mobile, Laurendine Road ca. 0.3 mi W of the jct of Hwys 193 and 24, ca. 7.5 mi SSE of Interst Hwy 10, 18 Sep 2013, *Urbatsch 11040* (LSU voucher in Szybryt 2017, DNA as *E. scabra*); Laurendine Road ca. 0.3 miles W of the jct of Hwys 193 and 24, ca. 7.5 mi SSE of Interst Hwy 10, 18 Sep 2013, *Urbatsch 11041* (LSU-2 sheets). **Florida**. Bay Co.: ca. 0.9 mi S of Vicksburg along Hwy 77, N of its jct with W Hwy 388, sandy, wet roadside, broader-leaved plants in wetter area, 30 Oct 2015, *Urbatsch 11277* (LSU), *11278* (LSU). Escambia Co.: Pensacola, W of Scenic Hwy, along dirt road in swamp ca. 0.2 mi S of Langley Ave, 12 Dec 1980, *Burkhalter 7448* (UWFP image). Franklin Co.: St. James Sound, Lanarck Station, open moist sands just back a few meters from the shore, 30 Oct 1971, *Godfrey 71034* (GA image);1 mi N of East

Point, locally abundant in open boggy margin of titi depression, 18 Oct 1975, *Godfrey 74580* (USMS image). Santa Rosa Co.: Ca. 13 mi SSW of Holt, 0.5 mi E of Indigo Creek, dry sandy roadside, 6 Oct 1966, *Chapman 152* (FLAS); E edge of Milton, along River Road E of the Blackwater River and N of US Hwy 90, 28 Nov 1980, *Wilhelm 8252* (USF image). Wakulla Co.: St. Marks, 0.15 mi SSE of the jct of US 98 and Fla 363, W side of road, power line ROW, 29 Oct 2015, *Urbatsch 11236* (LSU not seen – as cited in SERNEC notes: "This specimen with many hairs on abaxial midvein and on decurrent leaf bases exhibits pubescence much like that of *E. scabra*"). **Louisiana**. Jefferson Par.: Vic. of Plauche, near Harahan, ca. 1954, *Gordon s.n.* (NO); near midpoint of Bayou Coquille where boardwalk begins over forested swamp, 25 Sep 2006, *Gunn-Zumo & Ferguson B-501* (LSU). Lafourche Par.: La Rte 1, 5.3 mi S of jct with Rte 3090, salt marsh, 5 Nov 1982, *Givens 2849* (ILL [where IDed as *E. weakleyi*], LSU). St. Bernard Par.: bank of Bayou St. Malo ca. 1 mi N of jct with Bayou La Loutre, not common, 23 Oct 1959, *Lemaire 875* (NO). Livingston Par.: N of Watson, roadside in pineland, 3 Oct 1970, *Brown 21682* (LSU-2 sheets, images); ca. 1.25 mi W of of Maurepas along La Hwy 22, narrow prairie remnant along N side of hwy, 29 Oct 2013, *Urbatsch 10790* (LSU image, voucher). St. Bernard Par.: bank of Bayou St. Malo ca. 1 mi N of jct with Bayou La Loutre, not common, 23 Oct 1959, *Lemaire 875* (NO). St. Tammany Par.: West Pearl River, near Hwy 90 (D. White ecological study site no. 24), spoil bank, 13 Oct 1978, *Darwin 930* (LSU image, NCU); mouth of Pearl River (D. White ecological study site no. 1), 13 Oct 1978, *Darwin 956* (LSU image, NCU); coastal marshes of Lake Ponchartrain near Goose Point along La Hwy 434, ca. 3-3.5 mi S of jct with US Hwy 190 in Lacombe, 13 Oct 1981, *Pruski 2201* (LSU image, TEX); Slidell, 11 Oct 1927, *Reed 24* (LL); Fontainebleau State Park, brackish marsh, 18 Oct 1970, *Rogers 4794-B* (NCU); Salmen Tract, NW of Southern Rail and Hwy 111, 0.2 mi SW of the end of Sun Valley Drive in Slidell, mixed pine-hardwood forest, 27 Oct 2001, *Rosen 1675* (TEX); W of Lemieux Drive at the Bayou Cane access, forest of *Magnolia*, *Carpinus*, *Fagus*, 3 Nov 2001, *Rosen 1735* (TEX); West Perimeter Road just N of South Gate Rd and S of Transportation Rd, large opening in pine forest, wet site, 31 Sep 1994, *Slaughter 5667* (TEX); 30 mi W of Slidell, Interst Hwy 12, moist roadside, 23 Dec 1977, *Taylor 25678* (ILL) and *25680* (ILL); Bogue Chitto River at La. Hwy 21, S of Sun, along N shore of river, 19 oct 1979, *Thomas 68992* (FLAS); S of US Hwy 90, sand bar beside West Pearl River, 1 Nov 1980, *Thomas 74667* (DUKE); S of Slidell, N bank of Rigolets, beside Hwy 90 S of La Hwy 433 intersection, 23 Oct 1992, *Thomas 132,669* (MO, TEX); E of Abita Springs, Abita Flatwoods Preserve in Bush Quadrangle near Abita Creek N of La Hwy 435, 28 Sep 1996, *Thomas 152,539* (NLU image); NW of Slidell, Camp Villere (National Guard) N of I-12 and E of Military Road, flat pine woods, 11 Oct 1996, *Thomas 152,697* (LSU image); SW of Lacombe, northeast shore of Lake Ponchartrain at Goose Point, W of Bayou Lacombe, 16 Oct 1999, *Thomas 164,068* (BRY image, DUKE image, EKY image); S of St. Tammany, ca. 0.3 mi N of jct of IH-12 and La Hwy 434, SE corner of the intersection of La 434 and a local road, 11 Nov 1990, *Urbatsch 6926* (LSU image, NCU); Abita Springs Flatwoods Longleaf Pine Restoration Preserve, along gravel road through wet pine savanna, 29 Sep 2001, *Urbatsch 7987* (LSU image, TEX); ca. 5.6 mi WNW of Covington, Lake Ramsey Savannah Wildlife Mgmt Area, near SE corner of the parking area about 100 yards N of Lake Ramsey Rd, somewhat disturbed pine savannah, 18 Oct 2015, *Urbatsch 11283* (LSU-2 sheets, voucher, images); ca. 5.6 mi WNW of Covington, Lake Ramsey Savannah Wildlife Mgmt Area, ca. 2.3 mi W of jct of La Hwy 25 and Lake Ramsey Rd, disturbed pine savannah between power line and service on W of Lake Ramsey Savannah, 18 Oct 2015, *Urbatsch 11287* (27 individuals collected, representing "various leaf widths, head sizes, and stages of blooming") — *Urbatsch 11287*-2 voucher, *11287*-5, *11287*-8, *11287*-14, *11287*-21 (LSU all). Tangipahoa Par.: N of Independence, Camp Whispering Pines Girl Scout Camp, W side of La Hwy 1054, loamy soil, 24 Oct 2003, *Bartholomew 105* (LSU image); Hammond, along Wardline Road at IC railroad, 18 Nov 1997, *Montz 8889* (LSU-3 sheets images; SELU image); ca. 5 mi E of Independence, Camp Whispering Pines near Hwy 1054, study area, 9 Nov 2001, *Montz 9476* (LSU image); E of Independence and the Tangipahoa River, ca. 3 km N of jct La Hwy 1054 and 10, Camp Whispering Pines, W side of Hwy 1054, second-growth longleaf pine savanna, 3 Nov 2001, *Platt & Reilly s.n.* (LSU image); ca. 2.5 mi E of Chesbrough, Sandy Hollow Wildlife Mgmt Area, north tract, N of La Hwy 10, E of Varnado Rd, open moist area along drainage, 14 Oct 2002, *Reid 4295* (LSU image); ca. 4 mi NNE of Independence along La Hwy 1054, Camp Whispering Pines Girl Scout Camp, 2 Nov 2012, *Urbatsch 10757* (LSU voucher). Washington Par.: Near Sheridan, J.G. Lee Memorial Forest, sandy upland pine woods and plantations, 19 Oct 1991, *Fischer 434* (LSU image); 3.5

mi S of Vernado and 9 mi S of Angie, ca 1.3 mi S of jct of La 21 and La 436, wet boggy pineland depression along Lon Miley Road, just W of jct with La 21, 22 Oct 1984, *Pruski 2998* (LSU image); just E of La Hwy 445, ca. 0.9 mi N of jct of La 445 and US 190 in Robert, wet, boggy pineland depression, 1 Nov 1985, *Pruski 3119* (TEX); E of Bogalusa, S of La Hwy 10 beside Pearl River, 26 Oct 1974, *Thomas 42292* (NLU image); W of Clifton, beside La Hwy 38 at E branch of Bogue Chitto River, 18 Oct 1979, *Thomas 68857* (NLU image); 0.5 mi S of Angie, wet woods W of La Hwy 21 at a branch of Scarbrough Creek, 31 Oct 1980, *Thomas 74603, 74605, 74606* (LSU images); N of La Hwy 10 at Wayside Park E of Lawrence Creek and E of Franklinton, along banks of dirt road, 1 Oct 1982, *Thomas 82246* (NLU image); 2 mi S of Angie at a branch of Scarbrough Creek, unmowed ROW of La Hwy 21, 23 Oct 1992, *Thomas 132,833* (NLU image); E of Bogalusa, W side of Pearl River beside La Hwy 10 bridge, small strip of woods, 27 Sep 1996, *Thomas 152,298* (NLU); ca. 9.1 mi E of Franklinton, Lee Memorial Forest, Hwy 10 along edge of forest road ca. 120 feet WSW of the jct of Parish Rd 565 and Dollar Rd, 27 Oct 2013, *Urbatsch 10781* (LSU voucher image); ca. 9.1 mi E of Franklinton, Lee Memorial Forest, Hwy 10 along edge of Lee Forest Memorial Drive near entrance on Dollar Road, 27 Oct 2013, *Urbatsch 10782* (LSU voucher); ca. 9.1 mi E of Franklinton, Lee Memorial Forest along La Hwy 10, ca. 0.1 mi NE of the headquarters building along main road leading to the forest, 27 Oct 2013, *Urbatsch 10784* (LSU image); 3.1 air mi NE of Angie, ca. 1 mi N of La Hwy 438 and ca. 0.5 mi S of the Mississippi-Louisiana state boundary, well-drained gravel with wet depressions in former gravel pit area, 22 Aug 2015, *Urbatsch 11326* (LSU voucher); 3.8 air mi NE of Angie, ca. 1.1 mi N of La Hwy 438 and ca. 0.2 mi S of the Mississippi-Louisiana state boundary, private property, open sunny area near trailhead along a bayou or drainage area, 22 Aug 2015, Urbatsch 11332 (LSU image). Winn Par.: Hwy 84, 0.4 mi N of intersection with Hwy 124, N side of hwy, large population in a commercial pine forest, 19 Sep 1994, *Robbs 24* (LSU voucher, image). **Mississippi**. Clarke Co.: Shubuta, 11 Oct 1896, *Schuchert s.n.* (US image). Forrest Co.: US Hwy 49 just N of intersct with Hwy 98, seepage areas and small stream near powerline, common on upper (drier) edges of seep, 6 Oct 2015, *Alford 4515* (LSU image); 1.3 mi N of North Gate entrance to Camp Shelby off Hwy 49, disturbed low open woodland, 7 Nov 1970, *Rogers 4931* (NCU); along Hwy 49 4.4 mi N of jct with Hwy 13, pine lands, 14 Oct 1967, *Temple 7837* (LSU image, MISS image, MMNS image). Hancock Co.: Clermont Harbor, Bay Saint Louis Post Office, low areas near the coast, 31 Oct 1954, *Demaree 36282* (USF image); Clermont Harbor Post Office, brackish water covers roots at times, great patches, 31 Oct 1954, *Demaree 36287* (USF image); W of Waveland, N side of US Hwy 90 ca. 1.3 mi E of jct with Miss Hwy 607, roadside and adjacent wet to mesic pine savanna, 19 Oct 2008, *Gray 21* (LSU image); Waveland, along Clermont Blvd ca. 0.3 mi from where it joins Lower Bay Rd, 7 Nov 2010, *Mehr 21* (LSU image); 2.0 mi S of Kiln on State Hwy 63, near Jordan River, low open area along lake, 7 Oct 1967, *Temple 7638* (ILL, MISS); Waveland, near jct of Jordan St and Nile Street, 20 Oct 2011, *Urbatsch 10098* (LSU voucher); along Miss Hwy 607, ca. 0.3 mi SE of Hwy 10 near the Miss Welcome Center, wet ditch and adjoining pine woodlands, 20 Oct 2011, *Urbatsch 10142* (LSU-2 sheets, voucher); Waveland, along US Hwy 90 just E of jct with East Bay Road, 25 Oct 2012, *Urbatsch 10738* (LSU); near power station along Miss Hwy 607, ca. 0.5 mi SE of Interst. Hwy 10, open, sunny area, 25 Oct 2012, *Urbatsch 10742* (LSU); ca. 4 mi WNW of Necaise, Caesar Conservation Site, disturbed open meadow, under preparation for planting longleaf pines, 2 Oct 2003, *Wieland 9711* (MMNS image). Harrison Co.: 7 air km NNW of Gulfport city center, S of Interstate Hwy 10 and W of Canal Rd, powerline and railroad through swamp forest, 4 Oct 2012, *Atha 13030* (NY image); Biloxi, 18 Oct 1899, *Tracy 6443* (US image); Biloxi, 1699 Elizabeth Blvd, between Home Depot and edge of woods along Interstate Hwy 10 access from Home Depot parking lot, pine woodlands, sandy, 28 Oct 2015, *Urbatsch 11228* (LSU voucher). Jackson Co.: Deer Island, Ocean Springs Post Office, large patches, low wet areas, 1 Oct 1953, *Demaree 34438* (MISSA image, NCU, NY image); Ocean Springs, moist areas in shade, 17 Jan 1954, *Demaree 36215* (GAS image, USF image); 3 mi E of Ocean Springs, rolling pinelands, heavy undergrowth, 2 Jan 1942, *Duncan 4479* (GA image); Gulf Islands Natl Seashore, Petit Bois Island, near the north beach mid island, vegetated interdunal wet swales, 25 Oct 2006, *Gunn-Zumo & Ferguson PB-133* (LSU image); Gulf Islands Natl Seashore, Davis Bayou, N side of Park Rd NE of Visitor Center, 21 Oct 2005, *Gunn & Ferguson DB-375* (LSU image); Gulf Islands Natl Seashore, Davis Bayou, edges of slash pine dominated forest on W side of access road at gated entrance leading to govt boat dock, 9 Oct 2006, *Gunn-Zumo & Ferguson DB-464* (LSU image); just E of Gautier, slightly elevated mound above marsh E of Pascagoula

River, 26 Oct 1979, *McDaniel 23026* (FSU image); Petit Bois Island, ca. 25 mi SE of Pascagoula, 27 May 1973, *Taylor 13369* (ILL); 13.3 mi N of Van Cleave on Hwy 57, low ROW along small creek, 7 Oct 1967, *Temple 7655* (GA image, LSU image, MISS, NCU); along Gulf Coast at Gautier, 25 Sep 1970, *Temple 12864* (MISS image). Jasper Co.: Heidelberg, weedy roadside, 23 Sep 1966, *Jones 10563* (MISS). Jones Co.: 5 mi ENE of Laurel, roadside, 30 Sep 1978, *Morgan 1337* (MMNS image); ca. 6.5 mi ENE of Laurel, open field, 7 Oct 1978, *Morgan 1433* (NO image); 2 mi NE of Sandersville, disturbed area between hwy and railroad, 21 Oct 1978, *Morgan 1502* (MMNS image); 10 mi E of Laurel, low area near Hwy 84 near Co. line, 28 Oct 1978, *Morgan 1525* (MMNS image). Newton Co.: 5.7 mi S of Decatur on Hwy 15, fence row on E side of hwy, 12 Oct 1968, *Temple 10947* (GA image, MISS). Pearl River Co.: Picayune, ca. 250-350 m NW of jct Hwy I-59 and Miss Hwy 43 (at S Picayune exit off I-59), by frontage road W of I-59, seasonally wet, open field, sandy soil, 10 Nov 1999, *Bryson 17744* (TENN image, VSC image); Hwy I-59 Exit 4 to road at VFS parking lot, roadside in pineland, 28 Oct 1984, *Hermann 472* (NO image, UAM image, USF image); Picayune, Crosby Arboretum, southern 1/3, slash and longleaf pine savanna, 13 Oct 1981, *McDaniel 25580* (FSU image); 4.4 mi W of Poplarville on Hwy 26, sandy clay edge of seep slope in pine hills, 2 Oct 2002, *Kral 93324* (KANU image); McNeill, 25 Oct 1931, *Reed s.n.* (LL-2 sheets); Picayune, damp grassy savanna, 20 Oct 1964, *Sargent 8510* (GA image, MISS image); Picayune, low pineland, 12 Oct 1966, *Sargent 9000* (MISS image); 3 mi W of Picayune, low ground, 28 Sep 1970, *Sargent 10423* (SAT image); 5.0 mi W of Poplarville along Hwy 26, low area, 6 Oct 1967, *Temple 7530* (GA image, LL, MISS image). Stone Co.: 7.1 mi W of Wiggins, along creek on county blacktop, 1.5 mi SW of State Hwy 26, 8 Oct 1967, *Temple 7705* (GA image, MISS).

The collection from Winn Par., Louisiana, appears to be westward-disjunct. Stems and leaves of *Robbs R-24* are hirsutulous and molecular data place it as *E. scabra* (Szubryt et al. 2020) — given its pine-plantation habitat, a recent origin is plausible, connected with the commercial activity.

12. EUTHAMIA WEAKLEYI Nesom, **sp. nov.** **TYPE**: **USA**. North Carolina. Dare Co.: Near Avon, salt marsh-shrub bog transition, 10 Oct 1953, *A.E. Radford 7724* (holotype: NCU).

Similar to *Euthamia gymnospermoides* in its mostly glabrous stems and glabrous, glandular-punctate leaf surfaces but different in consistently non-resinous stems and leaves, different geography and habitat, and hexaploid (vs. tetraploid) chromosome number.

Stems mostly 50–100 cm tall, glabrous or sparsely minutely ciliate-scabrous on the ridges near the inflorescence; axillary shoots absent. **Leaves** mostly narrowly lanceolate, mostly 4–9.5 cm long, (2–)3–5(–7) mm wide, usually 3-nerved (lateral nerves dark, not raised) except in narrowest leaves, both surfaces faintly to prominently glandular-punctate, not resinous or rarely slightly so, not pustulate, glabrous, midvein sometimes minutely villous-hirtellous proximally, margins minutely scabrous-ciliate with basally upturned hairs. **Inflorescence** usually corymboid, often unevenly layered, commonly strongly interrupted; heads sessile-glomerate or sometimes the proximal heads (of a cluster) pedicellate. **Involucres** 3.5–5 mm high. **Ray flowers** 8–14(–16). **Disc flowers** 3–9, corollas 3–4 mm long. Maps 10, 11.

Flowering (Aug–)Sep–Nov. Prairies, fields, pine savannas, pine and pine-oak flatwoods, disturbed hammocks, fresh water marsh, spoil piles, brackish dredge soil, brackish marsh/flatwoods ecotone, brackish scrub, salt marsh and borders.

These plants were recognized as a distinct entity by Sieren (as *Euthamia hirtipes*; 1970; 1972, 1981) and by Taylor & Taylor (as *E. graminifolia* var. *hirtipes*; 1983). The type of *Solidago X hirtipes*, however (as noted above, see *E. floribunda*), is distinct in morphology from plants identified here as *E. weakleyi*. Representative collections of *E. weakleyi* as shown in Figs. 107-127. A South Carolina collection (Charleston Co.) reported as a state record for *E. graminifolia* (Hill & Horn 1997) is *E. weakleyi*.

Additional collections. ALABAMA. Conecuh Co.: 1.5 mi E of Brooklyn on Co. Rd 42, sandy edge of borrow pit in pine flats, 15 Oct 1996, *Kral 86937* (APSC). Houston Co.: Vic. of Southern Junction, Hwy 4 at 0.1 mi W of jct with Hwy 109, roadside, common with *Euthamia minor*, 26 Oct 1998, *MacDonald 12433* (TROY, UNA). Monroe Co.: Red Hill FW Tract, 15 mi SSE of Camden, along dry roadway, open piney area, 5 Oct 2011, *Barger et al. RH-415* (JSU). Russell Co.: Ca. 2 mi W of Pittsview, sandy loam of recently burned pineland savanna, 11 Oct 1978, *Kral 62882* (VDB); 6.4 mi E of Hurtsboro on Co. Rd 4, ca. 2 mi E of jct with Co. Rd 49, sandy peat loam of low clearing in pine flatwoods, 24 Oct 2002, *Kral 93553* (BRIT, UNA); 2.5 mi S of Hatcheechubee on Co. Rd 65, sandy clay of clearing, prairie-like area, 25 Oct 2003, *Kral 94653* (EKY). **CONNECTICUT**. Hartford Co.: Southern Windsor on US Rte 44, cut-over area under powerline, 23 Oct 1966, *Ahles 65429* (NCU). New London Co.: Groton, Bluff Point, sandy fields behind dunes, 12 Oct 1939, *Travis 2027* (PH). **DELAWARE**. Kent Co.: Lebanon, 999 Sorghum Mill Rd, 24 Sep 2003, *Elliot s.n.* (DOV); along road 1 mi E of Little Creek, 8 Oct 1933, *Larsen 315* (MO, PH-2 sheets); Persimmon Hummock, sandy beach, 7 Sep 1935, *Larsen 1054* (GA, PH); 1.0 mi NNW of Felton, E of Rd 244, ca. 0.3 mi N of jct with Rd 241, moist soil in powerline ROW, 29 Sep 2001, *Naczi 8917* (DOV); ca. 3 mi NW of center of Dover, along W side of Scarborough Rd, just N of jct with McKee Rd, sandy soil near edge of water, shore of drawn-down retention basin, 20 Oct 2001, *Naczi 8997* (DOV); 10 mi S of Dover, 18 Oct 1948, *St. John 78623* (FLAS); ca. 1.75 mi SE of Marydel, "Amish Ditch," nearly 1 mi S of Rte 222 (Sandy Bend Rd) on Rte 224 (Parkers Chapel Rd), ditch, 29 Sep 1986, *Seyfried CEP86-643* (DOV); Marydel Quad, ditch perpendicular to Rte 208, 27 Oct 1986, *Seyfried CEP86-1159* (DOV). Sussex Co.: N of Fenwick Beach, 3.6 mi N of Del-Md state line on Del Hwy 14, 2 Sep 1962, *Ahles 57759* (NCU); near Bethany Beach, Oct 1969, *Bradley 4317* (GMUF); 1 mi SE of Bayville, border of brackish marsh, 28 Aug 1936, *Fogg 11273* (PH); Fenwick Island, sand dunes, 28 Aug 1936, *Fogg 11303* (PH); Rehoboth, pine woods, margin of sand dunes, 16 Oct 1933, *Larsen 448* (PH); town of Bethany Beach along Coastal Hwy, Delaware Rte 1, ca. 1 mi N of Fred Hudson Rd (Rd 360), 25 Sep 2005, *Longbottom 6784* (DOV); Coastal Hwy (Rd 50) between the Indian River Inlet and Fred Hudson Rd (Rd 360), W side of road, 3 Oct 2012, *Longbottom 18299* (NY); town of Georgetown, College Park Drive, W of US Rte 113, Dupont Hwy, behind shopping center, roadside, 10 Oct 2012, *Longbottom 18375* (NY); 1 mi W of Broadkill Beach on Hwy 16, margins of salt marsh, 30 Sep 1971, *Massey 3062* (UNCC, VSC); Bethany Beach, 18 Oct 1948, *St. John s.n.* (FLAS); Hudson, E of railroad, S side of pond, 14 Oct 1987, *Seyfried et al. CEP87*-2151 (DOV); Fenwick Island, frequent on roadsides, 12 Oct 2006, *Stalter s.n.* (USCH); Delaware Seashore State Park, ca. 1 mi S of Dewey Beach, at Tower Rd along entrance rd at edge of tree line, sandy soil, 30 Sep 2007, *Tkacz 7* (DOV). **FLORIDA**. Brevard Co.: Salt Lake WMA, NNW of Titusville, W of I-95 on Fla Hwy 46, ruderal marsh area altered by drydown of nearby lake and long-term grazing, 26 Oct 2006, *Abbott 22314* (FLAS); near Lake Washington, prairies, 11 Dec 1920, *Small & DeWinkeler 9745* (DUKE). Charlotte Co.: Prairie/Shell Creek (SWFWMD property), 0.05 km S of Sam Way, disturbed wet flatwoods, 4 Dec 2010, *Franck 2526* (USF); Cecil M. Webb State WMA, ca. 0.3 mi S of Hwy 762 (Truckers Grade), ca. 0.6 mi SSE of I-75/Hwy 762, wet pine savanna, 17 Dec 2015, *Urbatsch 11305, 11306, 11309* (LSU vouchers, 11309 seen as image). Citrus Co.: Between Homosassa and Chassahowitzka, pinelands, 2 Dec 1923, *Small et al. 11062* (FLAS, US); Chassahowitzka, 10 Nov 1945, *St. John s.n.* (FLAS). DeSoto Co.: Deep Creek (SWFMD property), ca. 900 ha on W side of Peace River, ca. 4.5 km NE of jct of I-75 and Kings Hwy (Co. Rd 769), disturbed hydric hammock, 5 Dec 2008, *Franck 1089* (FSU). Dixie Co.: 7.1 mi N of Suwanee on Fla Hwy 349, roadside at margin of gum-cypress swamp, 6 Nov 1976, *Dixon 119* (VSC); 0.6 mi N of post office at Horseshoe Beach, locally abundant for a few meters just at the edge of *Juncus romerianus* marsh, 30 Oct 1989, *Godfrey 83654* (USCH); 6.8 km S of Jena Fla Hwy 358 on Fla 361, edge of wet pine woods, 25 Nov 2006, *Semple 11709*, voucher for 2*n*=54 (USF). Duval Co.: Near Jacksonville, low rich places, Oct [no year], *Curtiss 1349* (FLAS, MISSA); near Jacksonville, rich low places, Oct 1883, *Curtiss s.n.* (PH); near Jacksonville, 1 Oct 1894, *Curtiss 5347* (FLAS, MO, US). Escambia Co.: Pensacola, W of Scenic Hwy, ca. 500 ft S of Langley Ave, weedy area alongside dirt road through swamp, 8 Oct 1981, *Burkhalter 7988* (UWFP). Franklin Co.: E of Lanark, woods by Gulf of Mexico, 30 Sep 1938, *Baker s.n.* (FLAS); St. Joe Buffer WMA, ca. 2 mi N of Eastpoint, ca. 0.5 mi N of gate on Plum St, Magnolia Bluff unit, ecotone between flatwoods and salt marsh, 24 Oct 2001, *Carr 3945* (FLAS); along State Rd 65 between US Hwy 98 and Ft. Gadsden State Park, flat pine lands, dry roadside, 11 Oct 1976, *Gholson 3812* (FLAS); Lanark

Station, moist sand a few meters back from shore of St. James Sound, 30 Oct 1971, *Godfrey 71034* (NCU); 1 mi N of East Point, open boggy margin of titi depression, 18 Oct 1975, *Godfrey 74580* (NCU); 2 mi E of jct Hwy 98 and road to Alligator Point, 5 Nov 1971, *Lazor 5633* (NCU); St. Vincent Island, 30 Oct 1910, *McAtee 1689* (US). Gulf Co.: 6.5 air mi NW of Apalachicola, M&K tract W of Saul Creek, frequent in drying sandy loam along canal bordering M&K road at its southern terminus, 8 Nov 1985, *Anderson 9013* (FLAS, USF); E of Indian Pass along Hwy C-30, 8.6 mi W of jct with Hwy 98, open pine-palm forest, damp areas, 6 Nov 1983, *Sundberg 2248* (GA, TEX). Highlands Co.: N of Lake Sebring, sandy dry soil, 15 Nov 1948, *Garrett s.n.* (FLAS). Hillsborough Co.: Double Branch Bay Preserve, brackish marsh/flatwoods ecotone, 2 Nov 2017, *Campbell 964* (USF); Bahia Beach W of Ruskin, open sand near landscaped area, 3 Dec 1961, *Lakela 24870* (NCU); Cockroach Bay, spoil pile, 15 Nov 1984, *Miller 61* (FLAS); Little Manatee River State Park, N park boundary service road, W of Cypress Creek, mesic flatwoods, 28 Nov 1999, *Myers 589* (USF). Holmes Co.: NNW of Westville, jct of Edelstein Rd and Rte 179A, frequent among grasses in loamy sand of roadside by soil dump, 27 Oct 2016, *Anderson 30292* (FSU); Ponce de Leon, US Hwy 90, 4.9 mi E of Fla Hwy 81, wet area by old pavement, 6 Nov 1977, *Semple & Godfrey 3177* (MO). Jefferson Co.: St. Marks Natl Wildlife Refuge, along Aucilla Tram Road just E of the Pinhook River bridge, 7.9 mi E of Lighthouse Rd (Rte 59), frequent in drying loamy sand in pine-palm woodland, 5 Oct 2006, *Anderson 22468* (FSU). Lee Co.: Caloosahatchee Creeks Preserve, 7.9 air mi NE of downtown Fort Myers, N of the Caloosahatchee River, occasional in and along a trail through mesic flatwoods, 18 Oct 2006, *Woodmansee 1971* (USF). Levy Co.: Waccasassa Bay State Preserve, N of Dewey Allen Park Rd (elevated limerock road through saltmarsh), NW of jct with C-40 and C-40A, scrubby flatwoods along boundary, 15 Nov 1997, *Abbott 11118* (FLAS); 3 mi NE of Cedar Key, dry open area by salt marsh, with *Euthamia minor*, 17 Oct 1974, *Baltzell 6857* (FLAS); ca. 2.5 mi NE of Cedar key, S of jct SW 153rd Ct and State Rd 24, tidal marsh border, 27 Nov 2009, *Lange 183* (FLAS); ca. 1.5 mi NE of Cedar Key, salt marsh on Waccasassa Bay, 8 Jan 1949, *Miller & Arnold s.n.* (FLAS). Martin Co.: 9 mi NW of Indiantown, between Fla Hwy 710 and the railroad, 13 Nov 1977, *Baltzell 10059* (FLAS). Okaloosa Co.: N of old US Hwy 98 across from Lee Park, edge of old dunes along NW side of Four Prong Lake, white sand, 3 Nov 1991, *Burkhalter 13030* (UWFP); Ft. Walton Landing Park, NW area, weedy plant in area planted with ornamental grasses and palms, 18 Nov 2007, *Burkhalter s.n.* (UWFP). Pasco Co.: Along extension of Hwy 52 W of Hwy 19 at Bayonet Point, locally common in sandy soil, just starting to bloom, *E. tenuifolia* present but past blooming, 15 Nov 1969, *Anderson 3472* (FSU); Starkey Wilderness County Park, E. of New Port Ritchie, cypress dome swamp, depressional wetland, 31 Oct 2001, *Carr 3936* (FLAS); Werner-Boyce Salt Springs State Park, between the shop and Salt Springs, common in mesic flatwoods, 4 Nov 2002, *vanHoek & Petty WB283* (USF). Pinellas Co.: Tarpon Springs, 18 Nov 1933, *Reed s.n.* (LL). Polk Co.: Nalcrest, E. Leisure Lane, W side of old air strip, 200 yds N of Lake Woehyaskapka, sandy loam in pine grove, Oct 1985, *Wheeler s.n.* (FLAS-2 sheets, LSU). Santa Rosa Co.: Blackwater River E of Milton, mixed river swamp along Hwy 90, 22 Nov 1966, *Bozeman 8764* (NCU); near Avalon Beach, S of Hwy 10, E of jct with Avalon Blvd (Hwy 281), E of east end of San Gabriel Street, wiregrass savannah and flatwoods depression area, 13 Dec 1998, *Burkhalter 16156* (UWFP); near E edge of Gulf Islands Natl Seashore (Naval Live Oaks Area), N of west end of Wild Roost Rd, near wooden bridge, edge of flatwoods grading to marsh, 23 Nov 2001, *Burkhalter 18132* (UWFP); near E side of Escambia Bay, off Avalon Beach Road, slash pine flatwoods, 18 Oct 1978, *Godfrey 76794* (USMS); Fla Hwy 87, 1.8 mi N of US Hwy 98, marsh edge, 6 Nov 1977, *Semple & Godfrey 3162* (MO, USF); E edge of Milton, along River Road E of the Blackwater River and N of US Hwy 90, 28 Nov 1980, *Wilhelm 8252* (USF). Sarasota Co.: Myakka State Park, west prairie, Feb 1946, *Beck s.n.* (FLAS); E of Sarasota, flatwoods, 6 Mar 1941, *Murrill s.n.* (FLAS); Sarasota, 25 Nov 1943, *Perkins s.n.* (TEX). St. Johns Co.: Stokes Landing Conservation Area, ca. 9 mi NE of St. Augustine Regional Airport, frequent in open pine flatwoods next to tidal marsh, mucky clay soils, 9 Nov 2001, *Slaughter & Minno 12904* (USF). Taylor Co.: Steinhatchee, banks of brackish marshes, 22 Nov 1974, *Godfrey 74153* (VDB); W of Perry on US Hwy 98, S on Co. Rd 14, then SE of Mossy Hammock Rd ca. 0.6 mi, then up to ca. 0.4 mi SW, roadside ditches along pine plantations (ex flatwoods with hammock remnants), 11 Oct 2003, *Neubig 108-2003* (FLAS); Keaton Beach ca. 0.1 mi E of the jct of Fla Hwys 460 and 430, sandy park area and along banks of waterway, 29 Oct 2015, *Urbatsch 11254, 11255, 11257, 11258* (LSU vouchers). Wakulla Co.: St. Marks Natl Wildlife Refuge (St. Marks Unit), Rd 102 (Port Leon Rd) just W of Rte 59, dry loamy sand

of depression, 23 Oct 2008, *Anderson 24274* (USCH); St. Marks Natl Wildlife Refuge, alongside a dike near water, 5 Nov 1974, *Gholson 649* (FLAS) and *650* (FLAS); St. Marks Natl Wildlife Refuge, frequent in patches on sandy slopes of dikes across marshes, 5 Nov 1974, *Godfrey 74082* (LL, TTRS); Beach site 8WA34, 23 Aug 1966, *Neel & Komarek 397* (TTRS); Shell Point [just outside of St Marks NWR], tidal marsh, 27 Oct 1952, *Kurz 48* (VSC); 2.4 mi NNW of St. Marks and 0.25 mi NW of the jct of US 98 and Fla 363, side road 0.12 mi W of Fla 363, margin of sandy pine, oak woodland, 29 Oct 2015, *Urbatsch 11232* (LSU voucher, not seen) and *Urbatsch 11234* (LSU voucher, not seen); St. Marks lighthouse, sandy ridge between lagoon and Gulf shore, 8 Nov 1963, *Ward 3615* (FLAS, GA). Walton Co.: Vic. of Portland, swales near Basin Bayou, 17 Oct 1978, *Godfrey 76780* (FSU). Washington Co.: 2.4 mi E of Caryville, swale in broad drainage area between hwy and railway, 9 Nov 1977, *Godfrey 76219* (TTRS). **GEORGIA**. Baker Co.: Ichauway Plantation, locally abundant in open swales (a few *E. minor* intermixed), 5 Nov 1986, *Godfrey 82242* (FLAS, FSU, TTRS); Ichauway, pond 4, 29 Oct 2007, *Holtrop & McKernan s.n.* (ICHAUWAY); Ichauway, pond 4, 29 Oct 2007, *Stuber & Steele s.n.* (ICHAUWAY). Camden Co.: Camden, low grounds, Sep 1888, *JBB s.n.* (NCU); edge of a salt marsh by Little Satilla River, Rte 17, 24 Oct 2001, *McNeilus 01-356* (LSU); Little Cumberland Island, Lot 38, depression behind first low dune ridge up from high tide mark, 3 Nov 1972, *Worthington 99* (MISS). Chatham Co.: Ca. 12 mi WSW of Savannah, Bush Rd, ca. 1.3 mi NE of its jct with Fort Argyle Rd, ca. 2.6 air mi NNW of Interst Hwy 95, disturbed site under powerline, 2 Aug 2016, *Szubryt 1* and *3* (LSU vouchers, not seen); Grove Hill Plantation, 15 mi SW of Savannah, dikes of artesian pond, 11 Oct 1939, *Eyles 6702* (GEO). Dooly Co.: 6.5 mi W of Vienna, margins of small cypress depresions, 27 Jun 1967, *Lane 875* (LSU). Glynn Co.: Causeway to Jekyll Island, dense colony at edge of salt marsh, 2 Nov 1974, *Duncan 29168* (GA); Jekyll Island, ca. 1.5 km S of intersct Ga Hwy 520 and South Riverview Drive, along South Beachview Drive N of Summer Waves Water Park, along wet roadside through salt marsh area, 20 Sep 2003, *Thom & Weng 169* (GA). McIntosh Co.: Inland side of Sapelo Island 3.7 mi from north tip, in open edge of salt marsh, with *Spartina patens*, 17 Oct 1956, *Duncan 20688* (GA-2 sheets, MICH, MISS, MO, NCSC, NCU, TEX, US; *Duncan 20668* is *E. caroliniana*). Randolph Co.: Ca. 7.8 mi N of Cuthbert ca. 0.45 mi ENE of confluence of Pumpkin and Little Pumpkin creeks, S side of Co. Rd 107, ca. 0.4 mi E of crossing of Pumpkin Creek, between road and planted pines, 10 Oct 1988, *Allison 3630* (GA). Screven Co.: Near confluence of Brier Creek and Savannah River, low woods, 14 Oct 1940, *Eyles 7648* (NCSC). **MARYLAND**. Caroline Co.: Town of Choptank, along Poplar Neck Rd between Marsh Creek and Choptank Rd, roadside, 24 Sep 2006, *Longbottom 7965* (DOV); town of Bethlehem, along MD Rte 331, Dover Bridge Rd, S side of road at edge of woods, 24 Oct 2009, *Longbottom 13012* (NY). Charles Co.: 1.8 km SSE of Piney Church, 8.35 km NE of La Plata, Piney Branch Bog, sandy-gravelly successional areas bordering bog, 26 Sep 2003, *Strong 3271* (DOV). Kent Co.: Rd 206 (Westville Rd), 0.3 mi E of Rd 216 (Big Ditch Rd), ditch on S side of road, open site in woods, 30 Aug 1989, *Seyfried CEP89-634* (DOV); Powell Ditch, just W of Rd 216 (Big Ditch Rd) on Rd 206 (Westville Rd), N side of road, standing water, 18 Sep 1989, *Seyfried CEP89-907* (DOV). Dorchester Co.: Intersection of Steele Neck Rd and Kraft Neck Rd, 9 Oct 2005, *Longbottom 6899* (DOV, TEX); SW of Federalsburg on MD Rte 307, Williamsburg Rd, between Clark Canning House Rd and Mount Zion Rd, 20 Oct 2005, *Longbottom 6963* (DOV, TEX); SW of Vienna, along Steele Neck Rd at Kraft Neck Rd, W of the road along roadside ditch, 30 Sep 2008, *Longbottom 12296* (NY); Middle Hooper's Island, along Esther Dean Rd E of Hoopersville Rd, around a waterfowl impoundment, 11 Nov 2012, *Longbottom 18438* (MARY); SW of Federalsburg on Md Rte 307, Williamsburg Rd, N of Clark Canning House Rd, field under power line ROW, 21 Sep 2014, *Longbottom 21742* (MARY); Blackwater Wildlife Refuge, salt marsh at S tip of refuge, dry sandy clay soil, 23 Aug 1972, *Thompson 292* (MARY). Prince George's Co.: Macgruder Landing, W bank of Patuxent River, 1 mi below Lower Marlboro, 8 Oct 1950, *Walker 5633* (NCU). Queen Anne's Co.: ca. 5 mi N of W of Centreville, open, wide, densely weedy, sandy roadside in dense 2nd growth deciduous forest, 8 Nov 1975, *Fosberg 56051* (MO); Abbey's Island near mouth of Bush River, salt marsh, 16 Sep 1902, *Shull 382* (MO). St. Mary's Co.: Rte 5, N of Leonardtown, 26 Sep 1960, *Benedict 6442* (PH). Somerset Co.: N of Princess Anne, along US Rte 13 at Allen Rd, under power line ROW W of RR tracks, 24 Sep 2008, *Longbottom 12259* (NY). Talbot Co.: 3 7/8 mi NW of Easton, 8 Oct 1939, *Earle 2348* (PH); 4.25 mi WNW of Easton, meadow, 2 Sep 1940, *Earle 3015* (PH); 0.75 mi NE of Royal Oak, thin woods along railroad, 2 Oct 1943, *Earle 3876* (PH); Tilghman Island, near the end of Black Walnut Point Rd, E

side of road at edge of salt marsh, 10 Oct 1992, *Longbottom 3386* (MARY). Wicomico Co.: Along Sixty Foot Rd at Powell Rd, edge of woods, 6 Oct 2015, *Longbottom 23822* (MARY). Worcester Co.: Just N of Ocean City on Md Hwy 528, sand dunes, 2 Sep 1962, *Ahles 57711* (NCU); roadside bordering swamp opposite CCC camp on Snow Hill Rd, 11 Oct 1935, *Beaven 582* (DUKE); Assateague Island, 81st Street, bog in open secondary dunes, 9 Oct, *Higgins s.n.* (MARY); Assateague Island, State Park, NW side of main parking lots, disturbed sand, 29 Sep 1984, *Hill 15843* (CLEMS, MARY, VT); Ocean City, 94th Street, waste area behind shopping center, 10 Oct 2005, *Longbottom 6917* (DOV); between Stockton and Girdletree, EA Vaughn WMA, along entrance rd, 1 Oct 2006, *Longbottom 8023* (DOV); Snow Hill, sandy soil along roadside, 30 Sep 1931, *Moldenke 6594* (NY); Dominican College, salt marsh, 24 Sep 1931, *Redmond 92* (DOV); 2 mi SE of Berlin on Md Rte 376, roadside adjacent to low coastal woodlands, 14 Oct 1972, *Windler 4168* (NCU, VSC). **MASSACHUSETTS**. Barnstable Co.: Harwich, rich thicket at border of salt marsh near mouth of Red River, 25 Aug 1918, *Fernald & Long 17485* (PH); Orleans, moist field, 18 Oct 1917, *Knowlton s.n.* (PH); Yarmouth, dry field, 14 Oct 1920, *Knowlton s.n.* (PH). Bristol Co.: Acushnet, bog, 17 Oct 1972, *Ahles 76239* (NCU). Dukes Co.: Chappaquiddick Island, 20 Sep 1915, *Bicknell 9144* (PH); Elizabeth Islands, Uncatena, E shore of island, open barren hillside, 2 Sep 1927, *Fogg 2952* (PH); Elizabeth Islands, Nonamesset, exposed hills, E end, 2 Oct 1927, *Fogg 3179* (PH); Elizabeth Islands, Pasque, border of brackish pond, thicket, 28 Aug 1928, *Fogg 3750* (PH); Martha's Vineyard, 6 Sep 1916, *Harshberger s.n.* (PH); Martha's Vineyard, Tea Lane, Chilmark, 21 Sep 1916, *Seymour 1364* (PH). Nantucket Co.: Nantucket Island, Nantucket, swamp, 20 Sep 1960, *MacKeever 494* (PH). Norfolk Co.: Dedham, Charles River meadows, wet ground, 31 Aug 1908, *Forbes s.n.* (PH); Sharon, sandy soil, 7 Sep 1908, *Knowlton s.n.* (NCU); Nantucket Island, Hummock Pond, edge of swamp, 11 Sep 1965, *MacKeever 933* (NCU). Plymouth Co.: Wareham, edge of salt marsh, 23 Sep 1921, *Knowlton s.n.* (PH). **NEW JERSEY**. Atlantic Co.: Weymouth, Atlantic Cranberry Meadows, 26 Sep 1922, *Bassett s.n.* (GH); Hammonton, in sand near bog, 4 Sep 1917, *Gershoy 700* (GH); Hamilton, Gigantic City, intersect. of Scranton and Strand Aves, open, upland roadsides, 16 Aug 2005, *Moore 7481* (VDB). Bergen Co.: Hackensack Meadows, 4 Oct 1903, *Mackenzie 620* (IND); W of Leonia, edge of brackish marsh, 28 Sep 1916, *Pennell 9290* (NY). Burlington Co.: Dan's Island, SE near Job's Creek, New Gretna, fresh marshes bordering brackish marshes, 29 Sep 1915, *Long 13403* (GA); between Exit 50 S of NJ Parkway and the Bass River, 26 Sep 1969, *O'Connor & Ferren 733* (CHRB); between Interstate 206 and "Cherry Hill," ca. 1.0 mi S of Atsion and the Mullica River, sandy, peaty pineland, 25 Sep 1991, *Strong et al. 860* (US). Cape May Co.: Five-Mile Beach, sandy soil, 2 Oct 1899, *MacElwee 1429* (ILL, NCU); West Cape May, dry fields and roadsides, 26 Sep 1920, *Mackenzie s.n.* (CHRB, NY); 1 km W of Erma, Bennett Bog, 1 Sep 1960, *Montgomery s.n.* (CHRB); Ocean View, dry sandy soil, 11 Oct 1919, *Mackenzie s.n.* (NY); 1/4 mi SE of Sunset Beach, open disturbed area across from the Harbison Walker Refractory, 1 Oct 1979, *Morton 8296* (NY). Cumberland Co.: Southern part of county, 26 Sep 1972, *Laport s.n.* (CHRB); Bridgeton, edge of sandy, gravely tidal shore along Cohansey Creek, 25 Oct 1936, *Long 49249* (CHRB-2 sheets). Middlesex Co.: Morgan (South Amboy), dry sandy soil by RR, 9 Oct 1923, *Kelley s.n.* (CHRB). Monmouth Co.: Belmar, dry, sterile soil, common, Oct 1922, *Mackenzie s.n.* (NY); Sea Grit, 15 Sep 1907, *Williamson s.n.* (CHRB). Ocean Co.: Island Beach, 2 Oct 1931, *Chute & Small s.n.* (CHRB); Long Beach, 1 mi S of Barnegat City, roadside, 23 Oct 1935, *Loughridge 2211* (CHRB); Good Luck Point, 1/4 mi W of Wireless Telephone, tidal marsh, 23 Oct 1935, *Loughridge & Roemer 602* (CHRB); Lavallette, dry pine barrens, 1 Oct 1975, *Moldenke 30383* (LL); Lavallette, sandy pine barrens, 25 Aug 1977, *Moldenke 31559* (LL); near Mill Creek off of road from Pine Beach to Ocean Gate, disturbed, open area, 5 Sep 1972, *Morton 5148* (NY); Point Pleasant, sandy margin of Old Sams Pond, 22 Sep 1915, *Pennell 6601* (NY); Island of Long Beach, 27 Sep 1936, *Small s.n.* (CHRB); Bayhead, near pond, 2 Sep 1912, *Rankin s.n.* (CHRB). Prince Edward Co.: W of Farmville on US Rte 460, pond margin, Buffalo River, 16 Oct 1965, *Ahles 62985* (NCU). Salem Co.: S of Pennsville, along Delaware River S of Kellys Point, tidal shore, 8 Oct 1934, *Fogg 7612* (CHRB); Near Hancock's Bridge, sandy soil, 14 Oct 1970, *Laport s.n.* (CHRB). Somerset Co.: Hutcheson Memorial Forest, 26 Aug 1967, *Wales s.n.* (CHRB). **NEW YORK**. Nassau Co.: Long Island, Hewlett, swamp road, 10 Oct 1915, *Bicknell 9001* (NY); Long Island, Hewlett, near Water Works, 28 Aug 1915, Bicknell 9220 (PH); Long Island, Hewlett, Dyke Meadows, 10 Oct 1915, *Bicknell 8992* (NY); Hempstead Plains, S of Hicksville, 1 Oct 1928, *Ferguson 7261* (NY). Queens Co.: Woodhaven, Long Island, 10 Sep 1891, *Hulst s.n.* (ILL). Richmond Co.: Staten Island, South Avenue, 3

Oct 1903, *Dowell 2667* (GH); NY City, Borough of Staten Island, W side of island at Fresh Kills Landfill, 13 Sep 1989, *Grant 89-00580* (DOV). Suffolk Co.: Long Island, Long Beach, 22 Aug 1918, *Bicknell 8998* (PH); Long Island, Long Beach, back of the dunes, 5 Sep 1909, *Bicknell 9223* (PH); E of Pinelawn, pine barrens, 30 Aug 1935, *Cain 449* (NY, PH); Long Island, Fire Island, sandy area back of dunes from ocean, 14 Sep 1957, *Hoiberg 787* (CHRB); Wading River, 17 Sep 1873, *Miller 83* (LSU); Cold Springs Harbor, open field, 27 Sep 1932, *Murray 2915* (DOV); ca. 8.9 km E of Amagansett, between Napeague Harbor and Atlantic Ocean, sand dunes S of Montauk Hwy, 10 Sep 1979, *Schuyler 5375* (PH). **NORTH CAROLINA**. Beaufort Co.: S of Washington, brackish marsh along Pamlico River, 11 Oct 1958, *Britt 2790* (NCU); Goose Creek State Park, brackish marsh dominated by *Cladium jamaicense*, 19 Oct 1980, *Corda 247* (NCSC); near Pamlico River in Washington, brackish marsh, 11 Oct 1958, *Radford 42069* (FLAS, NCU); 4 mi S of Bunyan, brackish marsh near Pamlico River, 12 Oct 1958, *Radford 42138* (NCU). Brunswick Co.: Caswell Beach, margin of freshwater pool, 15 Nov 1947, *Godfrey 12064* (NCSC, NCU); Inland Waterway along the Caswell Beach Road, locally abundant in a swale at the edge of a salt marsh, 21 Oct 1949, *Godfrey 50140* (NCU). Camden Co.: Dismal Swamp State Park, bike trails N and NW of Visitor Center, Corapeake Rd at Myrtle Ditch, weedy clearing on old dikes, 4 Nov 2017, *Sorrie 13592* (NCU). Carteret Co.: Ca. midway between Otway and Straits on Hwy S-1332, flatwoods edge, 2 Sep 1982, *Angerman s.n.* (NCU, USCH); Croatan National Forest, Cedar Point natural area, along U.S. Forest Service trail across forested marsh hammock, 9 Jul 1991, *LeBlond 2306* (NCU); Piney Island Bombing Range, Cherry Point Marine Corps Air Station, marsh W of Dowdy Bay,19 Aug 1992, *LeBlond 2941* (NCU). Columbus Co.: 2.1 mi NE of Old Dock, pine savannah along NC Hwy 130, 23 Oct 1968, *Leonard & Radford 2196* (APSC, CLEMS, NCU, VCU). Currituck Co.: 1 mi S of state line on W side of Knotts Island, road embankment through marsh, 15 Oct 1958, *Ahles 51310* (NCU, USF); 2.4 mi N of Knotts Island (P.O.), then 1.3 mi W, brackish marsh, 15 Oct 1958, *Ahles 51316* (NCU); near Causeway to Knott's Island, marsh, 27 Aug 1952, *Radford 6563* (NCU). Dare Co.: Hatteras Island, 1.5 mi S of South Rhodanthe, E of Pamlico Sound, 12 Oct 1940, *Blake s.n.* (NCU); Salvo, brackish march, 5 Oct 1963, *Bradley 2036* (GMUF); Hatteras Island, E of Pamlico Sound, 1.5 mi S of South Rhodanthe, opening between bushes, thickets and tangles around marshy depressions, [growing with *E. caroliniana*, *Fosberg 17815*], 12 Oct 1940, *Fosberg 17806* (MICH, NCSC, NCU); Roanoke Island, 2 mi S of Manteo, savanna, 6 Oct 1950, *Godfrey & Fox 51038* (NCSC); Nag's Head, 1 Oct 1965, *Justice s.n.* (NCU); Nags Head Woods Ecological Preserve, SW portion of the preserve, marsh edge, 18 Aug 2004, *Krings 929* (NCSC); Nags Head Woods Ecological Preserve, along Old Nags Head Road, 3 Oct 2004, *Krings 1217* (NCSC); Nags Head Woods Ecological Preserve, edge of marshy inclusion off Roanoke Trail, sand, 15 Oct 2004, *Krings 1269* (NCSC); Kitty Hawk, marsh field, 16 Sep 1951, *Reed 1974* (CHRB); Roanoke Island, 17 Oct 1950, *Schallert 2650* (CHRB); Cape Hatteras Natl Seashore, Lighthouse Rd opposite road to old lighthouse site, sandy disturbed ecotone between road and pine-oak woodland, 24 Oct 2012, *Sorrie 13124* (NCU); N of Wanchese, ca. 0.4 mi NW along unimproved road that meets Skyco Rd ca. 0.2 mi SW of its jct with US Hwys 64 and 264, Skyco well field site, transition zone between extensive black needlerush marsh and loblolly pine woods, 6 Oct 1977, *Thomas s.n.* (NCU); SkyCo well field site, ca. 0.4 mi NW along unimproved road that meets SkyCo Rd ca. 0.2 mi SW of its jct with US Hwy 64 and 264, N of Wanchese, 6 Oct 1977, *Ware 6883* (NCU). Hyde Co.: Ocracoke Island, SE of Pamlico Sound, 5 mi SW of Hatteras Inlet, salt flat, mostly thickly covered by rushes, open place, 14 Oct 1940, *Fosberg 17891* (NCSC); Leechville, brackish marsh, 13 Oct 1930, *Godfrey & White 6850* (NCSC); Ocracoke Island, Cape Hatteras National Seashore, NE end of The Plains W of ntl park campground, maritime wet grassland, 15 Oct 2005, *LeBlond 6144* (NCU); 1.5 mi SE of Swanquarter, brackish marsh, 6 Aug 1958, *Radford 38999* (NCU); 1.5 mi E of Swanquarter, Oyster Creek, salt marsh, 18 Oct 1958, *Radford 42566* (NCU); cutover pineland on E side of Wilkerson Creek bridge, open field under power line ROW, 9 Oct 1977, *Whetstone 9260* (NCU); Leechville, brackish marsh, 13 Oct 1938, *White 6850* (DUKE). New Hanover Co.: Carolina Beach State Park, 0.55 mi SSW of W entrance to Snow's Cut, in *Spartina patens* marsh next to oak forest on Cape Fear River tidal levee, 23 Oct 2002, *LeBlond 5749* (NCU); E end of Co. Rd 1532 at the Pleasure Cove Marina and just S of the Intracoastal Waterway, shell hammock, 19 Oct 1979, *Sieren 1894* (NCU, VSC). Pamlico Co.: 0.5 mi E of Hobucken, brackish marsh, 12 Oct 1958, *Radford 42229* (NCU). Pasquotank Co.: 1 mi E of Elizabeth City, wet sandy flat bordering fresh water marsh, 5 Oct 1950, *Godfrey & Fox 50993* (DUKE, NCSC). **RHODE ISLAND**. Newport Co.: Little Compton, roadsides and

pastures, 28 Sep 1929, *Churchill & Weatherby s.n.* (PH); Block Island, dry open sandy field between Pilot Hill and Southeast Point, 20 Aug 1913, *Fernald et al. 10561* (PH). Washington Co.: Block Island, bushy field, 9 Sep 1967, *Marks s.n.* (NEBC); Hopkinton, roadside, 30 Aug 1919, *Ware et al. s.n.* (NEBC); Avondale, Westerly, border of brackish cove, 31 Aug 1919, *Ware & Fernald s.n.* (GH). **SOUTH CAROLINA**. Allendale Co.: 1 mi S of Tutens Mill Pond on US Rt 321 and 1 mi NW on dirt road, along Seaboard Air Line Railway, roadside, 10 Oct 1956, *Bell 20872* (NCU). Bamberg Co.: 2.5 mi S of Denmark on US. 321, open *Andropogon* association, 24 Oct 1957, *Ahles 37587* (NCU). Beaufort Co.: 3 mi W of Beaufort on US Hwy 21 at Salt Creek, border of pine woods by brackish tidal marsh, 11 Oct 1956, *Ahles s.n.* (NCU); 0.4 mi E of US Rte 21 and Co. Rt 41, sand hill, 11 Oct 1956, *Ahles 20928* (NCU, MICH); 0.8 mi S of Yemassee on Co. Hwy 3, savannah, 6 Sep 1956, *Bell 4705* (NCU); 3 mi W of Beaufort on US Hwy 21 at Salt Creek, border of pine woods by brackish tidal marsh, 11 Oct 1956, *Bell 5259* (NCU); 0.4 mi E of US Rt 21 and Co. Rte 41, sand hill, 11 Oct 1956, *Bell s.n.* (NCU); St. Helena Island, damp fields, Oct 1892, *Cuthbert s.n.* (FLAS); St. Helena Island, damp fields, 3 Nov 1902, *Cuthbert s.n.* (FLAS); Frogmore, palmetto hammock E of Co. Rte 74, 26 Oct 1970, *Leonard 4330* (NCU, USF); Coosaw Island, corner of Coosaw River Dr and Sherman Dr, roadside adjacent to moist, fire-suppressed pineland, 20 Oct 2005, *Payne 4001* (CLEMS); Frogmore, palmetto hammock E of Co. Rte 74, 26 Oct 1970, *Sieren s.n.* (NCU); Lemon Island, maritime hammock, 20 Oct 1973, *Whetstone 2150* (NLU). Berkeley Co.: N side of Wando River at Wando along State Rd 41, abundant along roadside at disturbed edge of salt marsh, 3 Nov 2002, *McMillan 6807* (WILLI); 2.8 air mi ESE of downtown Honey Hill, E side of Wardfield Rd, 1.8 mi N of jct with SC Hwy 45, occasional in open, wet pine savanna, more frequent along open ditch of the road, 26 Sep 2014, *Nelson 33598* (US, USCH); Bluff Plantation, Western Branch of Cooper River, pasture field, 15 Oct 1980, *Porcher 1720a* (CLEMS). Charleston Co.: Little Edisto, edge of brackish swamp land, 25 Oct 1953, *Blake 12541* (LL-2 sheets); Goose Creek Reservoir near Charleston, dry ground several feet from and above the water, 22 Oct 1975, *Gholson 4863* (FLAS); Santee Coastal Reserve, Washo Reserve, S side of Santee Gun Club Rd, powerline crossing, 2.1 mi E of South Santee Rd, wet sand, low drier ridges near road, 6 Nov 1992, *Hill 24526* (CLEMS, NY). Clarendon Co.: 2 mi SE of St. Paul, savannah, 19 Oct 1957, *Radford 31028* (NCU). Colleton Co.: Jct of Co. Rd 48 and Rt 63, low pine savannah, 12 Oct 1956, *Ahles 21076* (NCU); Bear Island, edge of marsh behind house, 14 Oct 1978, *Douglass 121* (CLEMS); US Hwy 21 near Ruffin, 7 Oct 1958, *Freeman 58413* (NCU); 2.4 mi NNW of Islandton, utility ROW on E side of Buckner Rd, SSW of Ashton Rd jct, wet soil, scrubby pine plantation edge, 16 Oct 2018, *Kilpatrick s.n.* (SALK); 8 mi S of Cottageville, W side of Jacksonboro Rd (Sec 40) and 3.5 mi S of Sec 45, occasional on sandy border and ditch margin, 30 Oct 2016, *Nelson 34729* (USCH). Dorchester Co.: 1.5 mi NNE of St. George on US Hwy 15, savannah, 25 Oct 1957, *Ahles 37794* (NCU); Pregnall Road 1.8 mi S of US Hwy 78 at Pregnall, occasional on sandy peat of dripping, seeping, road bank of a road apparently cutting through something of a (clearcut) pocosiny streamhead, 18 Oct 2014, *Nelson 33807* (US). Georgetown Co.: Tom Yawkey Wildlife Center, South Island, SW corner of Gibson Pond, large patch on open, grassy dike edge, 28 Aug 1990, *Nelson 9657* (LSU, USCH); 1 mi S of Maryville, savannah, 20 Oct 1957, *Radford 31346* (NCU); no other collection data, *Tarbox s.n.* (USCH); Cat Island, dredge disposal site, pine-mixed hardwood, 4 Nov 1983, *Weeks 43* (CLEMS). Horry Co.: Pine barrens, 1933, *Tarbox s.n.* (LL). Jasper Co.: 0.7 mi S of jct SC Hwys 170 and 128 on Hwy 170, brackish marsh, 7 Sep 1956, *Ahles 18102* (NCU); 0.7 mi S of jct SC 170 & 128 on SC 170, brackish marsh, 7 Sep 1956, *Bell s.n.* (NCU); 4.8 mi SW of Ridgeland on US Hwy 17, pine savannah, 8 Sep 1966, *Bell 4894* (NCU); 1.1 mi SE of Coosawhatchie on SC Hwy 170, old field, 11 Oct 1956, *Bell 5291* (NCU voucher); Knowles Island, Ridgeland, Palm Key Resort, 330 Coosaw Way, abundant in salt shrub thicket bordering salt marsh, 6 Oct 2002, *McMillan 6752* (CLEMS). Marion Co.: 3 mi NE of Friendship, sandy roadside and margin of low woods, 20 Oct 1957, *Bell 11095* (NCU). Orangeburg Co.: E of Holly Hill, Co. Rd 174, 0.4 mi NNW of jct Co. Rd 104, pine savannah, 26 Sep 1957, *Ahles 35030* (GA, NCU); near Eutaw Springs, 1.0 mi NNE of the jct of SC Hwy 6 and secondary road 38-137, infrequent in dry woods around a large pond, 22 Oct 1980, *Aulbach-Smith 1278* (USCH). Williamsburg Co.: 3.6 mi SW of Andrews, near SC Hwy 41, savannah, 19 Oct 1957, *Radford 31198* (NCU); Scottswood Plantation, 100 yds S of dirt road and 1.2 mi E along first dirt road to E off the Canal Road from the jct just S of the maintenance shed, flatwoods margin of pond cypress dome, 24 Oct 1984, *Rayner 2083* (USCH). **VIRGINIA**. Accomack Co.: Chincoteague Natl Wildlife Refuge, 0.8 mi on Beach Road NW from Toms Cove Visitor Center, 12 Nov

2015, *Dakar 149* (NCU); Wallops Island/NASA Flight Facility, SW of Chincoteague Island, NE of old coast guard station, common in damp sandy opening in brackish scrub, 13 Oct 1994, *Fleming 10075* (GMUF); 5 mi S of Temperanceville, Rte 13, field in pinelands, 4 Nov 1934, *Leeds 1844* (PH) and *1845* (PH); 1 mi S of Maryland boundary, Rte 13, edge of ditch, 4 Nov 1934, *Leeds 1849* (PH). Augusta Co.: See citations in separate paragraph. Dinwiddie Co.: W of Winfield's Mill, depression in argillaceous woods, 13 Oct 1941, *Fernald & Long 14046* (GH). Essex Co.: SE of Tappahannock, sandy beach of Rappahannock River at Richmond Beach, 16 Oct 1939, *Fernald & Long 11628* (PH); E of Dunnsville, grassy shore of the Rappahannock, 3 Nov 1934, *Leeds 1846* (PH). Lancaster Co.: Marattica, end of Rte 622, salt water marsh, 30 Sep 1973, *Stanley & Miller s.n.* (GMUF). Mathews Co.: SE of Baron, Mobjack Bay, end of Rte 600, roadside, 13 Oct 1985, *Bradley 21327* (GMUF); near Mathews, 3.5 mi S of jct of Rts 14 and 611, dry, sandy soil near fire tower, 15 Oct 1978, *van Montfrans 222* (AUA, NO). Middlesex Co.: S of Hartfield, W of Va Rte 3, ca. 0.3 mi S of Va Rte 33, cutover field off N fork of gravel road in Mariner's Woods, 15 Sep 1981, *North 789* (LYN); near Topping, Va Rte 3, ca. 0.9 mi N of jct with Va Rte 33, edge of mixed woods on E side of road, 6 Oct 1981, *North 852* (LYN). Norfolk Co.: Near Northwest, fresh reed-marsh and swale along Northwest River, 11 Oct 1941, *Fernald & Long 14047* (PH). Northampton Co.: E of Eastville, open thicket back of salt marsh, 12 Oct 1935, *Fernald & Long 5528* (PH). Prince Edward Co.: W of Farmville on US Rte 460, pond margin, Buffalo River, 16 Oct 1965, *Ahles 62985* (NCU). Virginia Beach City: S end of Catfish Rd, off Drum Point Rd, adj. to marsh of Back Bay, 20 Oct 1989, *Bray & Grimm s.n.* (NCU); 1.6 mi WNW of Creeds, 0.4 mi SW of Pungo Ferry bridge, common, brackish dredge soil in marshes along W side of North Landing River, 18 Oct 1995, *Fleming 11542* (GMUF).

Tentatively included here within typical *Euthamia weakleyi* are plants of a disjunct population system from the area of sinkhole ponds and marshes in Augusta Co., Virginia, where many other coastal plain disjuncts occur (Fleming & Van Alstine 1999; Buhlmann et al. 1999). These plants were identified as *Euthamia tenuifolia* in the floristic list by Fleming and Van Alstine (1999). They perhaps are the basis of Haines's inclusion of Virginia in the range of *E. gymnospermoides* (in FNA, 2006) — in 2002 he annotated *Killip 36066* (US) as that species, noting the 'conspicuous punctae' on the leaves. Collections of Atlantic coastal plain *E. weakleyi* have been identified by various other collectors as *E. gymnospermoides*.

Virginia. Augusta Co.: Kennedy Mtn Meadow, vic. Stuarts Draft, open cranberry bog, 19 Sep 1937, *Carr 310* (GH, PH); Forest Service Rte 42, near S end, 5 Aug 1967, *Freer et al. 7177* (LYN); vicinity of Lipscomb, near Lipscomb Pond, field, 8 Sep 1940, *Killip 36066* (FSU, GH-Fig. 128, VPI, US-Fig. 129); Shenandoah Acres, marsh, 8 Sep 1940, *Killip 36142* (US, Figs. 132, 133); Maple Flat ponds, S edge, 30 Aug 1967, *Ramsey et al. 7234* (LYN, NCU, VPI); ca. 2 mi SE of Stuarts Draft, wet meadow by South River, 1370 ft, 4 Aug 1976, *Stevens 13343* (VPI, Fig. 130); ca. 2 mi ESE of Stuarts Draft, large open marl marsh along South River, vicinity of Kennedy Creek, 1370 ft, 8 Sep 1979, *Wieboldt et al. 3559* (VPI, Fig. 131).

In McIntosh Co., Georgia, some populations of *Euthamia weakleyi* appear to approach the narrow-leaved morphology of *E. caroliniana* and even sometimes have scattered axillary shoots similar to the latter (e.g., Fig. 118). Six duplicates of *Duncan 20688* from Sapelo Island (identified here as *E. weakleyi*), may comprise 2 morphotypes approaching *E. caroliniana*, but typical *E. caroliniana* also occurs on Sapelo Island. Plants with narrow, nearly linear, leaves also occur in the southern half of the Florida peninsula (e.g., Brevard, Charlotte, DeSoto, Hillsborough, Lee, Levy, Martin, Pasco, Polk, and Sarasota counties, e.g., Figs. 119-123), but intermediate leaf widths are present and all are otherwise similar to more typical *E. weakleyi*.

Chromosome counts from five localities in North Carolina, South Carolina, and Florida (see Map 10) show *Euthamia weakleyi* to be hexaploid, a condition apparently unique in the genus. Molecular samples from South Carolina, Georgia, and Florida (Szubryt et al. 2020) further support monophyly of *E. weakleyi*. Some of the morphological variability may result from an alloploid origin for *E. weakleyi*, allowing wider possibilities of chromosomal recombination and segregation.

Similarities of some populations of *Euthamia weakleyi* to *E. leptocephala* (2x) and to *E. gymnospermoides* (4x) suggest that their genomes may be incorporated. Alloploidy may also contribute to *E. weakleyi*'s variance in ecology (e.g., salt water marsh, fresh water marsh, pine savannas, flatwoods, fields). On the other hand, Szubryt et al. (2020) note that there is no molecular evidence to suggest that *E. weakleyi* is of hybrid origin.

Intermediacy between *Euthamia weakleyi* (6x) and *E. caroliniana* (2x), such as suggested on Sapelo Island (above), might involve formation of tetraploids. Unidirectional introgression between tetraploids and diploids is discussed by Stebbins (1971) but there is little other indication of gene flow between these two species even though they are widely sympatric. The difference in ploidy probably contributes to effective genetic isolation.

13. EUTHAMIA LEPTOCEPHALA (Torr. & Gray) Greene, Mem. Torrey Bot. Club 5: 321. 1894. *Solidago leptocephala* Torr. & Gray, Fl. N. Amer. 2: 226. 1842. **LECTOTYPE** (Sieren 1981): **Louisiana**. No other locality data, *M.C. Leavenworth s.n.* (GH 12516 image; isolectotype: NY image). Protologue: "Western Louisiana, *Dr. Leavenworth! Dr. Hale!* Texas, *Drummond*!" Duplicates of the Hale collection are at GH, K, NY, and P; the Drummond collection is at K with a probable duplicate at P.

Stems 30–100 cm, glabrous. **Leaves** mostly 4–8(–10) cm long, 3–8 mm wide, 1-veined or 3-veined with laterals dark and not raised, margins minutely scabrous, surfaces glabrous, usually glandular-pustulate without sunken punctate-glands, but sometimes pustulate and faintly punctate, or only faintly punctate, or sometimes glandularity not at all evident. **Inflorescence** characteristically dense and flat-topped; heads glomerate or distinctly pedicellate. **Involucres** subcylindric, 4–6 mm long. **Ray flowers** 7–15. **Disc flowers** 3–6(–9), corollas 2.5–4 mm long. Map 12.

Euthamia leptocephala (2x) is broadly sympatric with *E. pulverulenta* (probably 4x) but no intermediates have been encountered. Typical *E. leptocephala* and *E. gymnospermoides* (4x) have been collected from intermixed populations in southeastern Oklahoma (e.g., *Taylor 9422* and *Taylor 9424* from near Unger and Boswell in Choctaw Co., cited below). There is no evidence of hybridization in the small regions where *E. leptocephala* and *E. lanceolata* (2x) are parapatric or slightly overlapping.

Inflorescences of *Euthamia leptocephala* commonly are of sessile-glomerate or subsessile heads, but plants (populations?) with distinctly pedicellate heads are scattered through the geographic range and not uncommon. The two morphological expressions have different aspects (Figs. 92-95) but a lack of a geographical pattern in their occurrence suggests that they are variants within a single lineage.

Among the long-pedicellate plants is a collection from Polk Co., Arkansas — the two sheets were annotated by C.S. Taylor in 1979 as "heads very atypical" and "involucral bracts very atypical." Features are of *Euthamia leptocephala* except for the very narrowly elongated basal portion of the involucre. The plants are fruiting, well past flower, which may be correlated with the involucral morphology, but as Polk County is part of an area with known endemics (Novaculite Uplift subsection of the Ouachita Mountains), the population there should be relocated. Polk Co.: Ca. 1.5 mi SSE of Hatfield, near Six Mile Creek, fields, dry shaly banks, pine, post oak, and hickory woods, 900-1000 ft or 1100-1300 ft [ranges differing on the two sheets], aromatic, 9 Oct 1955, *McWilliam 631* (UARK 008597-Fig. 96, UARK 008598). From other Arkansas counties in the Novaculite Uplift region (Garland, Hot Spring, Howard, Logan, Montgomery, Perry, Pulaski, Saline, Scott), typical *E. leptocephala* has been collected only in Garland, Pulaski, Saline, and Yell counties. One collection is known from Polk County (Atkins, margin of low wooded area S of town, 23 Sep 1968, *Tucker 7609*, NCU) — these plants have leaves without apparent glands and long involucres with a narrow base.

The northwestern corner of the range of *Euthamia leptocephala* is in two counties of southwestern Oklahoma — collections are cited here (and mapped in Map 12), as they contrast in morphology and habitat with *Euthamia oklahomensis* (described below), which occurs in the same region (but not sympatrically).

***Euthamia leptocephala* sensu stricto in Oklahoma**. Choctaw Co.: Ca. 7.5 mi E of Hugo on Hwy 70 just S of dam at bridge over Kiamichi River, sandy riverside, 17 Sep 2001, *Hoagland & Buthod HUGO664* (OKL); Unger, between Hwy 70 and RR track, 5 Nov 1971, *Taylor 9416* (BRIT-2 sheets, OKL-2 sheets); 1/4 mi W of Unger, S side of RR track, interspersed with [*E. gymnospermoides*], 5 Nov 1971, *Taylor 9422* (BRIT-2 sheets, OKL-2 sheets); ca. 0.25 mi E of Unger on Hwy 70, roadside, 29 Oct 1975, *Taylor 20983* (BRIT, NY); 1.5 mi E of Boswell, along RR track in a wet ravine, [interspersed with *E. gymnospermoides*, *Taylor 9425*], 5 Nov 1971, *Taylor 9424* (BRIT-2 sheets, OKL-2 sheets). McCurtain Co.: Little River National Wildlife Refuge, Unit 4 at Yellow Banks, disturbed area, 26 Sep 2007, *Buthod & Hoagland LR-714* (OKL); Red Slough Wildlife Management Area; Unit 40N, disturbed grassland, 29 Oct 2010, *Buthod & Hoagland RS-257* (OKL); 6.5 mi SE of Broken Bow, moist, rich gum-oak hickory woods on edge of cypress swamp, 16 Oct 1937, *Hopkins & Cross 2395* (OKL, OKLA); 4 mi W of Garvin, open area between road and railroad, hardwood on both sides of ROW clearing, sandy rocky soil, 10 Aug 1966, *Stephens 8455* (OKL); Barney Ward Lake, 2 mi W of Tom, 22 Jul 1972, *Taylor 11121* (BRIT); 2.5 mi N of Tom, along a spring fed stream, 29 Oct 1975, *Taylor 21025* (BRIT, NY, VDB); 0.5 mi N of Tom, old field, 14 Oct 1951, *Waterfall 10498* (OKLA, SMU); 2 mi S of Tom, coastal plain forest, 12 Oct 1957, *Waterfall 14751* (OKLA).

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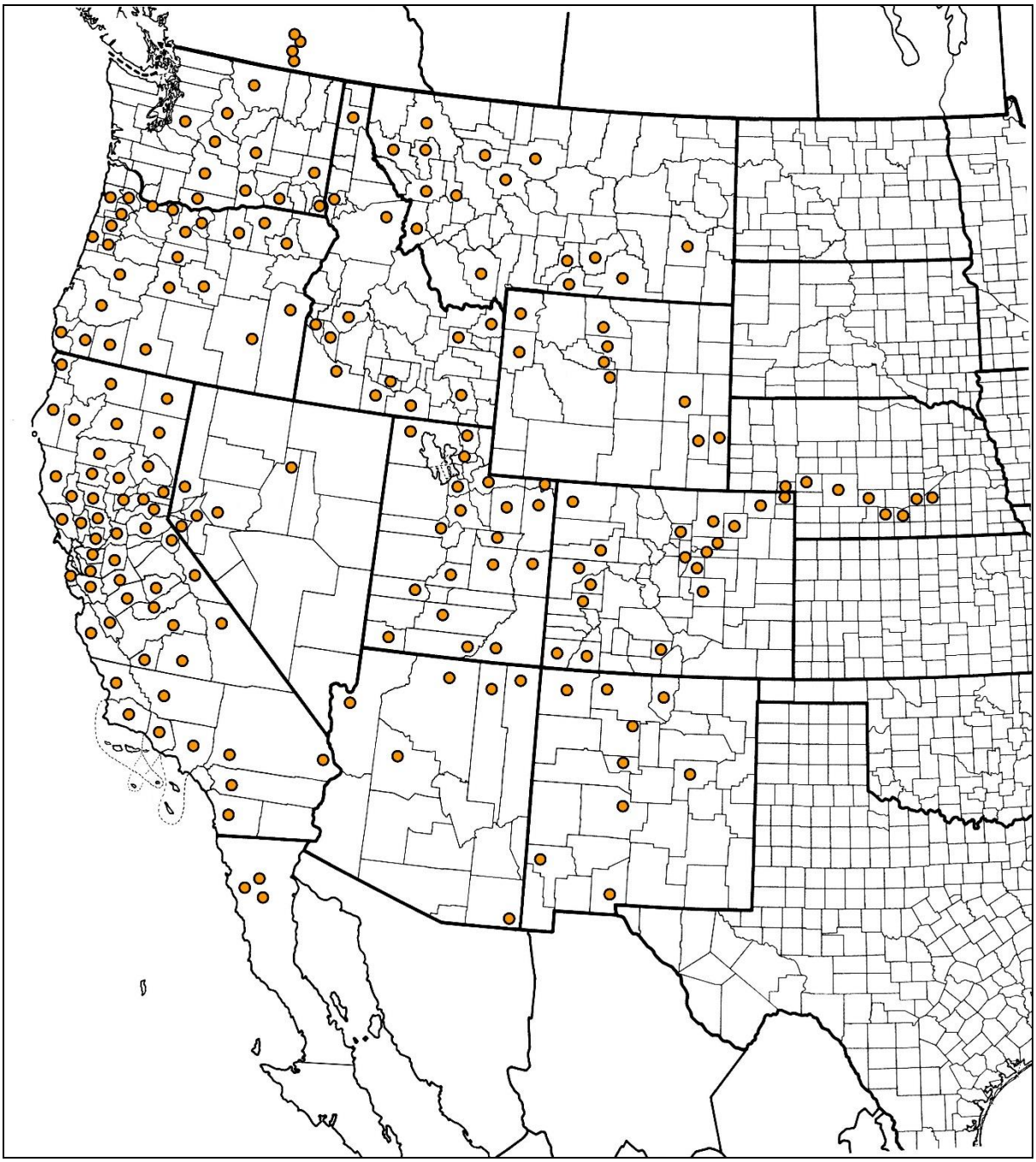
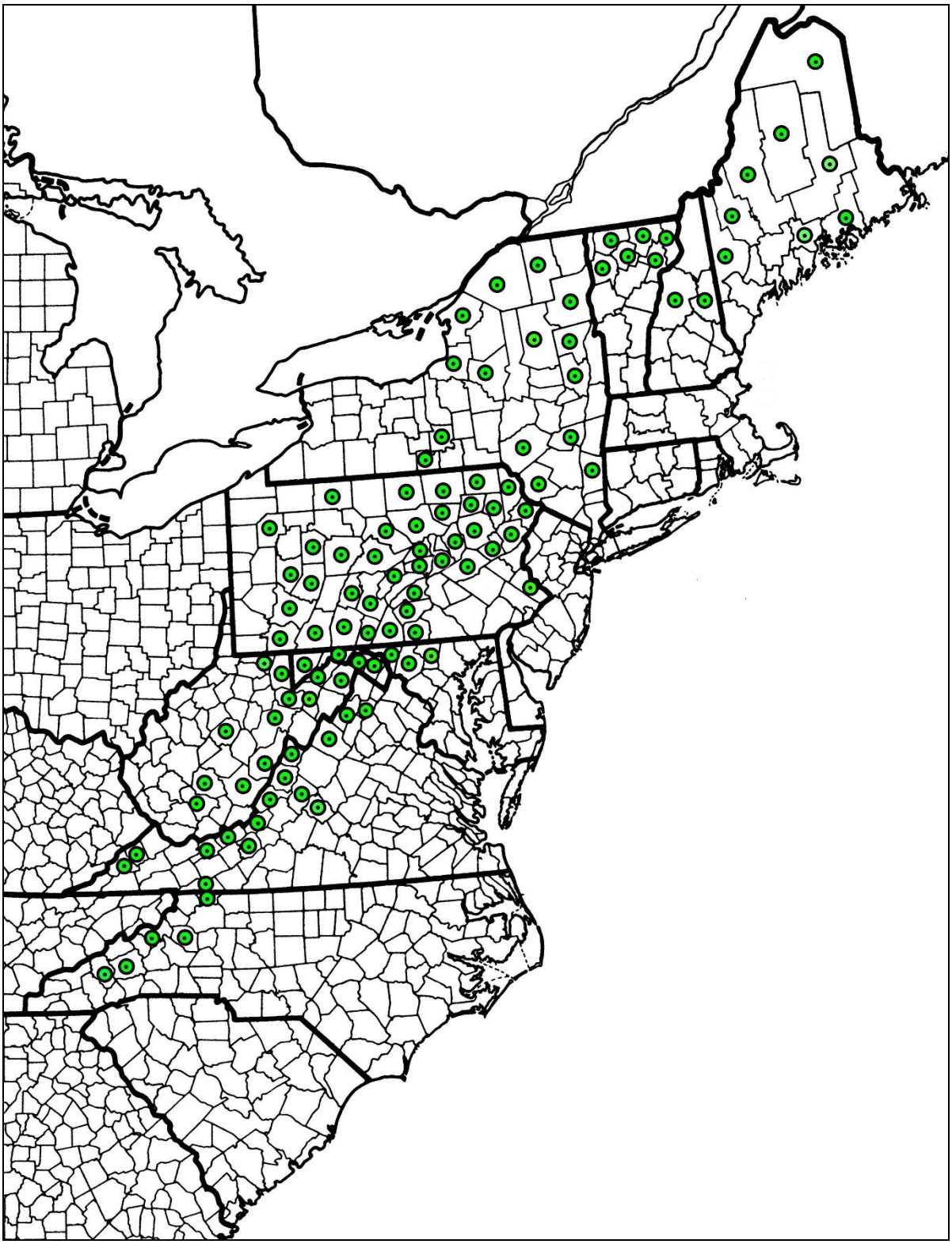
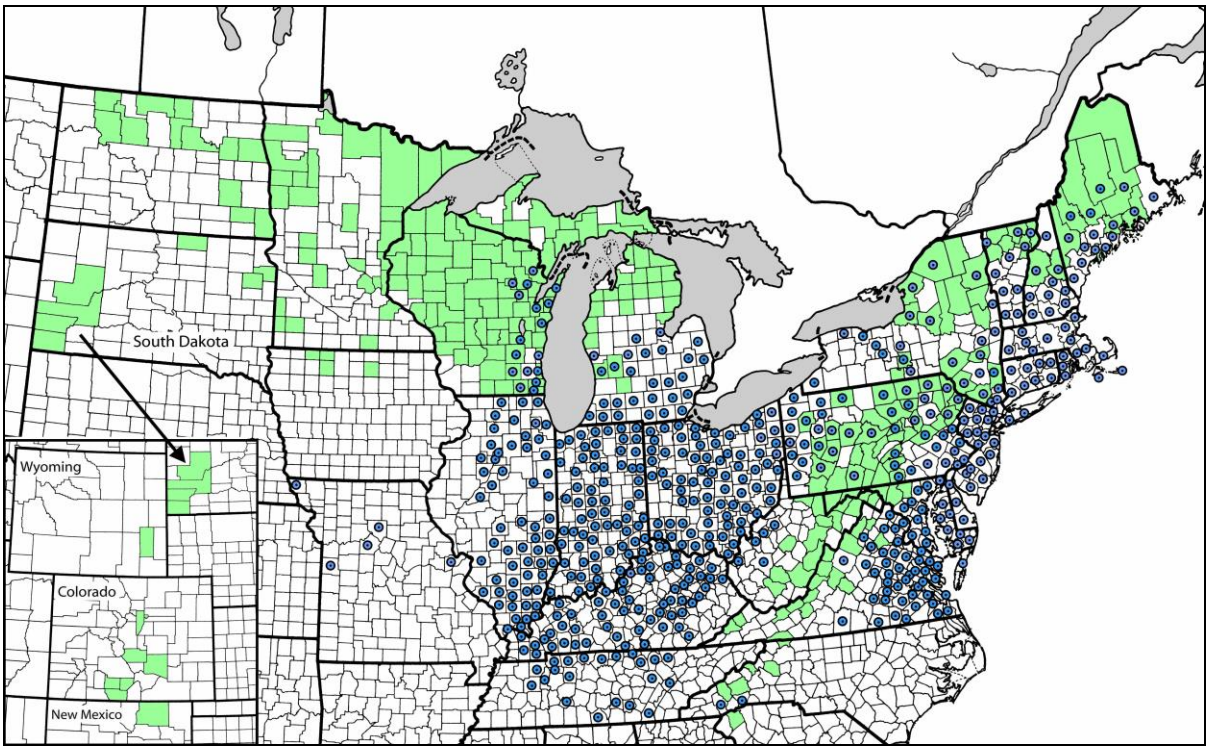


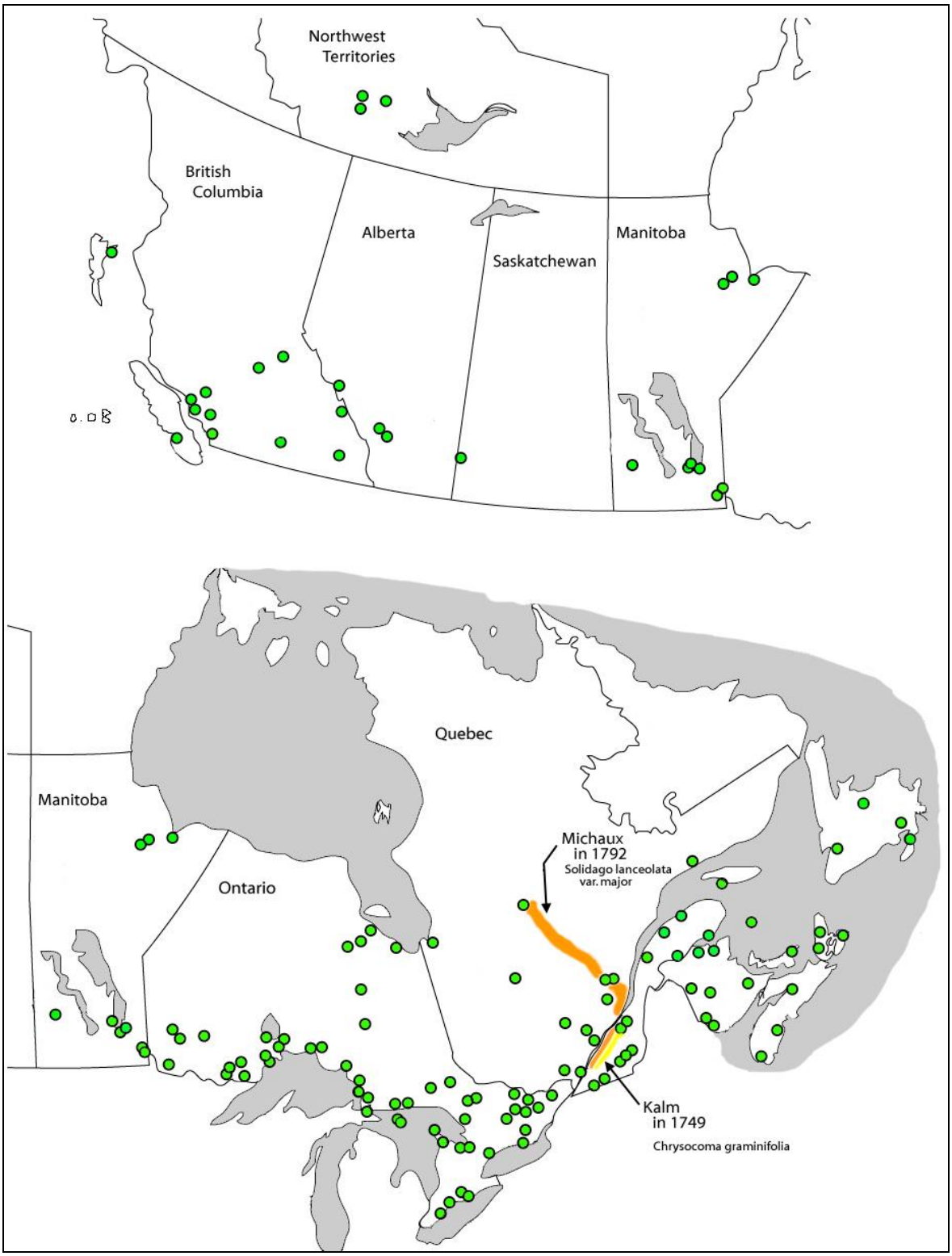
Map 1. *Euthamia occidentalis*.



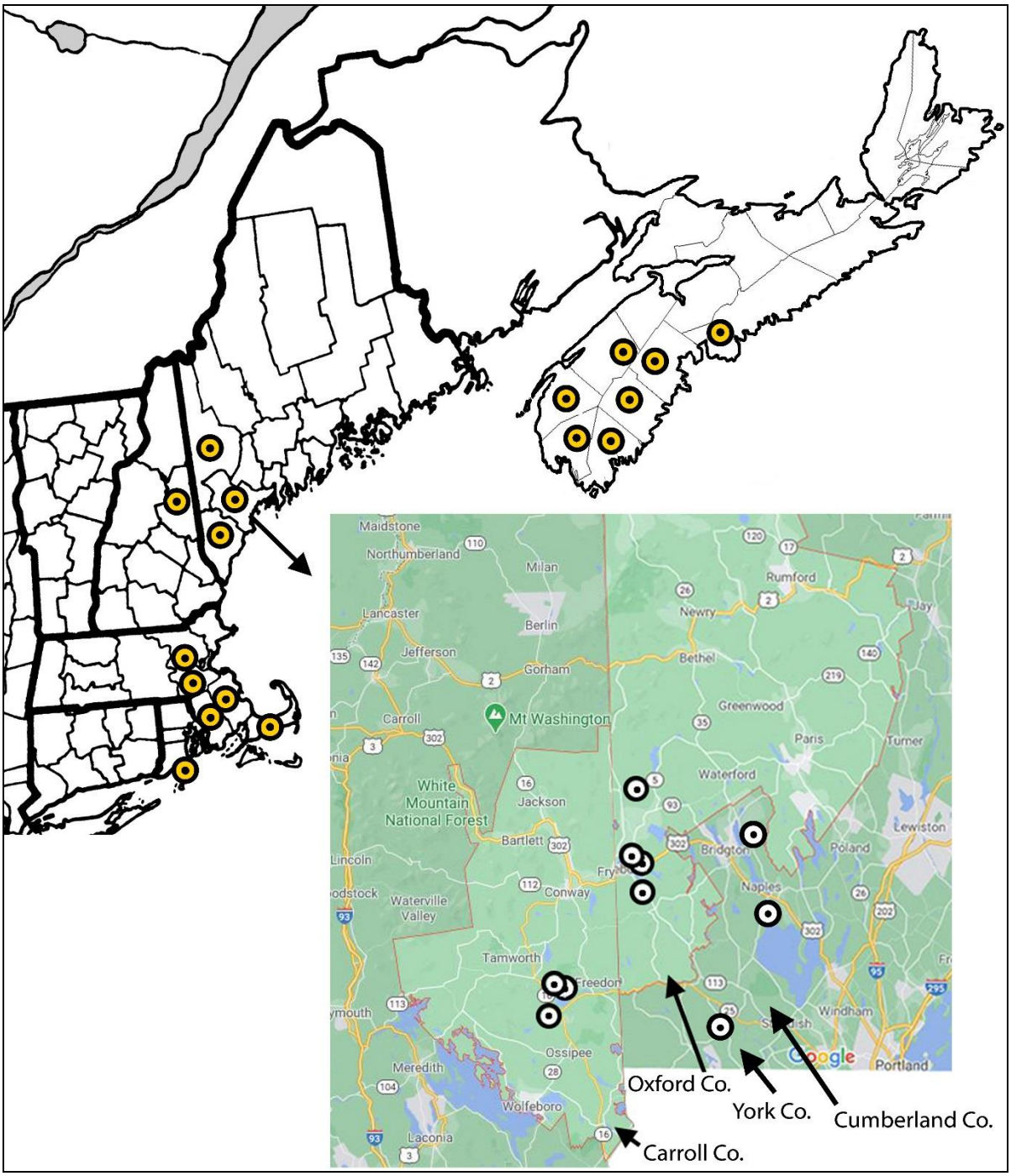
Map 2. *Euthamia graminifolia* sensu stricto in the northeastern USA. See Maps 3 and 4 for wider distribution.



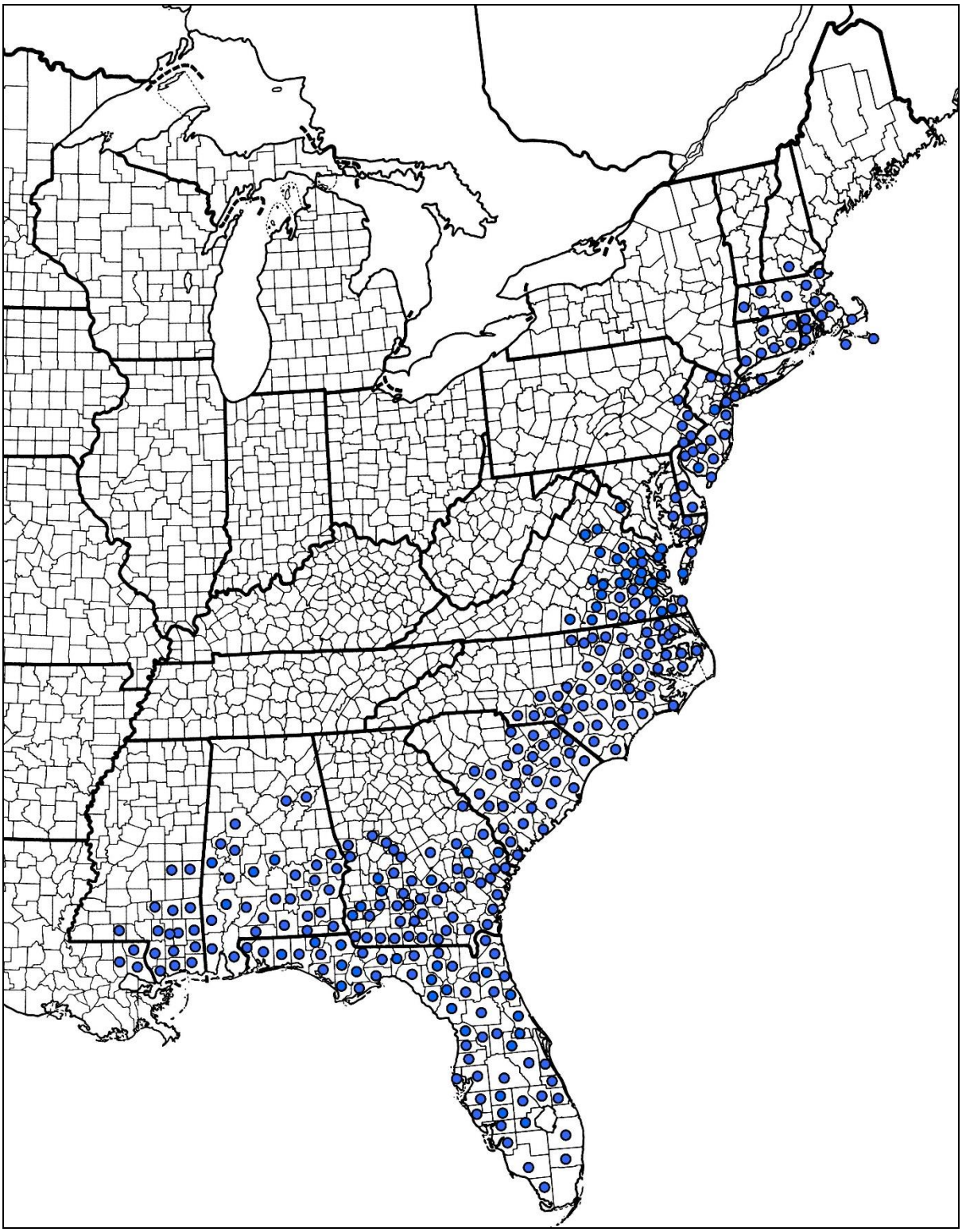
Map 3. *Euthamia graminifolia* and *E. lanceolata* in the USA. Inset shows *E. graminifolia* in its range from South Dakota southward to Wyoming, Colorado, and New Mexico.



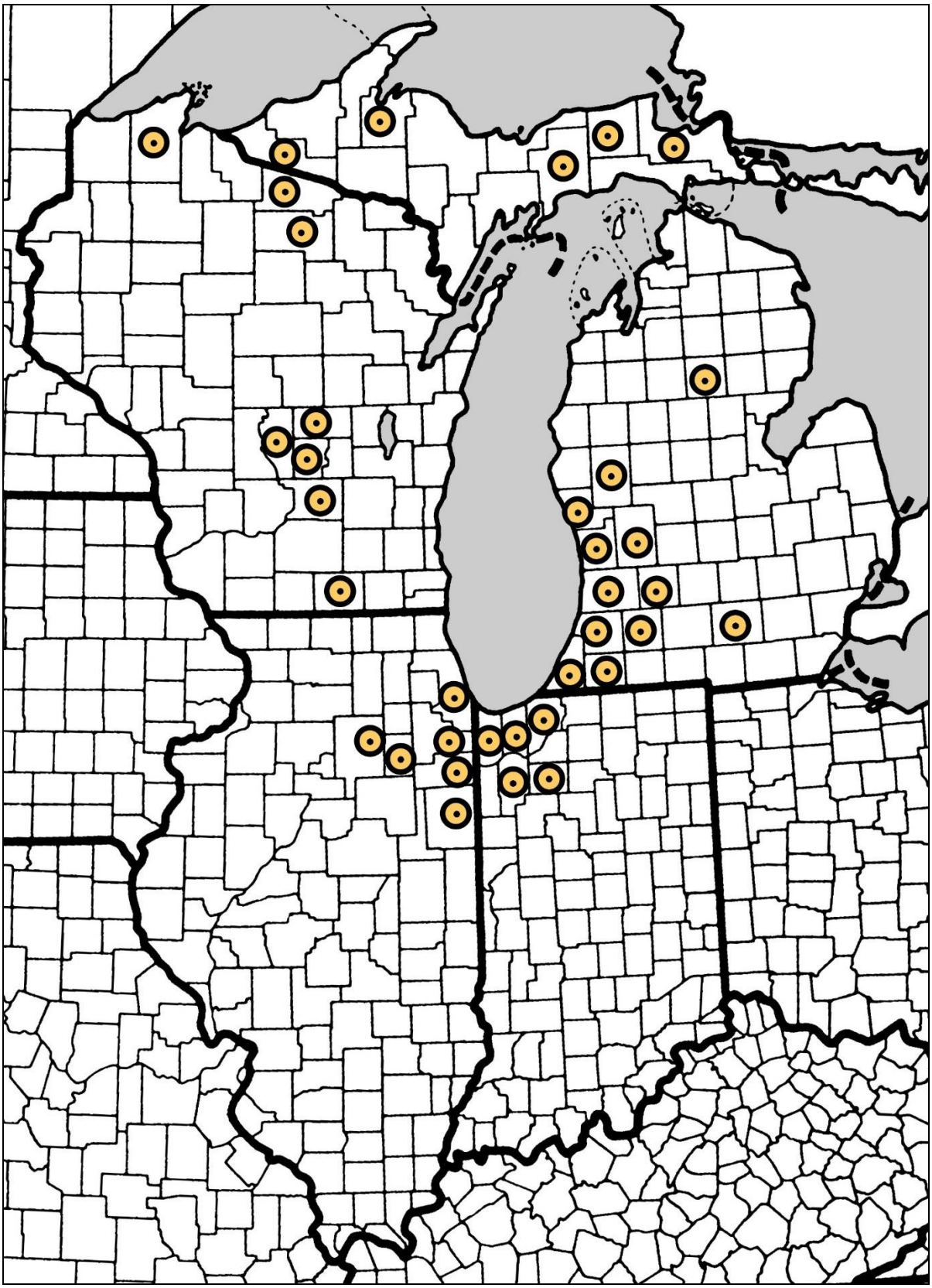
Map 4. *Euthamia* in Canada. Most of the records are *E. graminifolia* sensu stricto (see Map 2 for distribution in the eastern USA); *E. gymnospermoides* (see Map 8) *and E. lanceolata* (Map 3) occur in southeastern Ontario. *Euthamia galetorum* (Nova Scotia) is shown in Map 5; *E. occidentalis* (British Columbia) is shown in Map 1. Colored lines show routes of early collectors Andre Michaux and Peter Kalm in Canada (Quebec).



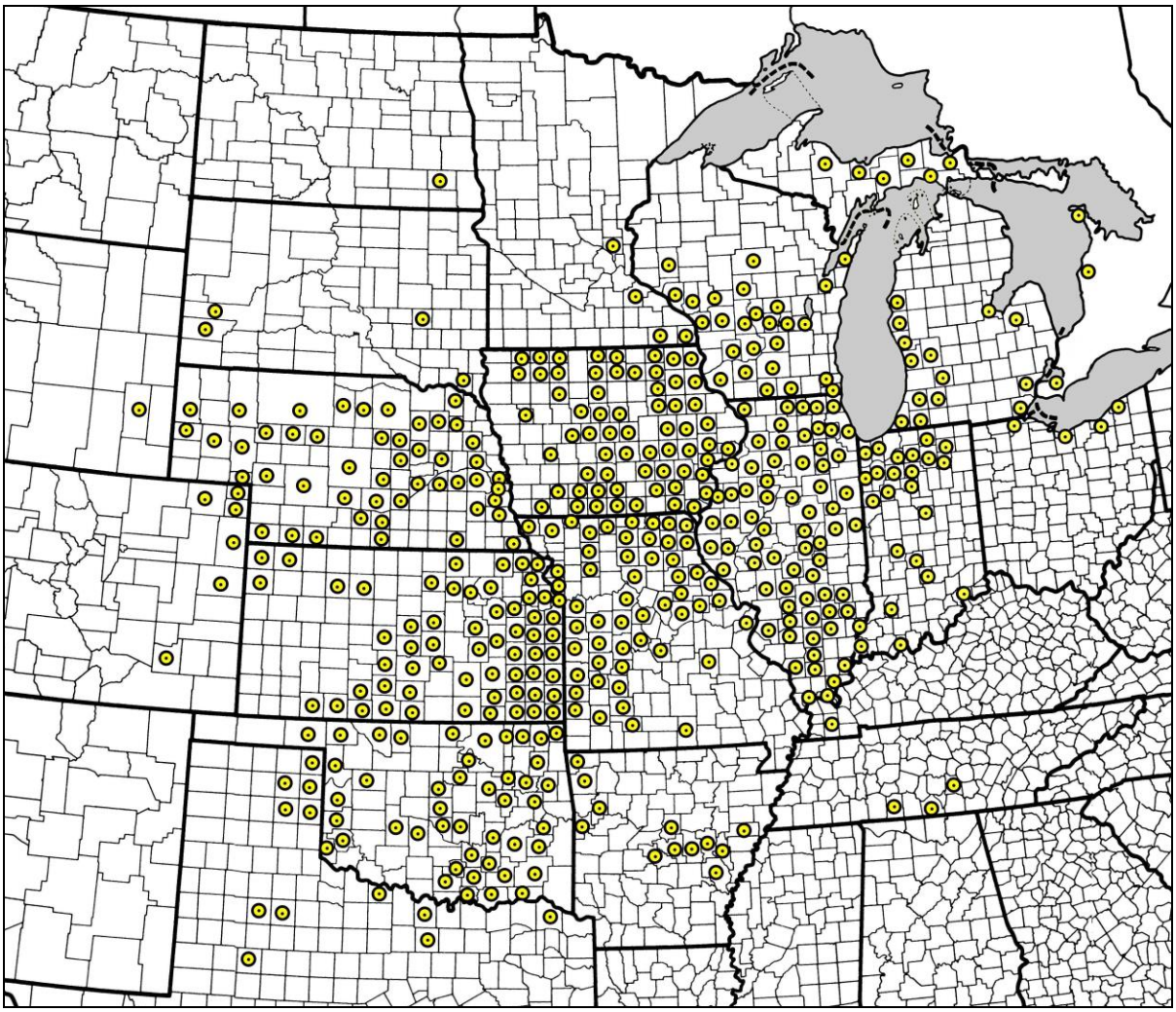
Map 5. *Euthamia galetorum*. Northeastern USA and Nova Scotia.

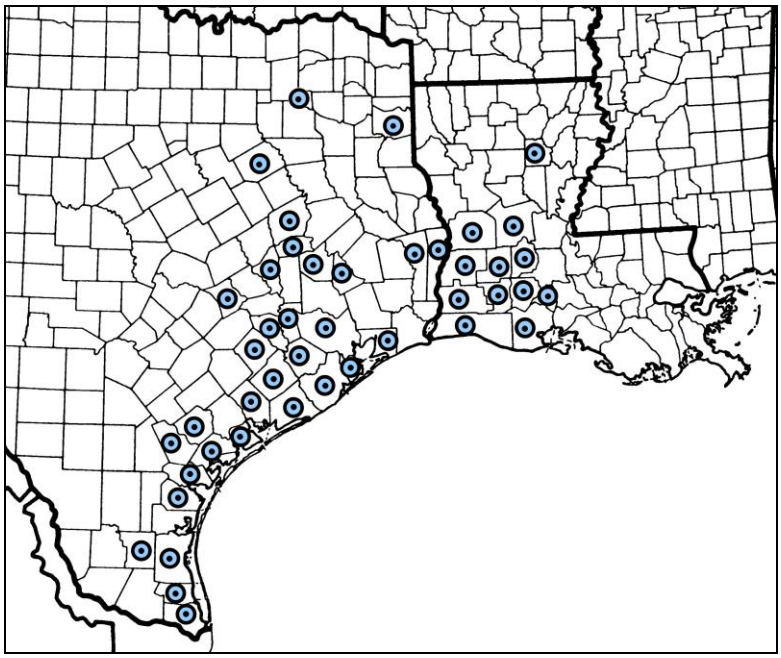


Map 6. *Euthamia caroliniana*.

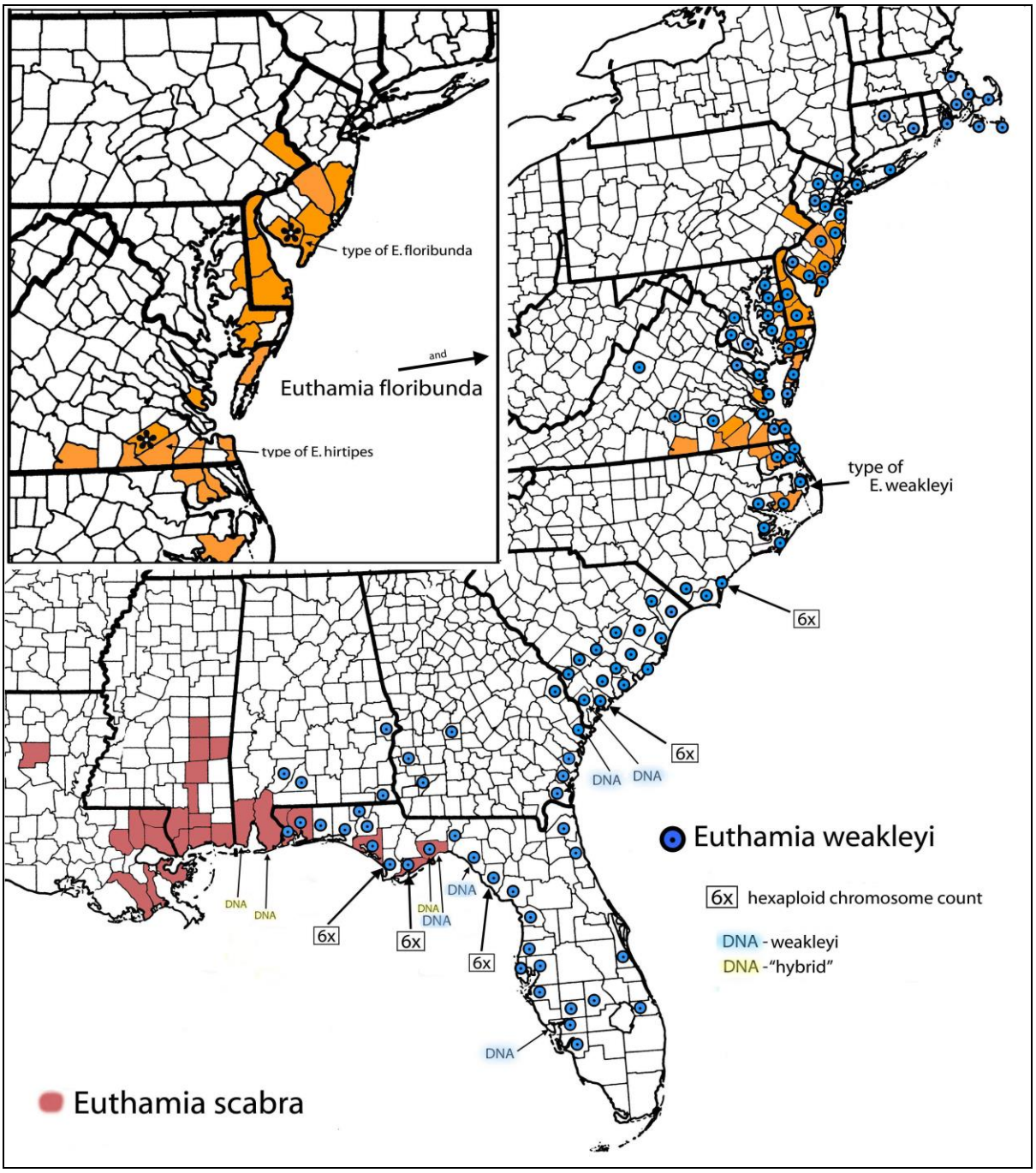


Map 7. *Euthamia remota*.

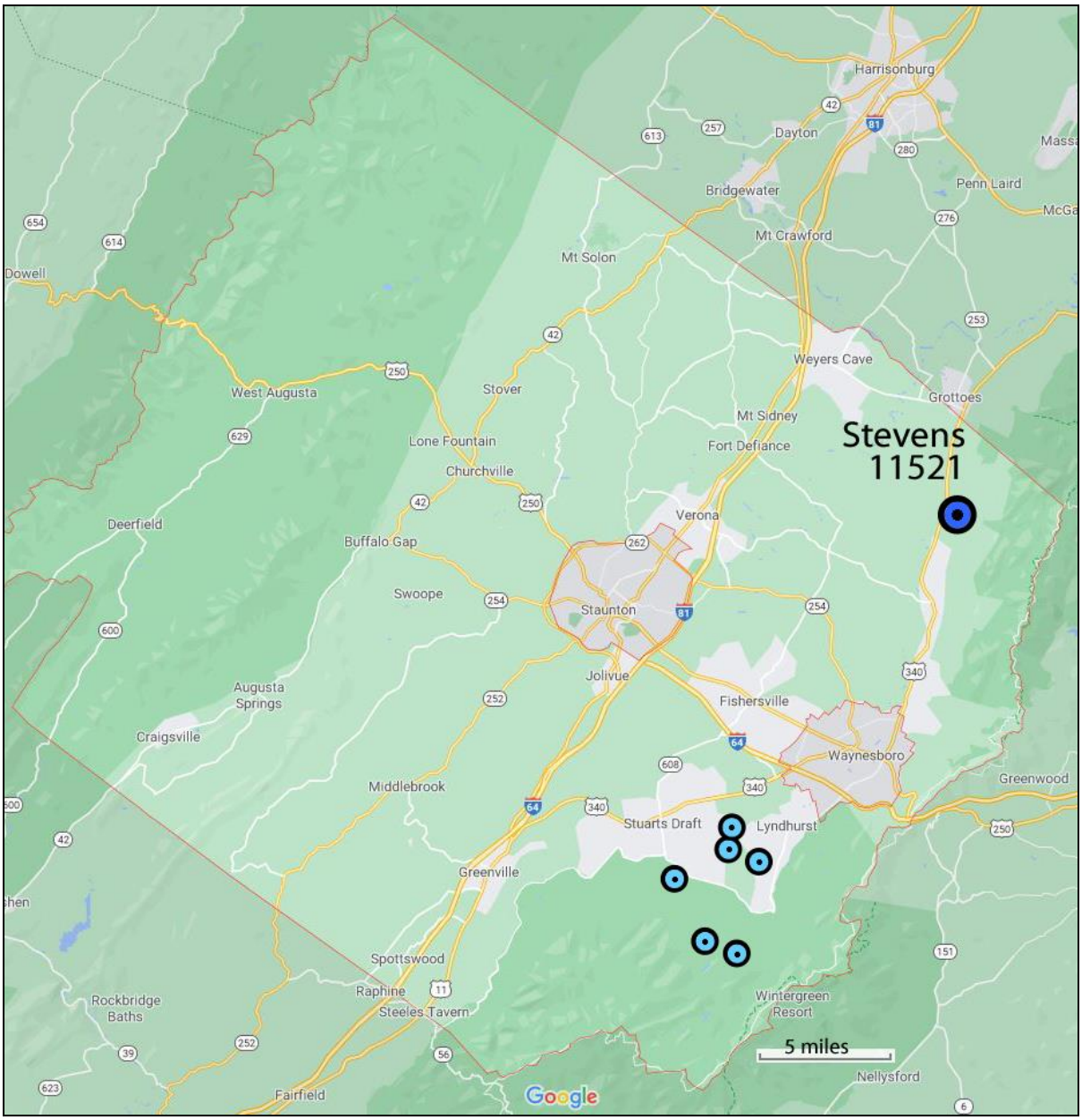




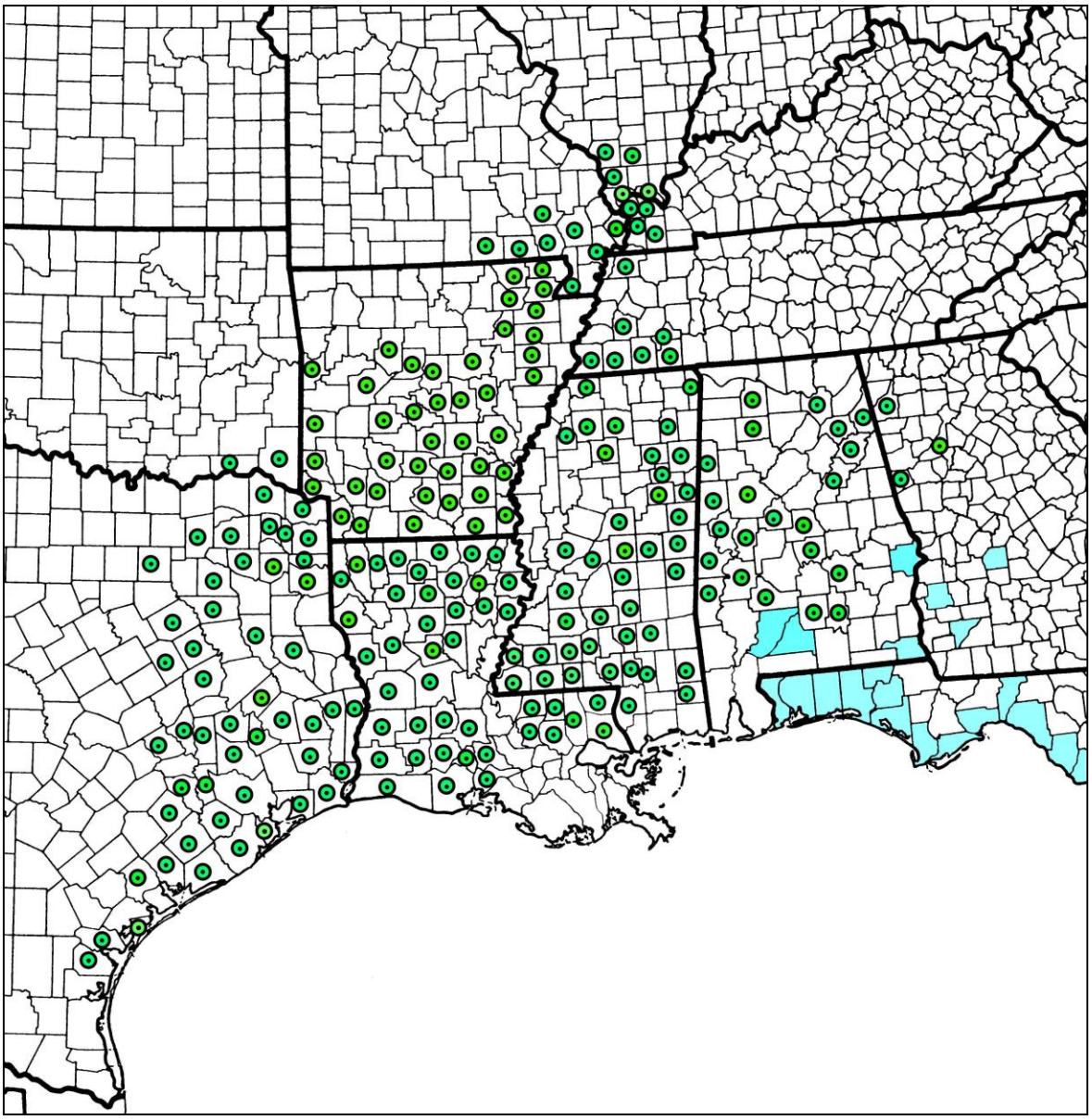
Maps 8 and 9. Above. *Euthamia gymnospermoides.* Below. *Euthamia pulverulenta*.



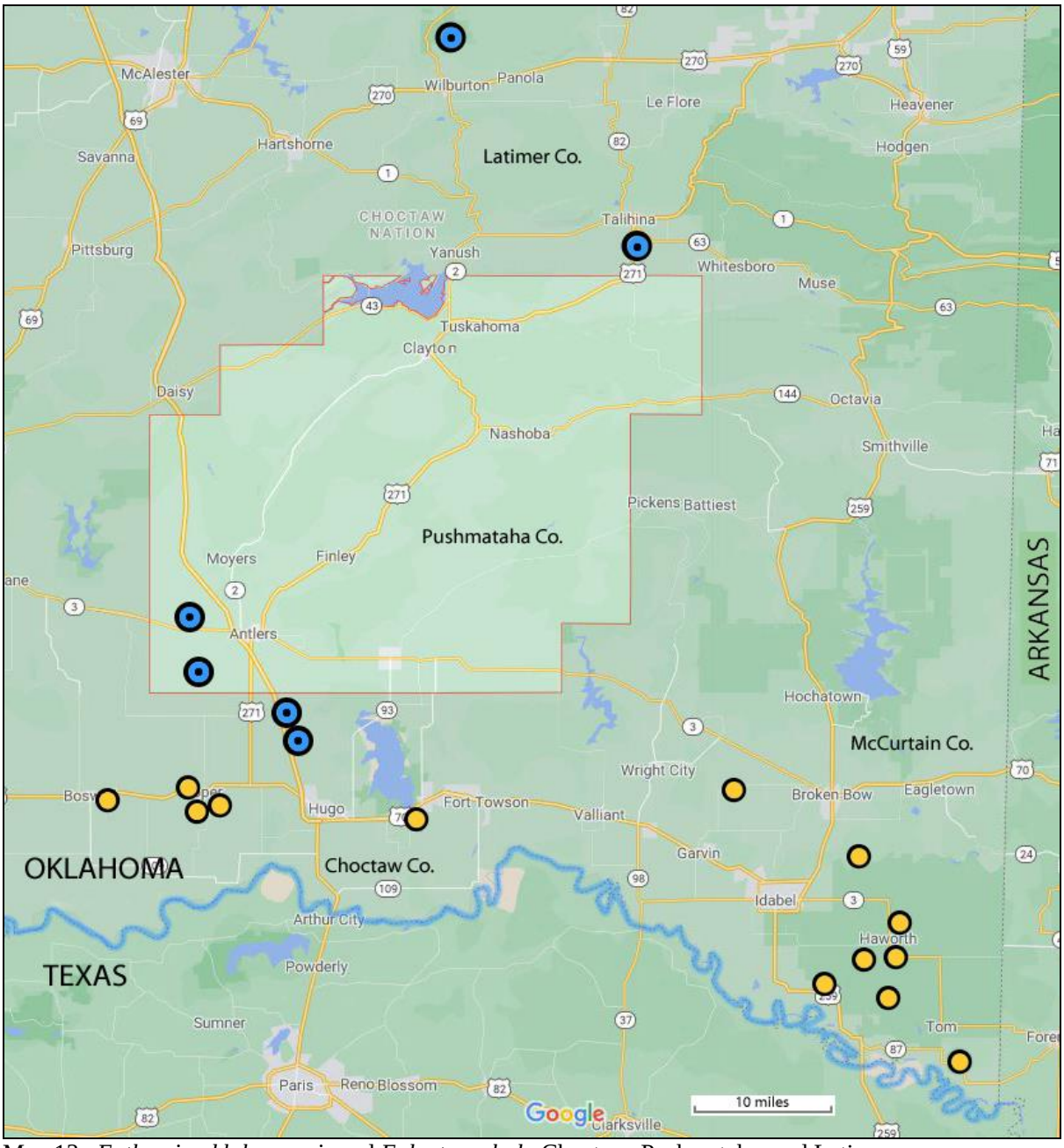
Map 10. *Euthamia floribunda*, *E. weakleyi* (also see Map 11), and *E. scabra*.



Map 11. *Euthamia weakleyi* in Augusta Co., Virginia (citations in text). *Stevens 11521* (ODU) is *Euthamia lanceolata*.



Map 12. *Euthamia leptocephala*. Blue-shaded counties show the western distribution of *E. weakleyi*.



Map 13. *Euthamia oklahomensis* and *E. leptocephala* Choctaw, Pushmataha, and Latimer cos., Oklahoma.

Figure 1. *Euthamia occidentalis* — characteristic inflorescence morphology. Yavapai Co., Arizona. *Coburn 1533* (ASU).

Figure 2. *Euthamia occidentalis* — early development of inflorescence. Coconino Co., Arizona. *Stevens s.n.* (ASC).

Figure 3. *Euthamia occidentalis* — inflorescence with relatively few lower branches yet developed. Coconino Co., Arizona. *Atwood 6390* (NY).

Figure 4. *Euthamia occidentalis* — strongly corymboid inflorescence. Garfield Co., Utah. *Welsh & Atwood 28287* (BRY).

Figure 5. *Euthamia occidentalis* — variation in rhizome morphology.

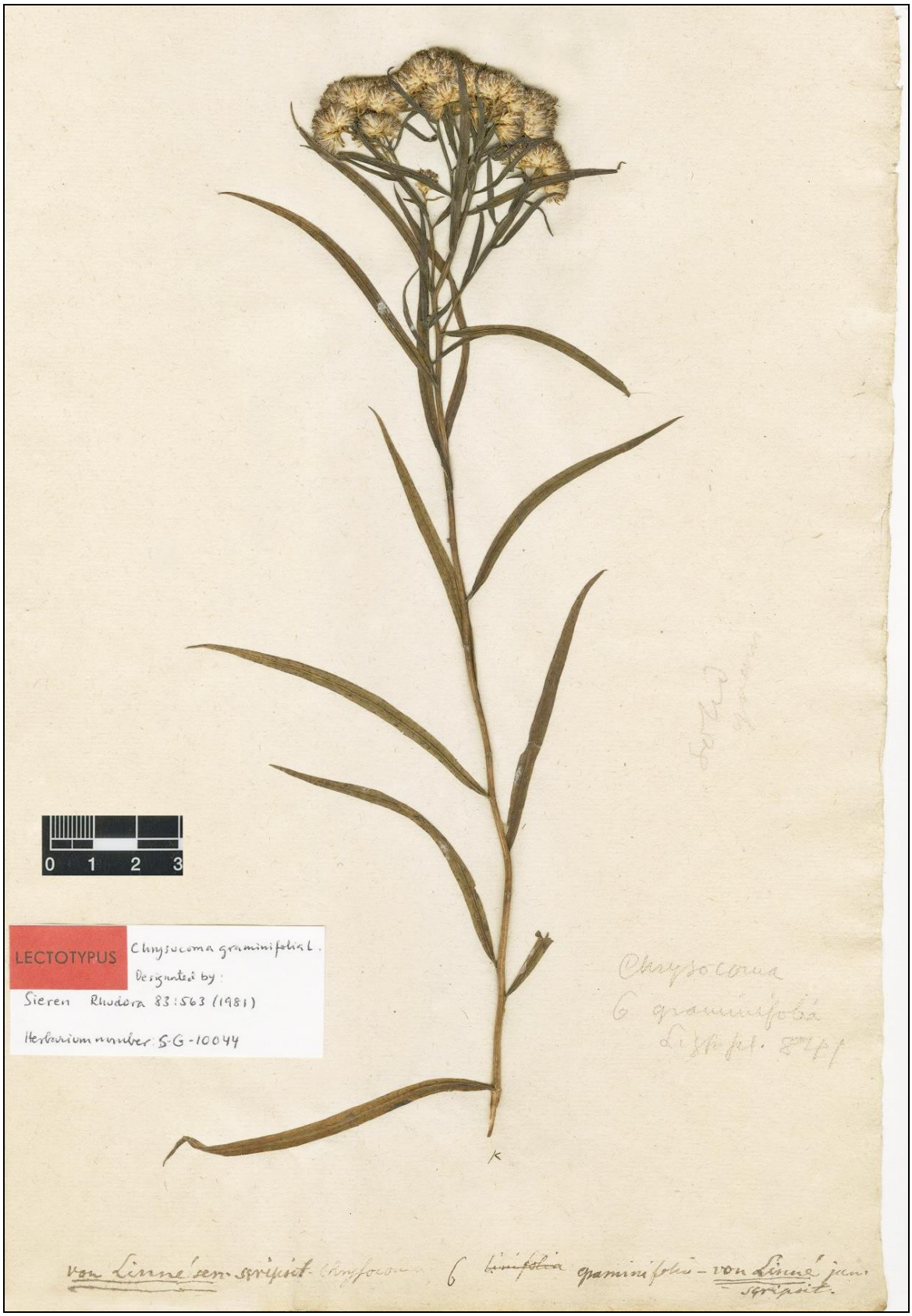


Figure 6. *Euthamia graminifolia*. Lectotype of *Chrysocoma graminifolia* (S-LINN), from Quebec.

Figure 7. *Euthamia graminifolia*. Detail from lectotype of *Chrysocoma graminifolia* (S-LINN). Stems, inflorescence axes, and leaves are glabrous.

Figure 8. *Euthamia graminifolia*. Detail from isotype of *Solidago perglabra* (LL), from Indiana. Stems and leaves are glabrous.

Figure 9. *Euthamia graminifolia*. Detail from holotype (CAN) of *Solidago graminifolia* forma *gemmans*, from northeastern Ontario.

Figure 10a. *Euthamia graminifolia*. Population variation in inflorescence morphology. Quebec. Argenteuil Co.: *Rolland-Germain s.n.* (NCSC).

Figure 10b. *Euthamia graminifolia*. Population variation in inflorescence morphology. Quebec. Argenteuil Co.: *Rolland-Germain s.n.* (COLO).

Figure 10c. *Euthamia graminifolia*. Population variation in inflorescence morphology. Quebec. Argenteuil Co.: *Rolland-Germain s.n.* (IND).

Figure 10d. *Euthamia graminifolia*. Population variation in inflorescence morphology. Quebec. Argenteuil Co.: *Rolland-Germain s.n.* (NO).

Figure 11. *Euthamia lanceolata*. Type of *Solidago lanceolata* (LINN 998.11), from "America septentrionali."

Figure 12. *Euthamia lanceolata*. Details from LINN type of *Solidago lanceolata* (see Fig. 0). Stems, inflorescence axes, and leaf veins and surfaces are hirsutulous to hirtellous.

Figure 13. *Euthamia lanceolata*. Detail from holotype of *Euthamia nuttallii* (NDG), from the District of Columbia.

Figure 14. *Euthamia lanceolata*. Detail from holotype of *Euthamia hirtella* (NDG), from Indiana.

Figure 15. *Euthamia bracteata*. Holotype (MO). Cañon City, Colorado (*Brandegee 3072* in 1872).

Figure 16. *Euthamia floribunda*. Holotype (US). Port Norris, New Jersey (*Holmes 452* in 1890).

Figure 17. *Euthamia floribunda*. Port Norris, New Jersey (*Holmes 378* in 1890, CHRB).

Figure 18. *Euthamia floribunda*. Holotype (GH) of *Solidago* x *hirtipes*. Sussex Co., Virginia.

Figure 19. *Euthamia floribunda*. Isotype (US) of *Solidago* x *hirtipes*. Sussex Co., Virginia.

Figure 20. Inflorescence of *Euthamia floribunda* (top, US holotype) and *Euthamia hirtipes* (bottom, PH isotype).

Figure 21. Inflorescence of *Euthamia floribunda* and *Euthamia hirtipes*. Detail from Fig. 19.

Figure 22. Midcauline leaves of *Euthamia floribunda* (top, US holotype) and *Solidago* x *hirtipes* (bottom, PH isotype). Proximal leaves of *E. floribunda* are 3-nerved. Peduncles and pedicels, stems, and leaves (both sides) are densely and evenly hirtellous to hirsutulous.

Figure 23. *Euthamia galetorum*. Holotype, *Greene s.n.* (NDG), from Annapolis Co., Nova Scotia.

Figure 24. *Euthamia galetorum*. Detail from holotype.

Figure 25. *Euthamia galetorum*. Detail from holotype of *Solidago tenuifolia* var. *pycnocephala* (*Fernald et al. 22743*, GH), from Yarmouth Co., Nova Scotia.

Figure 26. *Euthamia galetorum*. Yarmouth Co., Nova Scotia. Isotype of *Solidago tenuifolia* var. *pycnocephala*. *Fernald & Long 22743* (NY).

Figure 27. *Euthamia galetorum*. Yarmouth Co., Nova Scotia. *Fernald & Long 22744* (MICH).

Figure 28. *Euthamia galetorum*. Shelburne Co., Nova Scotia. *Fernald & Long 493* (MICH).

Figure 29. *Euthamia galetorum*. Shelburne Co., Nova Scotia. *Fernald & Long 24604* (MICH).

Figure 30. *Euthamia galetorum*. Queens Co., Nova Scotia. *Reznicek 8719* (MICH).

Figure 31. *Euthamia galetorum*. Oxford Co., Maine, *Pease 17,293* (NEBC).

Figure 32. *Euthamia galetorum*. Oxford Co., Maine, *Pease 17,293* (NEBC).

Figure 33. *Erigeron carolinianus* L. Lectotype (Dillenius, Hort. Eltham. 2: 412, t. 306, f. 394. 1732).

Figure 34. Epitype of *Erigeron carolinianus* (*Catesby s.n.* from 1723, OXF 87315, Sherardian Herb. no. 1877).

Figure 35. *Euthamia caroliniana*. Lectotype (PH) of *Solidago tenuifolia* Pursh, from New Jersey, pine barrens near Dismal Swamp.

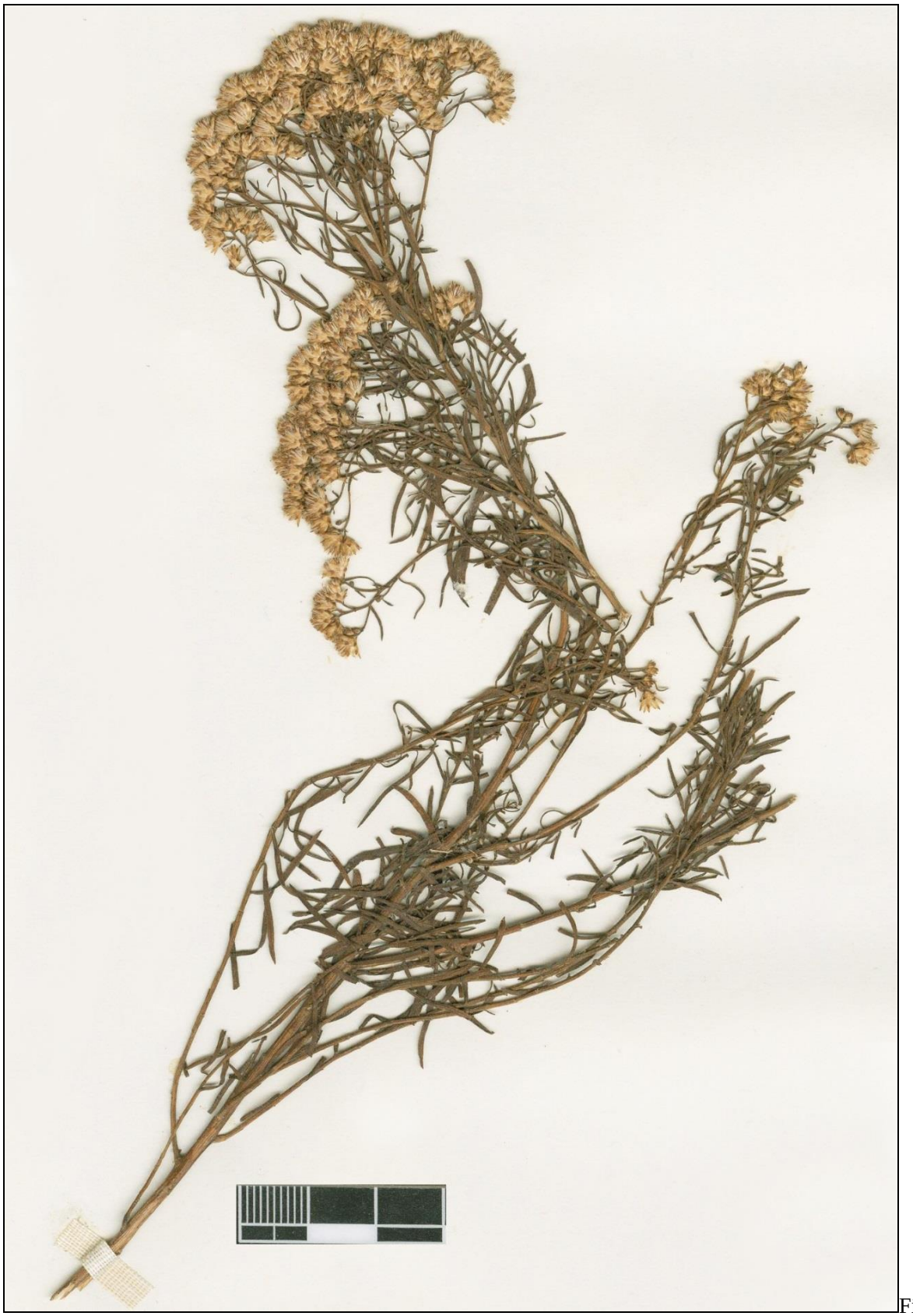


Figure 36. *Euthamia caroliniana*. Lectotype (PH) of *Solidago tenuifolia* Pursh (closer view of Fig. 34).

Figure 37. *Euthamia caroliniana*. Lectotype (PH) of *Solidago tenuifolia* Pursh, details.

Figure 38. *Euthamia caroliniana*, representative morphology. Harnett Co., North Carolina, *Williams 142* (CAU).

Figure 39. *Euthamia caroliniana*, representative morphology. Duplin Co., North Carolina, *Ahles 35696* (NCU).

Figure 40. *Euthamia caroliniana*, representative morphology. Richmond Co., North Carolina, *Radford 19342* (NCU).

Figure 41. *Euthamia caroliniana*, representative morphology. New Hanover Co., North Carolina, *Sieren 1461* (VSC).

Figure 42. *Euthamia caroliniana*, representative morphology. Pender Co., North Carolina, *Weakley 2012* (NCSC).

Figure 43. *Euthamia caroliniana*, representative morphology. Montgomery Co., North Carolina, *Matthews & Levins s.n.* (UNCC).

Figure 44. *Euthamia caroliniana*, representative morphology. Person Co., North Carolina, *Volovsek 2* (DUKE).

Figure 45. *Euthamia caroliniana*, representative morphology. Durham Co., North Carolina, *Palmer 1033* (DUKE).

Figure 46. *Euthamia remota*. Lectotype, *Umbach s.n.* (US), from Lake Co., Indiana.

Figure 47. *Euthamia remota*. Marquette Co., Wisconsin. *Schuett & Roe 101* (WIS).

Figure 48. *Euthamia remota*. Marquette Co., Wisconsin. *Cochrane 15270* (WIS).

Figure 49. *Euthamia remota*. Marquette Co., Wisconsin. *Cochrane & Iltis 12497* (WIS).

Figure 50. *Euthamia remota*. Marquette Co., Wisconsin. *Cochrane 15286* (WIS).

Figure 51. *Euthamia gymnospermoides*. Marquette Co., Wisconsin. *Rodriguez 3015* (WIS). Contrast *E. remota*.

Figure 52. *Euthamia gymnospermoides*. Isotype (US) from Creek Co., Oklahoma.

Figure 53. *Euthamia gymnospermoides*. Details from US isotype.

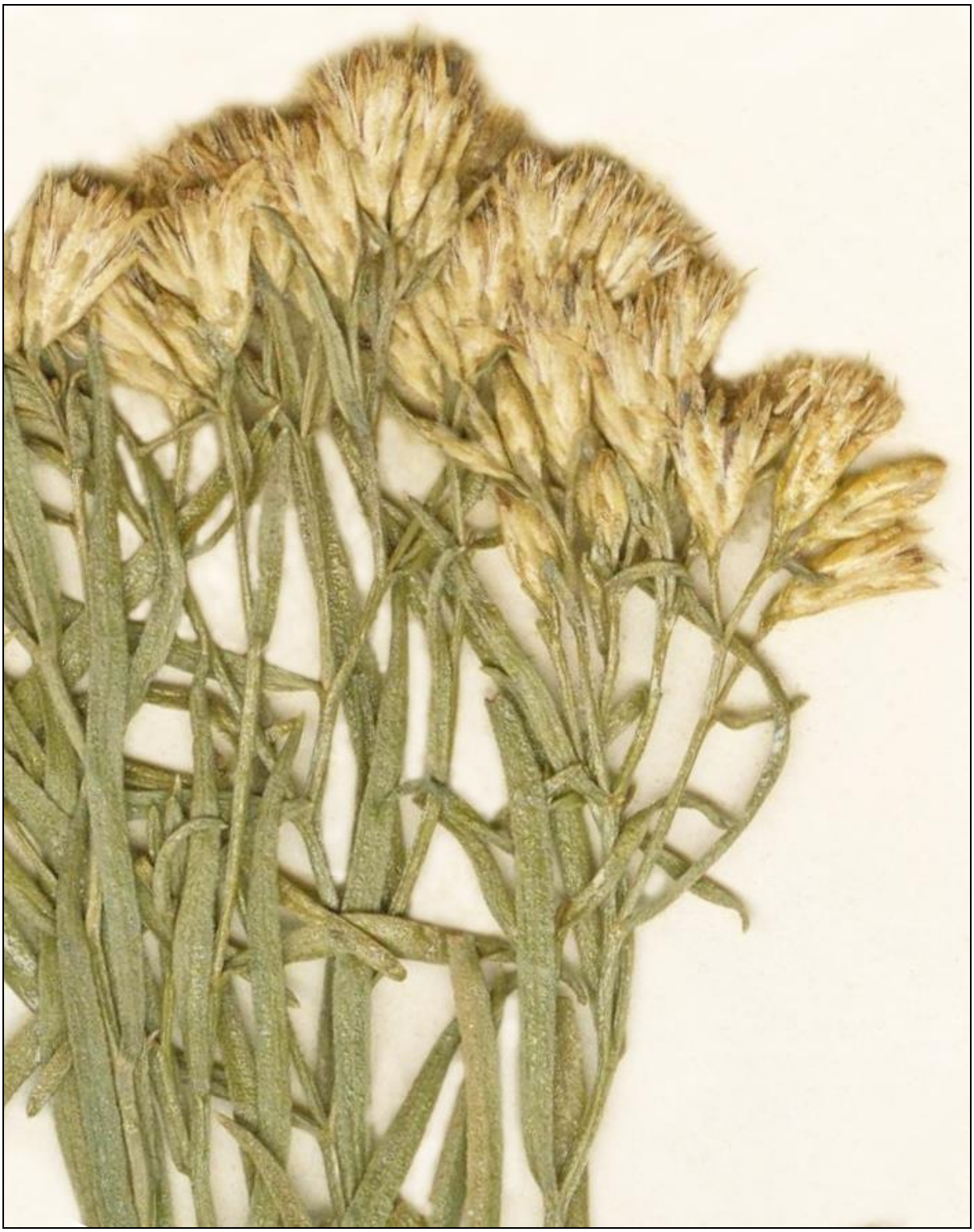


Figure 54. *Euthamia gymnospermoides*. Details from NY isotype.

Figure 55. *Euthamia gymnospermoides*. Holotype of *Euthamia chrysothamnoides* (US) from Nevada Co., Arkansas.

Figure 56. *Euthamia gymnospermoides*. Newton Co., Indiana. *Deam 49676* (IND).

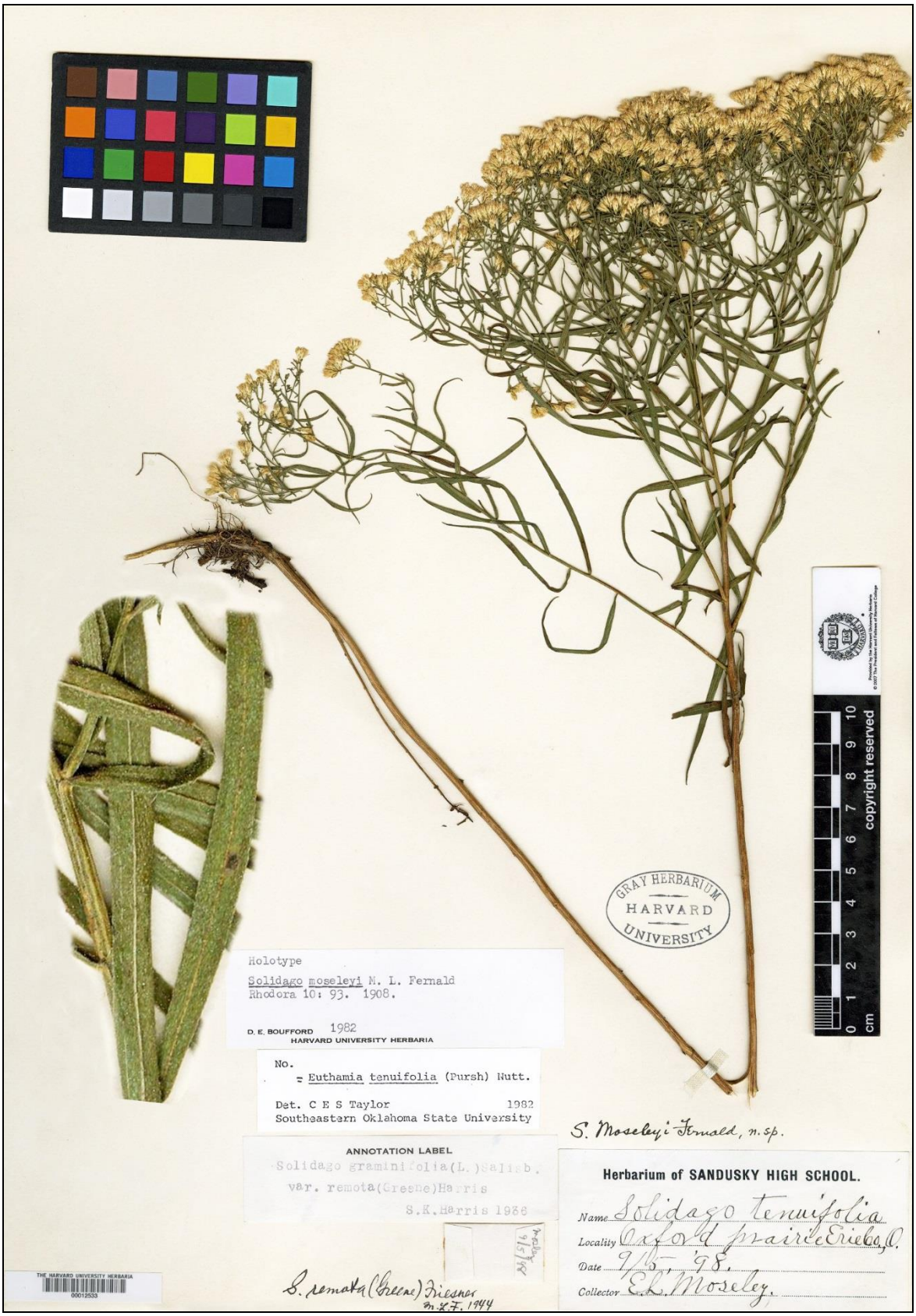


Figure 57. *Euthamia gymnospermoides*. Holotype of *Solidago moseleyi* (GH).

Figure 58. *Euthamia gymnospermoides*. Details from holotype of *Solidago moseleyi*.

Figure 59. *Euthamia gymnospermoides*. Holotype of *Euthamia camporum* (NDG) from Logan Co., Colorado.

Figure 60. *Euthamia gymnospermoides*. Details from NDG holotype of *Euthamia camporum*.

Figure 61. *Euthamia gymnospermoides*. Holotype (NDG) of *Euthamia media* from Henderson Co., Illinois.

Figure 62. *Euthamia gymnospermoides*. Details from NDG holotype of *Euthamia media*.

Figure 63. *Euthamia gymnospermoides*. DuPage Co., Illinois. *Henry 163* (PH).

Figure 64. *Euthamia gymnospermoides*. Cass Co., Indiana. *Deam 32629* (IND).

Figure 65. *Euthamia gymnospermoides*. Forest Co., Wisconsin. *Elder s.n.* (US).

Figure 66. *Euthamia pulverulenta*. Holotype (US) from Harris Co., Texas.

Figure 67. *Euthamia pulverulenta*. Details from US holotype.

Figure 68. *Euthamia pulverulenta*. Details from US holotype (below) and GH isotype (above).

Figure 69. *Euthamia pulverulenta*. Calcasieu Par., Louisiana. *Gilmore 3457* (LSU).

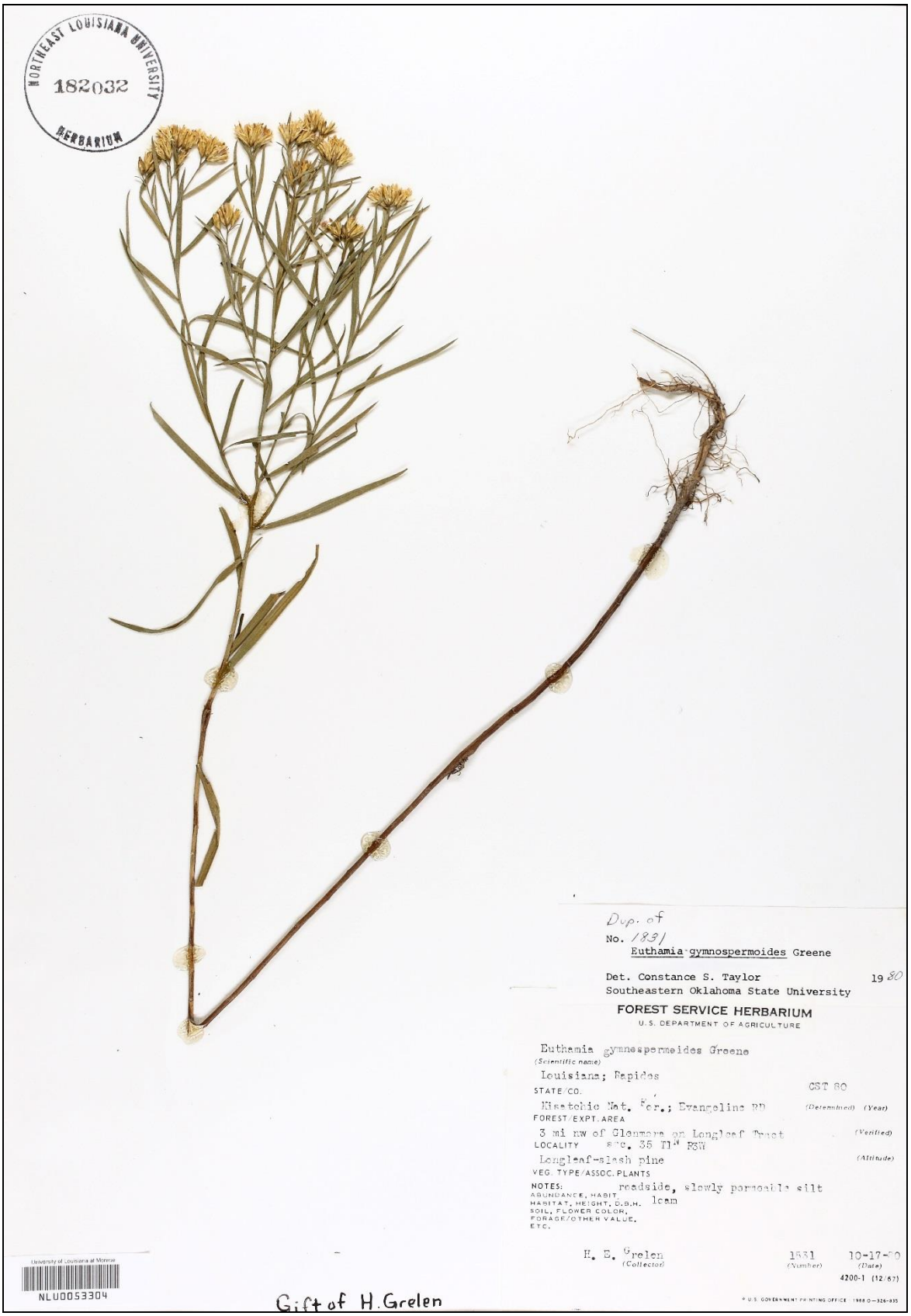


Figure 70. *Euthamia pulverulenta*. Rapides Par., Louisiana. *Grelen 1831* (LSU).

Figure 71. *Euthamia pulverulenta*. Cameron Par., Louisiana. *Leggio 21* (LSU).

Figure 72. *Euthamia pulverulenta*. Jefferson Davis Par., Louisiana. *Urbatsch 6073* (LSU).

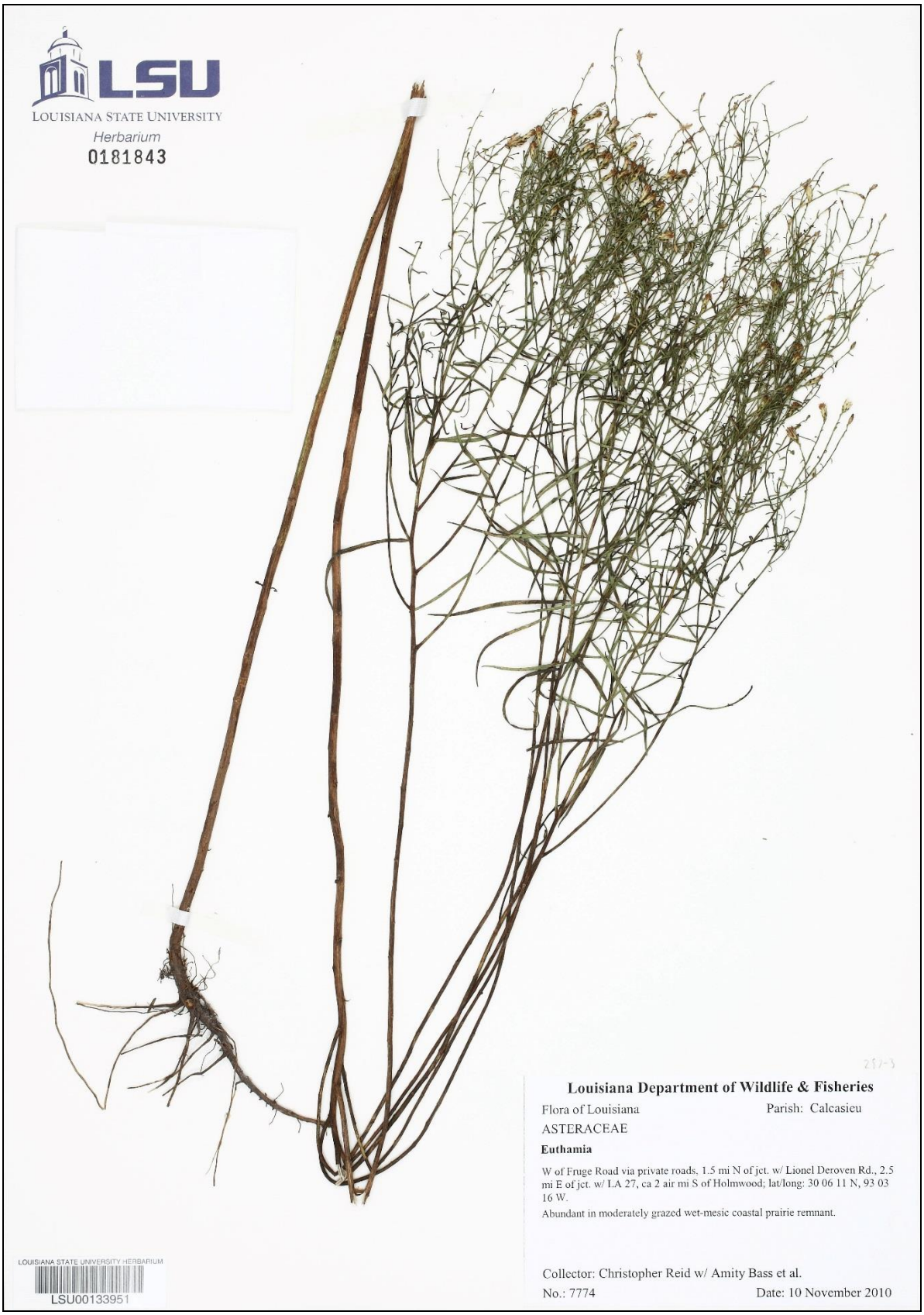


Figure 73. *Euthamia pulverulenta*. Calcasieu Par., Louisiana. *Reid 7774* (LSU).

Figure 74. *Euthamia pulverulenta*. Calcasieu Par., Louisiana. *Thomas 98160* (NLU).

Figure 75. *Euthamia pulverulenta*. Calcasieu Par., Louisiana. *Cormier 1258* (NLU).

Figure 76. *Euthamia scabra*. Holotype (NDG), from Biloxi in Harrison Co., Mississippi. Peduncles and pedicels, stems, and leaves (both sides) are hirtellous to hirsutulous.

Figure 77. *Euthamia scabra*. Detail from holotype (NDG).

Figure 78. *Euthamia scabra*. Detail from holotype (NDG). Stems and leaf surfaces and margins hirsutulous to hirtellous or scabrous.

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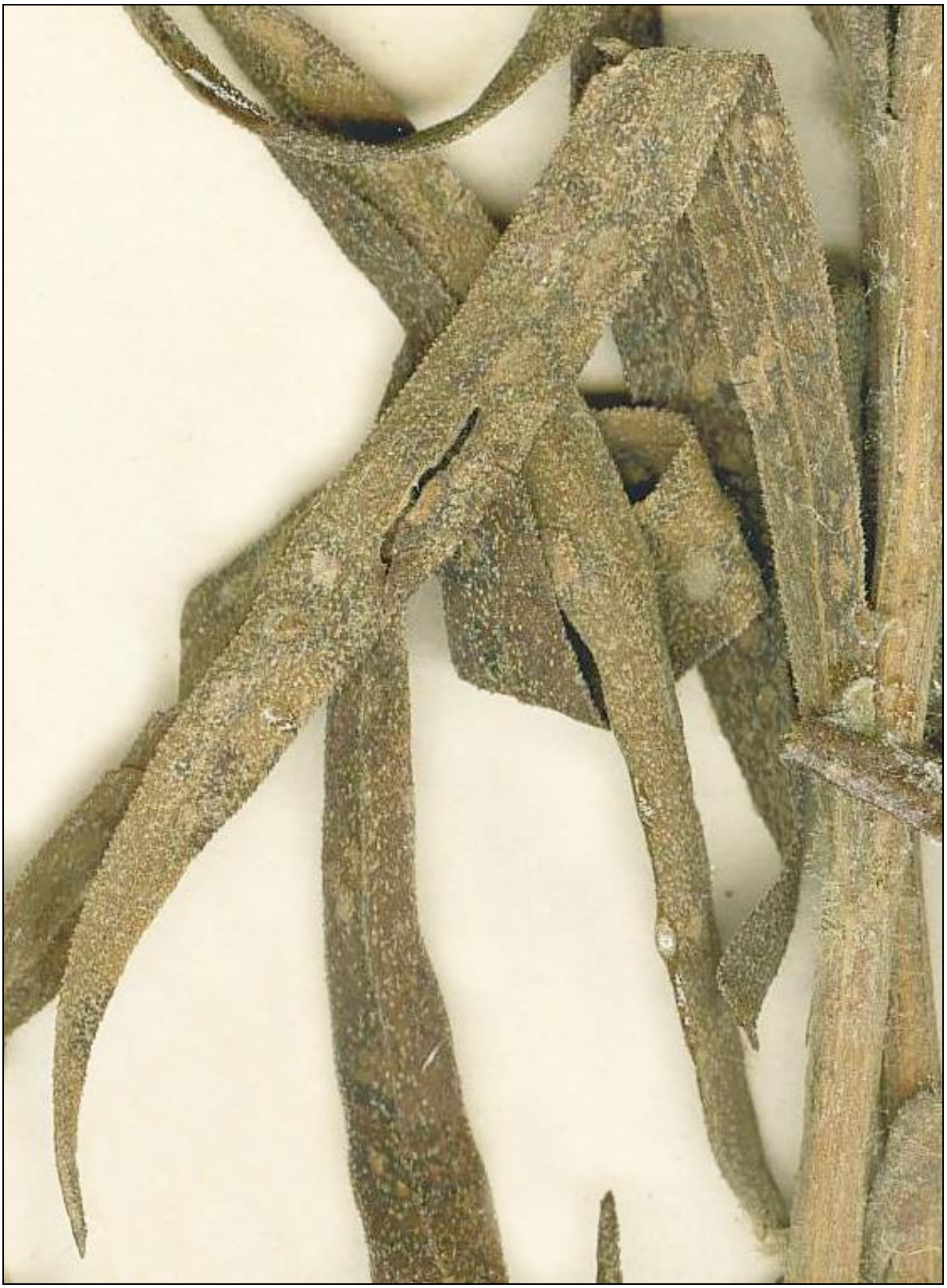

Figure 79. *Euthamia scabra*. Detail from holotype (NDG). Stems and leaf surfaces and margins hirsutulous to hirtellous or scabrous.

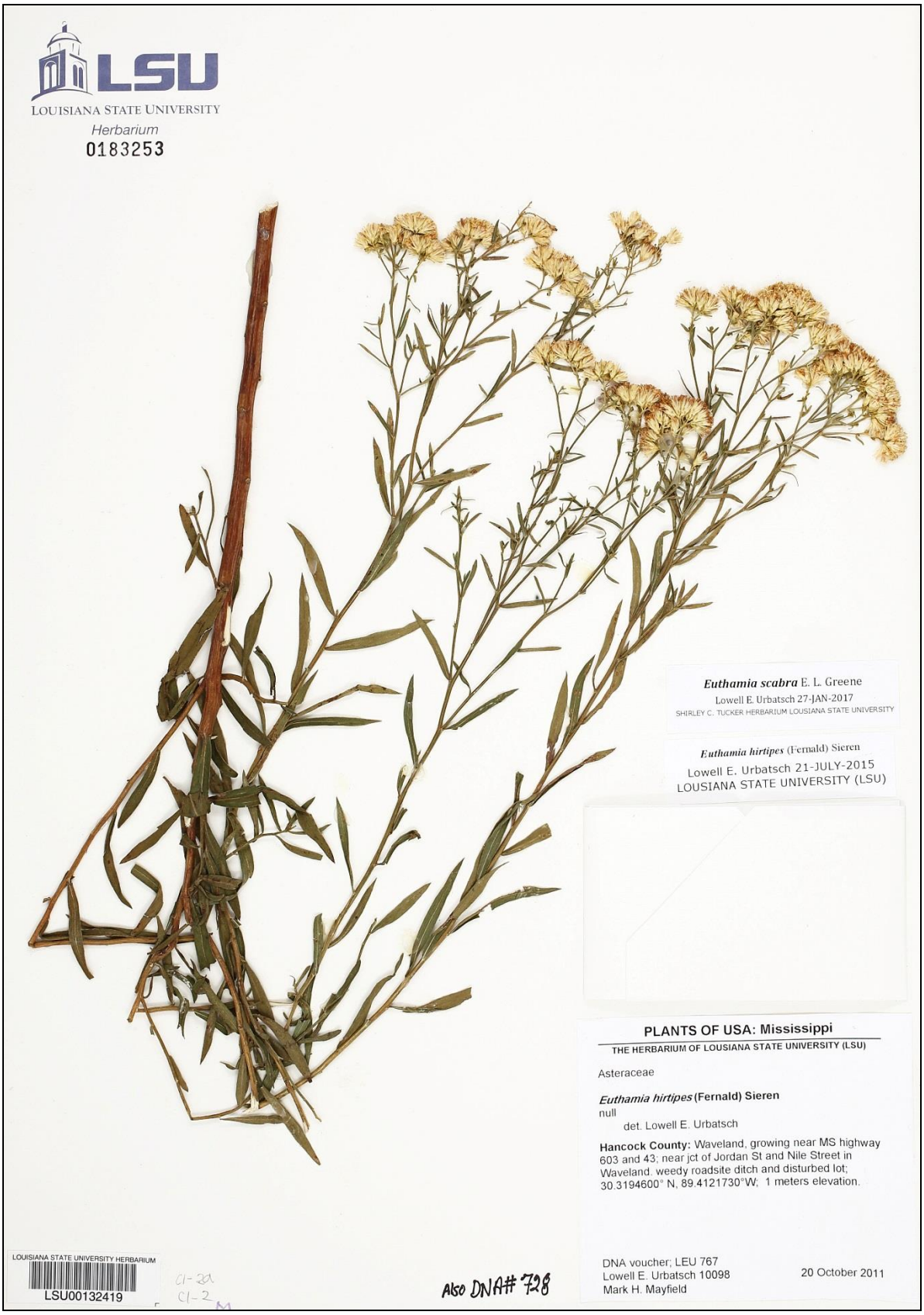

Figure 80. *Euthamia scabra*. Hancock Co., Mississippi. *Urbatsch 10098* (LSU).

Figure 81. *Euthamia scabra*. Jackson Co., Mississippi. *Gunn-Zumo & Ferguson DB-464* (LSU).

Figure 82. *Euthamia scabra*. Santa Rosa Co., Florida. *Chapman 152* (FLAS).

Figure 83. *Euthamia scabra*. Franklin Co., Florida. *Godfrey 74580* (USMS).

Figure 84. *Euthamia scabra*. Bay Co., Florida. *Urbatsch 11277* (LSU).

Figure 85. *Euthamia scabra*. Bay Co., Florida. *Urbatsch 11278* (LSU).

Figure 86. *Euthamia scabra*. Bay Co., Florida. *Urbatsch 11278*, duplicate (LSU).

Figure 87. *Euthamia scabra*. St. Tammany Par., Louisiana. *Urbatsch 11287-8* (LSU).

Figure 88. *Euthamia scabra*. St. Tammany Par., Louisiana. *Urbatsch 11287-21* (LSU).

Figure 89. *Euthamia scabra*. St. Tammany Par., Louisiana. *Urbatsch 11287-5* (LSU).

Figure 90. *Euthamia scabra*. St. Tammany Par., Louisiana. *Urbatsch 11287-14* (LSU).

Figure 91. *Euthamia scabra*. St. Tammany Par., Louisiana. *Urbatsch 11287-2* (LSU).

Figure 92. *Euthamia leptocephala*—sessile to subsessile heads. Monroe Co., Alabama. *Barger et al. RH-415* (JSU).

Figure 93. *Euthamia leptocephala*—sessile to subsessile heads. Poinsett Co., Arkansas. *Nunn 9194 (UARK*).

Figure 94. *Euthamia leptocephala*—pedicellate heads. Faulkner Co., Arkansas. *Culwell 4648.5 (UCA*).

Figure 95. *Euthamia leptocephala*—pedicellate heads. Bienville Par., Louisiana. *Urbatsch 10401* (LSU).

Figure 96. *Euthamia leptocephala*—pedicellate heads. Polk Co., Arkansas. *McWilliam 631 (UARK*). See comments in text about the narrowly elongate involucre base in this collection.

Figure 97. *Euthamia oklahomensis*. Choctaw Co., Oklahoma. *Taylor 23216* (BRIT).

Figure 98. *Euthamia oklahomensis*. Pushmataha Co., Oklahoma. *Taylor 20449* (BRIT).

Figure 99. *Euthamia oklahomensis*. Pushmataha Co., Oklahoma. *Taylor 20449* (NY).

Figure 100. *Euthamia oklahomensis*. Pushmataha Co., Oklahoma. *Taylor 23370* (BRIT).

Figure 101. *Euthamia oklahomensis*. Latimer Co., Oklahoma. *Waterfall 10541* (BRIT).

Figure 102. *Euthamia oklahomensis*. Latimer Co., Oklahoma. *Fishbein 6822* (BRIT).

Figure 103. *Euthamia oklahomensis*. Portion of inflorescence, sessile to subsessile heads.

Figure 104. *Euthamia oklahomensis*. Portion of inflorescence, sessile to subsessile heads.

Figure 105. *Euthamia oklahomensis*. Leaf vestiture.

Figure 106. *Euthamia oklahomensis*. Stem and leaf vestiture. Bottom: adaxial side of leaf with glandular-punctae and hirsutulous midvein. Upper left: abaxial leaf surfaces without glandular-punctae.

Figure 107. *Euthamia weakleyi*. Barnstable Co., Massachusetts. *Fernald & Weatherby 17488* (NEBC).

Figure 108. *Euthamia weakleyi*. Barnstable Co., Massachusetts. *Goldman 3870* (GH).

Figure 109. *Euthamia weakleyi*. Cumberland Co., New Jersey. *Laport s.n.* (CHRB).

Figure 110. *Euthamia weakleyi*. Ocean Co., New Jersey. *Morton 5148* (NY).

Figure 111. *Euthamia weakleyi*. Cape May Co., New Jersey. *Montgomery s.n.* (CHRB).

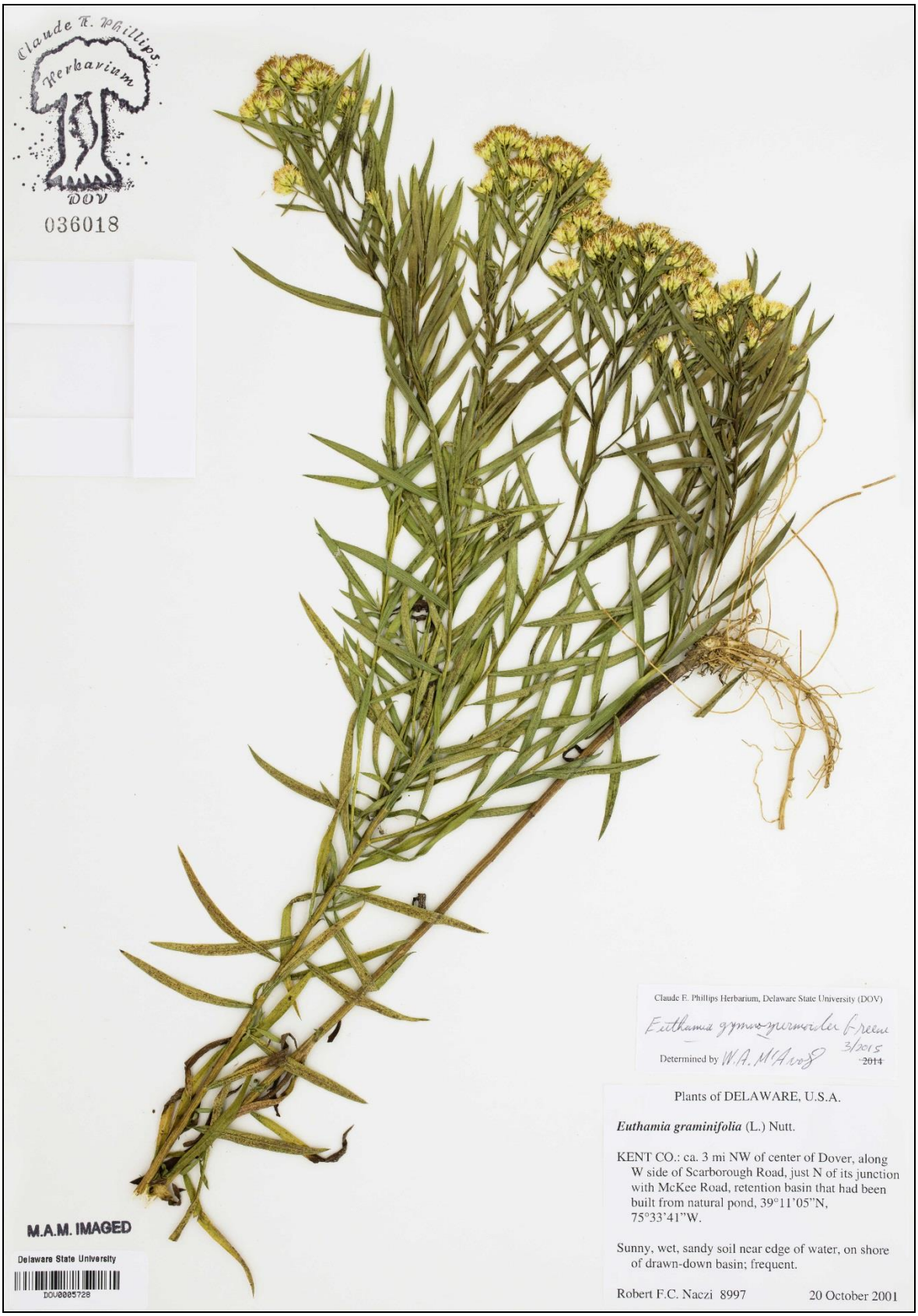

Figure 112. *Euthamia weakleyi*. Kent Co., Delaware. *Naczi 8997* (DOV).

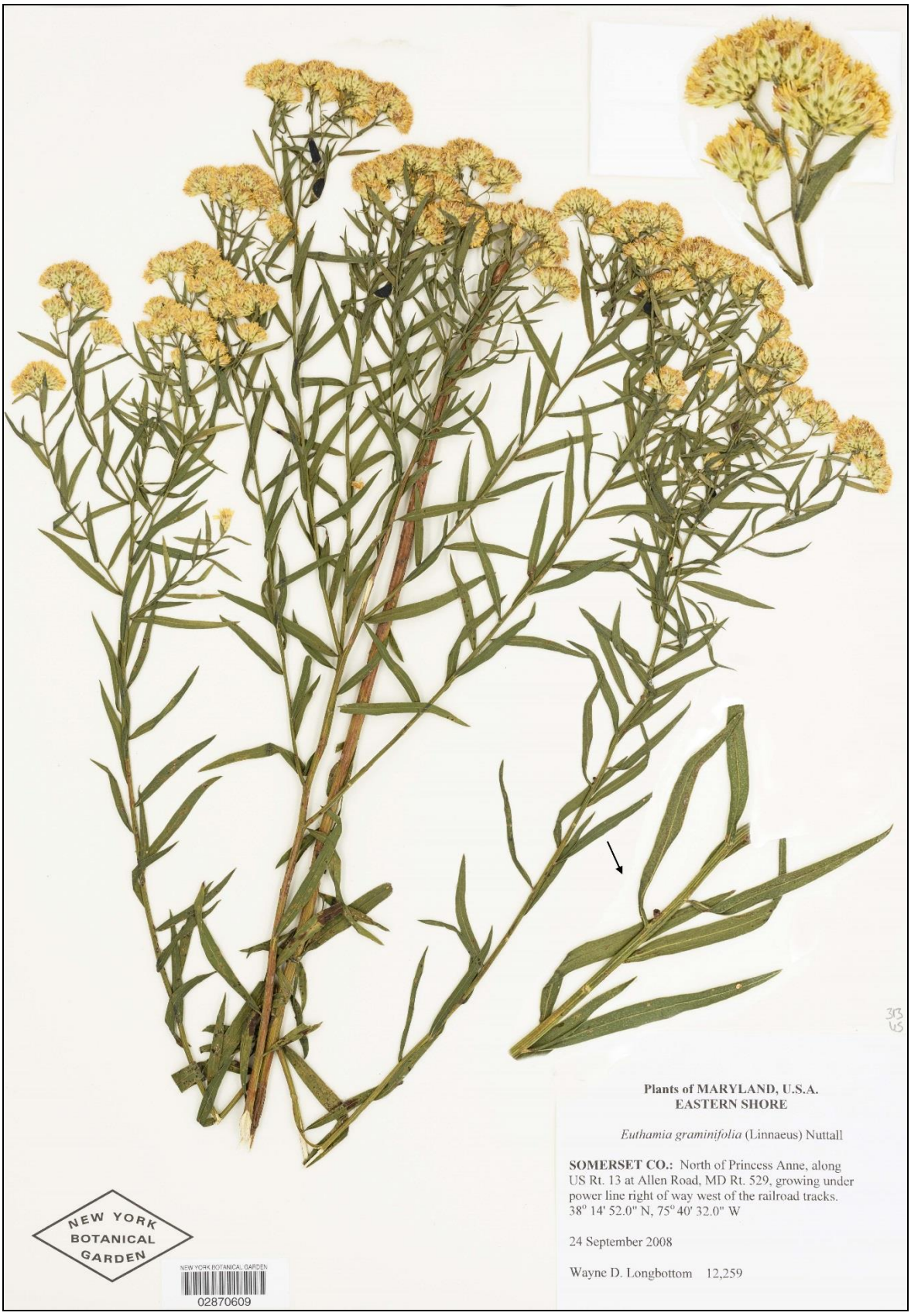

Figure 113. *Euthamia weakleyi*. Somerset Co., Maryland. *Longbottom12259* (NY).

Figure 114. *Euthamia weakleyi*. Dare Co., North Carolina. *Godfrey & Fox 51038* (NCSC).

Figure 115. *Euthamia weakleyi*. New Hanover Co., North Carolina. *Sieren 1894* (VSC).

Figure 116. *Euthamia weakleyi*. Dorchester Co., South Carolina. *Nelson 33807* (US).

Figure 117. *Euthamia weakleyi*. Baker Co., Georgia. *Godfrey 82242* (FLAS).

Figure 118. *Euthamia weakleyi*. McIntosh Co., Georgia. *Duncan20668* (US).

Figure 119. *Euthamia weakleyi*. Brevard Co., Florida. *Abbott 22314* (FLAS).

Figure 120. *Euthamia weakleyi*. Hillsborough Co., Florida. *Myers 589* (USF).

Figure 121. *Euthamia weakleyi*. Lee Co., Florida. *Woodmansee 1971* (USF).

Figure 122. *Euthamia weakleyi*. Polk Co., Florida. *Wheeler s.n.* (FLAS).

Figure 123. *Euthamia weakleyi*. Levy Co., Florida. *Lange 183* (FLAS).

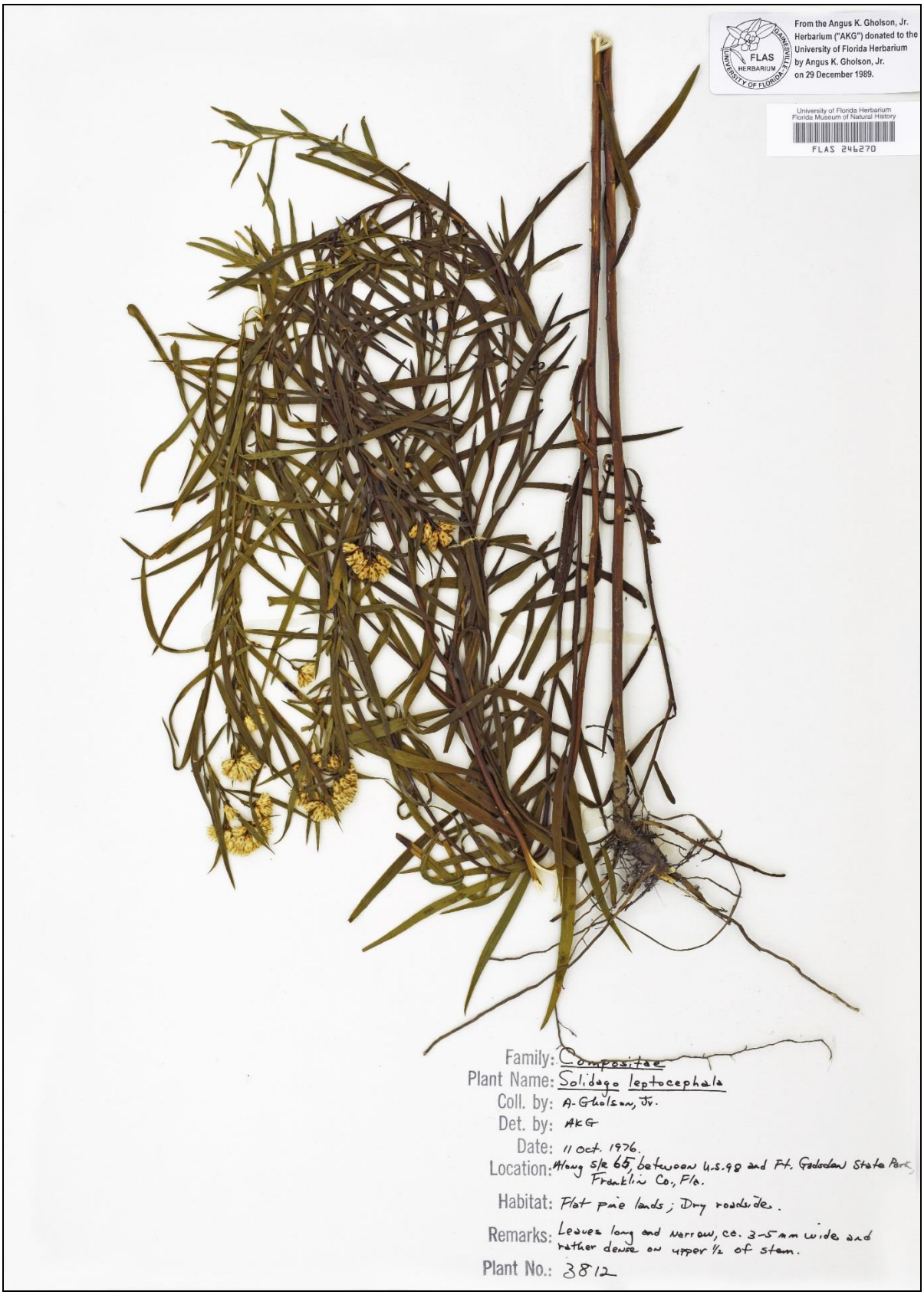

Figure 124. *Euthamia weakleyi*. Franklin Co., Florida. *Gholson 3812* (FLAS).

Figure 125. *Euthamia weakleyi*. Wakulla Co., Florida. *Gholson 649* (FLAS).

Figure 126. *Euthamia weakleyi*. Clarke Co., Mississippi. *Schuchert s.n.* (CHRB).

Figure 127. *Euthamia weakleyi*. Jones Co., Mississippi. *Morgan 1433* (NO).

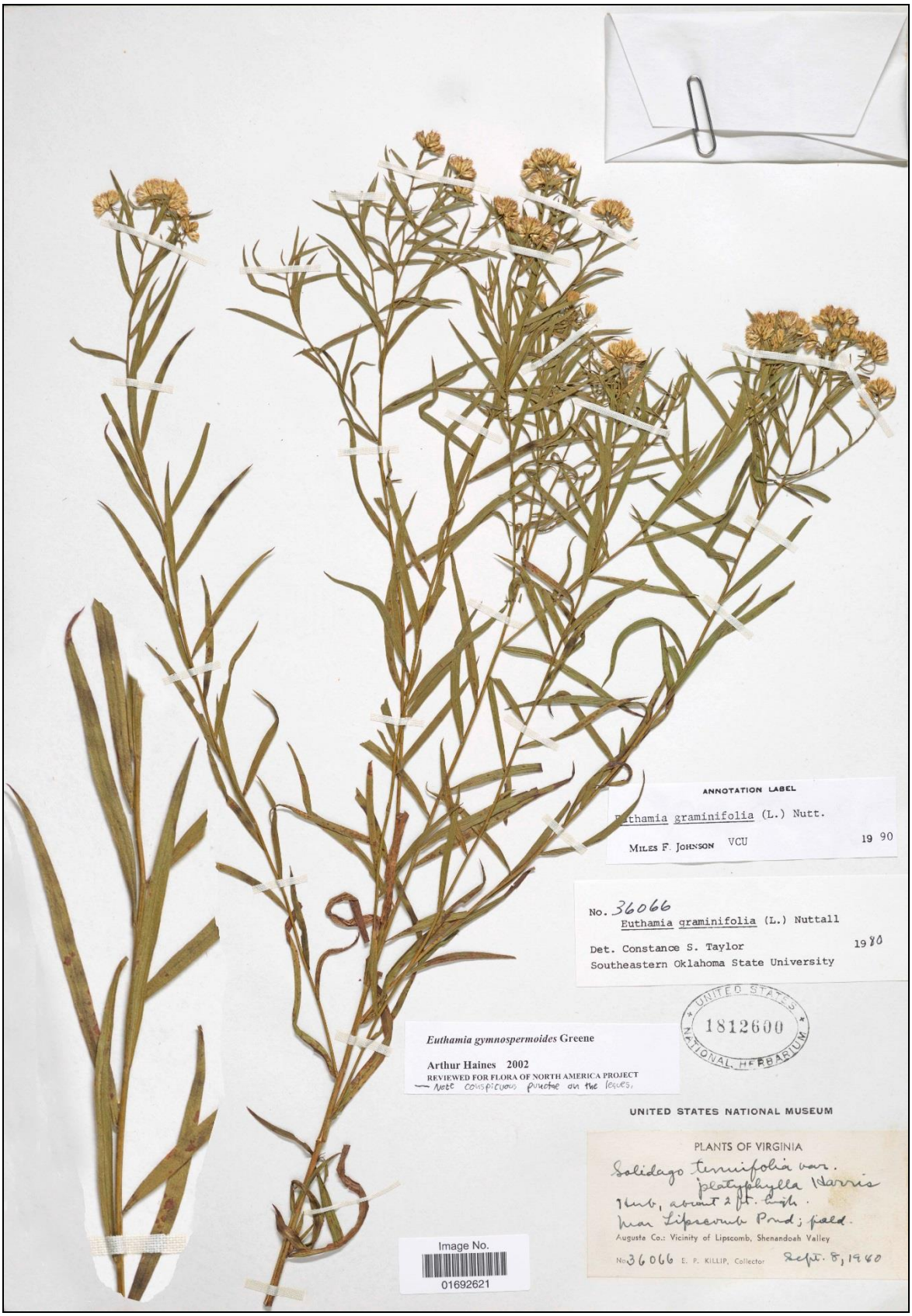

Figure 128. *Euthamia weakleyi*. Augusta Co., Virginia. *Killips 36066* (US).

Figure 129. *Euthamia weakleyi*. Augusta Co., Virginia. *Killips 36066* (GH).

Figure 130. *Euthamia weakleyi*. Augusta Co., Virginia. *Stevens 13343* (VPI).

Figure 131. *Euthamia weakleyi*. Augusta Co., Virginia. *Wieboldt 3559* (VPI).

Figure 132. *Euthamia weakleyi*. Augusta Co., Virginia. *Killips 36142* (US).

Figure 133. *Euthamia weakleyi*. Augusta Co., Virginia. *Killips 36142* (US), detail of Figure 132.