Solidago cumberlandensis (Asteraceae), a New Species from the Cumberland Plateau of Tennessee

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Abstract. A new species, *Solidago cumberlandensis* Dattilo (Asteraceae), is described based on morphological traits and molecular data. This species has a novel combination of diagnostic characters for *Solidago* L. ser. *Erectae* (G. Don) Hoffman, where it is provisionally placed, most prominently including an extensive network of stoloniferous rhizomes producing colonies of sterile rosettes that significantly outnumber inflorescence-bearing stems during the flowering season. It is also distinctive for the DNA sequence of the nuclear ribosomal ITS region, differing from all other reported *Solidago* species. *Solidago cumberlandensis* has been documented from full-shade to part-sun situations within forested, narrow, flat to gently sloping riparian zones of high-gradient streams flowing through gorges of the Cumberland Plateau of Tennessee.

Key words: Asteraceae, endangered species, endemic, *Solidago*, *Solidago* ser. *Erectae*, Tennessee.

Solidago L. ser. *Erectae* (G. Don) Hoffman (Asteraceae), as circumscribed by Semple and Beck (2021), contains multiple recently described and narrowly endemic species. Of the nine taxa of *Solidago* ser. *Erectae* occurring in the southeastern United States (Weakley & Southeastern Flora Team, 2025), which includes *S. arenicola* B. R. Keener & Kral, *S. austrocaroliniana* Semple & J. B. Nelson, *S. ayuhwasi* M. Brock & D. Estes, *S. erecta* Banks ex Pursh, *S. kralii* Semple, *S. plumosa* Small, *S. racemosa* Greene, *S. rigidiuscula* (Torr. & A. Gray) Porter, and *S. speciosa* Nutt., four have been described since 2003 (Keener & Kral, 2003; Semple, 2003; Semple & Nelson, 2018; Brock & Estes, 2023). Six of these taxa possess conservation status ranks indicating at least a moderate risk of extinction due to a narrow geographic range, small population size, or other factors (NatureServe, 2025). Four of these taxa are strictly associated with dynamic riverscour habitats and adjacent riparian zones (Estes et al., 2023). While *S. plumosa* and the more recently described *S. ayuhwasi* are restricted to the Yadkin River (North Carolina) and Hiwassee River (Tennessee), respectively, *S. arenicola* and *S. racemosa* are more wide-ranging, but rare, riverscour species. Where their ranges overlap in the southeastern United States, there has been confusion as to whether individual collections of riverscour goldenrods should be placed in *S. arenicola* or *S. racemosa* based on observed morphological differences (Floden, 2012; Semple et al., 2019).

Amongst this backdrop of uncertainty, Dr. Larry Pounds collected a goldenrod in 2010 in the "shade" of the "sandy bottom" of Whites Creek in Roane County, Tennessee (*Pounds s.n.*, TENN). The cylindrical inflorescence, petiolate cauline leaves, and preference for dynamic riparian habitat suggested this *Solidago* might be a riverscour species currently placed within series *Erectae*. While the specimen was determined to be *S. arenicola* at the time, Pounds noted on the specimen label that "flowering stalks" arise "from rhizomes separately from the rosettes." This detail was relevant to Pounds because the *Solidago* from Whites Creek appeared similar to the relatively recently described *S. arenicola* (Keener & Kral, 2003), although the description of that taxon makes no mention of colony-forming sterile rosettes arising from creeping stoloniferous rhi-

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zomes. Pounds discussed the inconsistencies of the Whites Creek *Solidago* with several of the authors and others in the Tennessee botanical community around the time of collection, but with no other described *Solidago* species providing a better fit, the determination stood.

On 4 September 2024, while conducting population monitoring for another plant species, Adam Dattilo and other botanists with the Tennessee Division of Natural Areas collected a *Solidago* with a cylindrical inflorescence and a profusion of sterile basal rosettes growing in the sandy soils of the forested floodplain of Clifty Creek State Natural Area along the Roane-Morgan county line. Subsequent communication with Dr. Pounds revealed that the Clifty Creek individuals were most likely the same taxon found on Whites Creek. Additionally, Pounds noted a third location on nearby Soak Creek. These three streams are all high-gradient tributaries to the Tennessee River system that drain the eastern portion of the Cumberland Plateau. We collected new voucher specimens from Whites Creek and Soak Creek in October 2024 to further assess the taxonomy and geographical distribution of the unusual plants.

Materials and Methods

Field studies were conducted in 2024 and 2025 to collect voucher specimens, images, and site characteristics of the unknown *Solidago* taxon at the three known sites. Herbarium studies were also conducted during this same time period at MO and TENN to compare the unknown taxon to other *Solidago* species. Thirteen specimens (one holotype, six isotypes, and six paratypes) were used for the morphological measurements utilized in the species description. Detailed microscopic imagery utilized a Leica M165C microscope and Leica MC190 HD camera (Leica Microsystems, Wetzlar, Germany).

A database was assembled of nuclear ribosomal ITS sequences from each of the *Solidago* species that occur in Tennessee, with the exception of *S. tarda* Mack. ex Small, for which material was not available, as well as all available *Solidago* ser. *Erectae* species that were analyzed by Semple et al. (2023). Although this locus has shown limited variability among *Solidago* species and is not useful for determining phylogenetic relationships or infrageneric placement in the genus (Schilling et al., 2008; Laureto & Barkman, 2011), it has been shown to serve as a molecular barcode in other Asteraceae genera (Schilling et al., 2007; Schilling & Floden, 2018) and can help to assess whether an entity is genetically distinct. New ITS sequences were generated for 14 species, including the unknown *Solidago*, by Sanger sequencing (Appendix 1). DNA was extracted from leaf samples either freshly collected or taken from herbarium specimens using the DNeasy Plant Mini Kit protocol (QIAGEN, Valencia, California, U.S.A.). Polymerase chain reaction (PCR) amplifications and sequencing of the ITS region followed Schilling et al. (2007) and utilized primers ITS-4 and ITS-5 (White et al., 1990). For 10 species, nucleotide reads were downloaded from Sequence Read Archive (SRA) data at GenBank (Appendix 1) and ITS sequences were obtained by assembling the reads to the ITS region of *Solidago curtisii* Torr. & A. Gray (DNA 5129) using the Map to Reference assembly algorithm in Geneious Version 9.1.7 (Biomatters, Auckland, New Zealand), set to medium-low sensitivity and iterated five times with an ambiguity threshold of 60%.

Taxonomic Treatment

Solidago cumberlandensis Dattilo, sp. nov. TYPE: U.S.A. Tennessee: Roane Co., in sandy alluvial soils of first terrace floodplain growing in full shade of closed canopy forest, creeping stoloniferous rhizomes produce colonies of sterile basal leaves, growing with evergreen trees *Tsuga canadensis* and *Pinus strobus* and the shrubs *Rhododendron maximum*, *Kalmia latifolia*, and *Leucothoe fontanesiana*, 35.80°N, 84.77°W, 25 Aug. 2025 (early fl.), *A. Dattilo, E. E. Schilling & S. Scarborough 2025-03* (holotype, TENN-V-0257169!; isotypes, APSC!, MO!, NCU!, UCHT!, WICH!, WLU!). Figures 1, 2.

Diagnosis. *Solidago cumberlandensis* Dattilo differs from *S. arenicola* B. R. Keener & Kral, *S. ayuhwasi* M. Brock & D. Estes, and *S. erecta* Banks ex Pursh in its narrower inflorescence and long stoloniferous rhizomes that produce colonies of larger, oval to ovate, sterile basal leaves. It additionally differs from *S. arenicola* in its shorter involucre and wider mid-cauline leaves; from *S. ayuhwasi* in its longer involucre, wider mid-cauline leaves, and less congested inflorescence; and from *S. erecta* in its wider, petiolate mid-cauline leaves.

Perennial, 50–100(–150) cm, clonal from creeping stoloniferous rhizomes to 4 mm diam., rhizomes long-branching, regularly extending 10–20 cm between basal rosettes. Sterile basal rosette leaves longer than cauline leaves, total length 12–24 × 2.5–6 cm, petiole to (4.5–) 6–10(–12) cm, lamina length (5.5–)7–14 cm, often forming dense patches. Stems single, erect, glabrous to glabrate proximally, glabrous to sparsely pubescent distally from midstem to just below the inflorescence. Basal and lower cauline leaves present at flowering, alternate, ovate, total length and width to 10–20 × 2.5–5 cm, gradually tapering to a 3–5(–8) cm petiole, not sheathing, lamina length 6–13 cm, blade glabrous to strigose with minute stiff hairs adaxially and glabrous to glabrate abaxially, apex acute to acuminate, margins serrate and



Figure 1. Holotype of *Solidago cumberlandensis* Dattilo (*Dattilo, Schilling & Scarborough 2025-03*; TENN-V-0257169).



Figure 2. Images depicting the general appearance and distinguishing characteristics of *Solidago cumberlandensis* Dattilo. —A. Inflorescence. —B. Habit. —C. Basal leaf with flowering stem. —D. Clonal patch. —E. Stolon in situ. —F. Sterile basal rosette. —G. Inflorescence branch. —H. Lower cauline leaf margin. —I. Achenes.

scabrous with short antrorse incurved hairs; mid-stem leaves with total length and width (6.5–)8–12 × 2–4 cm, distinct petiole (0.5–)1–2(–3) cm, lamina length (6–)8–11(–12.5), leaves gradually reduced, becoming lanceolate to oblanceolate and serrulate to entire distally. Inflorescence a cylindrical paniculate raceme, 15–50 × 2–5 cm, branch length at mid-inflorescence averaging 2(–3+) cm with shorter to nearly sessile branches at the proximal and distal ends of the inflorescence; central arrays of inflorescence average 2 to 3(to 8) heads; subtending leafy bracts longer than most proximal inflorescence branches, axis pubescence dense with short, spreading hairs. Involucres 4–6 mm high, phyllaries strongly unequal in 3 to 4 series, median 3–3.5 × 0.75–1 mm, (1 to)3(to 5) veins, ciliate distally, sparsely and minutely glandular. Ray flowers 7 to 11 per head,

4.5–5.5 × 1–1.5 mm. Disk flowers (7 to)9 to 12(to 15) per head, 3.5–4.5 mm. Achenes glabrous, 2.5–2.75 mm.

Phenology. Early individuals of *Solidago cumberlandensis* begin to flower around mid-August, with peak flowering occurring during September and flowers persisting on some individuals until mid-October. Some mature achenes were present in collections from early October, but most fertilized flowers likely mature later in October. In a common garden in Knoxville, Tennessee, flowering time of *S. cumberlandensis* is similar to *S. arenicola*, *S. ayuhwasi*, and *S. erecta*.

Distribution and habitat. *Solidago cumberlandensis* has been documented from three localities along the eastern portion of the Plateau Escarpment Level IV ecoregions (Griffith et al., 1998) extending from near Harriman, Tennessee, southwest to the vicinity of Spring City, Tennessee (Fig. 3). The species occurs within the narrow, flat to gently sloping riparian zones of Clifty Creek, Whites Creek, and Soak Creek where these high-gradient streams flow from the Cumberland Plateau through gorges of the Cumberland Plateau Escarpment to the Tennessee River in the Ridge and Valley ecoregion. Within these riparian forests, *S. cumberlandensis* occurs in three primary situations: (1) first terraces, (2) shaded cobble bars, and (3) seasonally dewatered side channels that are connected to the main channel during higher flow events. Across all habitats, *S. cumberlandensis* occurs in sandy, well-drained soils, with deeper and less rocky soils occurring on the terraces. All sites are inundated in higher flow events, but do not possess wetland characteristics.

Though situated in riparian zones that are subject to regular flooding, the core habitat for *Solidago cumberlandensis* is markedly distinct from the riverscour species *S. arenicola*, *S. ayuhwasi*, *S. plumosa*, and *S. racemosa*. Robust flowering plants of those species typically occur in partial- to full-sun situations along rock outcrops or cobble bars. In contrast, *S. cumberlandensis* occupies mature second-growth deciduous and mixed evergreen deciduous forest with near 100% canopy cover, similar to the habitat of *S. faucibus* Wieboldt. Extensive colonies of *S. cumberlandensis* grow and flower in full shade to part sun; plants were not observed in high-light environments of nearby riverscour on Whites Creek. There is no open riverscour of significant size near the *S. cumberlandensis* Clifty Creek or Soak Creek populations; all plants are situated in full-shade to partial-sun environments. Characteristic species of the riparian forest habitats supporting *S. cumberlandensis* include the evergreen trees *Tsuga canadensis* (L.) Carrière and *Pinus strobus* L., along with deciduous overstory species *Liriodendron tulipifera* L., *Magnolia acuminata* (L.) L., *M. tripetala* L., *Betula nigra* L., *Quercus rubra* L., *Acer rubrum* L., and *Fagus grandifolia* Ehrh. The Ericaceous shrubs *Rhododendron maximum* L., *Kalmia latifolia* L., and *Leucothoe fontanesiana* (Steud.) Sleumer are common components of the shrub layer, and deciduous shrubs including *Hamamelis virginiana* L. and *Xanthorhiza simplicissima* Marshall are also present. Regular herbaceous associates include *Mitchella repens* L., *Polystichum acrostichoides* (Michx.) Schott, *Chasmanthium sessiliflorum* (Poir.) H. O. Yates, and *Solidago curtisii*.

Preliminary conservation status. *Solidago cumberlandensis* is a regular component across approximately 0.7 km and 2 km of riparian forest on Clifty Creek and Whites Creek, respectively; the Soak Creek population is restricted to a single site totaling less than 0.5 ha. NatureServe (2025) rankings for the species would be G1/S1 with only three known populations and a small area of distribution totaling about 16 km^2. Despite the few known occurrences, additional populations may be found within this eastern escarpment on the Cumberland Plateau along other smaller streams and rivers. The Clifty Creek and Soak Creek populations occur on permanently protected state land; the Whites Creek population occurs on private land protected by a conservation easement.

Etymology. The epithet *cumberlandensis* refers to the Cumberland Plateau physiographic province, where the species is known to occur.

Notes. Fifty-three ITS sequences for 41 *Solidago* species were compared, which includes all *Solidago* attributed to Tennessee except *S. tarda* (for which no data were available), plus sequenced species of *Solidago* ser. *Erectae*. Sources of newly reported ITS sequence data for 24 of these species are listed in Appendix 1. The ITS sequences for *Solidago* species were uniformly 630 bp in length, with the exception of *S. arguta* Aiton, which was 631 bp. Overall, ITS sequences exhibited relatively few differences, with pairwise identity values of 98% and above. Many of the differences involved the presence of a polymorphism at an individual position. Most of the samples for which new data were available, including those of *S. cumberlandensis*, exhibited such polymorphisms, which may have been overlooked in previous studies. Samples of a single individual of *S. cumberlandensis* from each of the three different watercourses possess the same two unique substitutions relative to all other *Solidago* species examined, and at a third position shared a single change with *S. spithamaea* M. A. Curtis ex A. Gray and *S. porteri* Small; note that because of the limits of phylogenetic application of ITS data in *Solidago*, this does not necessarily indicate any relationship to these two

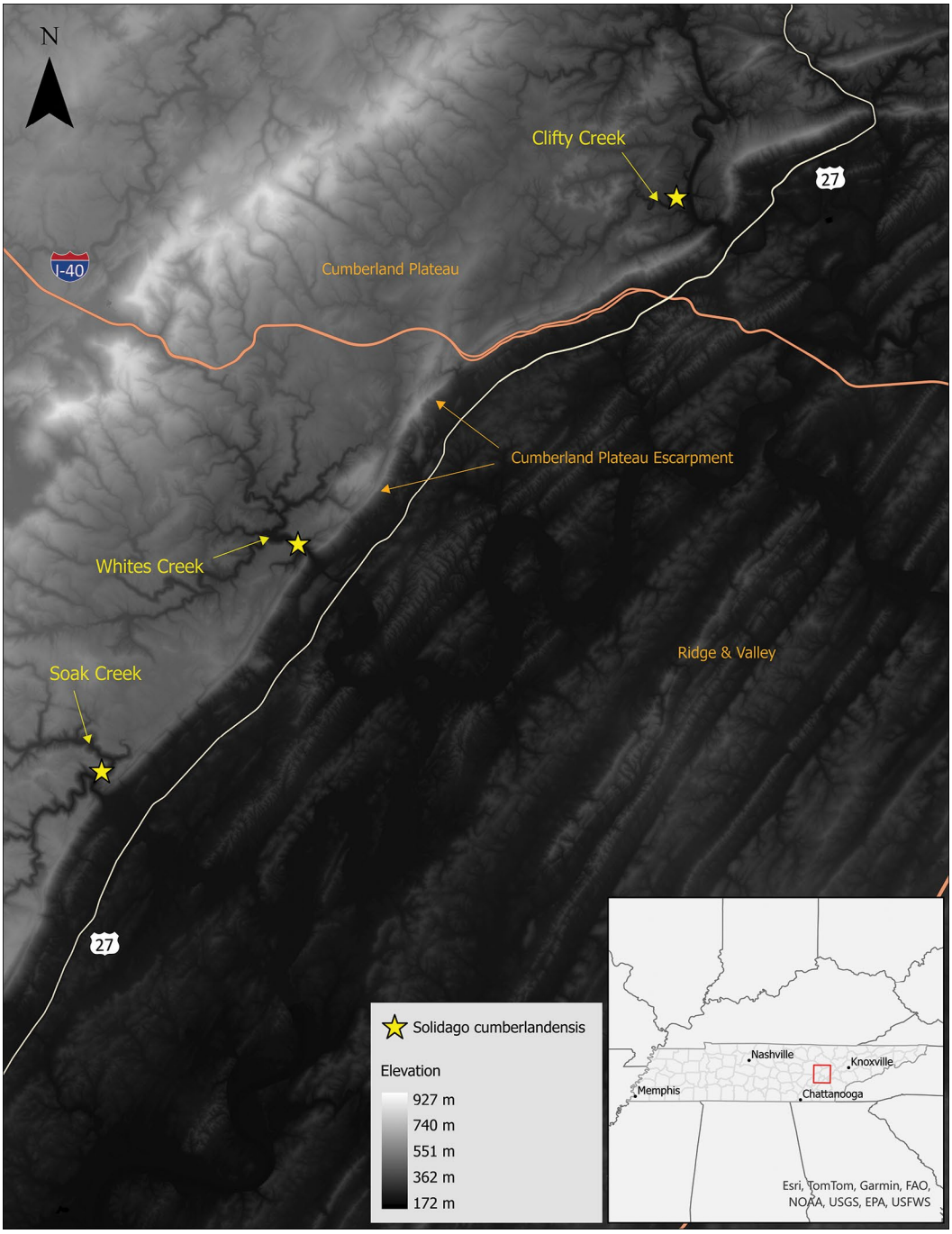


Figure 3. Geographical distribution of *Solidago cumberlandensis* Dattilo in the context of elevation and ecoregion.

species. Molecular data thus supports the distinctiveness of *S. cumberlandensis* given that these samples were consistently different from all other Tennessee *Solidago* species with available sequences, any sequenced species of *Solidago* ser. *Erectae*, and, based on the results of BLAST searches, from any other *Solidago* species that have been reported in GenBank.

Within *Solidago* ser. *Erectae*, *S. cumberlandensis* is morphologically similar to *S. arenicola*, *S. ayuhwasi*, and *S. erecta* in possessing a cylindrical inflorescence

Table 1. Key characteristics of *Solidago cumberlandensis* Dattilo compared to other morphologically similar species. Values for *S. arenicola*, *S. ayuhwasi*, and *S. erecta* originate from published sources (Semple & Cook, 2006; Floden, 2012; Semple et al., 2017; Brock & Estes, 2023) except for inflorescence widths of *S. arenicola* and *S. ayuhwasi* and mid-cauline leaf width of *S. ayuhwasi*, which were directly measured from specimens.

	S. cumberlandensis	*S. arenicola*	*S. ayuhwasi*	*S. erecta*
Underground structure	long, stoloniferous rhizomes	short, horizontal to ascending rhizome, caudex-like	branching caudex	erect caudex
Habit	clonal, patch-forming	solitary to tight clumps	solitary to tight clumps	solitary to tight clumps
Basal leaf shape	elliptical to ovate, blade abruptly narrowing to petiole	spatulate to oblanceolate, blade gradually narrowing to petiole	oblanceolate to broadly lanceolate, blade gradually narrowing to petiole	oblanceolate to obovate, blade gradually narrowing to petiole
Basal leaf width	25–50 mm	15–32 mm	5–35 mm	15–50 mm
Mid-cauline leaf width	20–40 mm	6–10 mm	10–18 mm	2–10 mm
Cauline leaf attachment	petiolate	petiolate	petiolate	sessile
Involucre height	4–6 mm	7–12 mm	3–4 mm	3.5–6.5 mm
Average inflorescence width	3 cm	5 cm	5–6 cm	4 cm

and basally disposed leaves; see Table 1 for a comparison of their morphologies. In addition to comparing specimens to other species in *Solidago* ser. *Erectae*, we also examined other *Solidago* species for morphological similarity to the unknown taxon. The basal leaves of *S. faucibus* are similar to those of *S. cumberlandensis*, but the secund inflorescence of *S. faucibus* clearly separates the two. *Solidago bicolor* L. and *S. hispida* Muhl. ex Willd. var. *hispida* possess a cylindrical inflorescence and persistent basal leaves that are gradually reduced upward, but in contrast to *S. cumberlandensis*, have hispid leaves and stems, narrower cauline and basal leaves that taper more gradually toward the base, and, in *S. bicolor*, white flowers. *Solidago cumberlandensis* can resemble *S. roanensis* Porter, but the phyllaries of *S. roanensis* are lanceolate-attenuate and gradually taper toward the tip, whereas phyllaries of *S. cumberlandensis* are wider, lanceolate to oblanceolate, and more abruptly narrow to the apex.

Paratypes. U.S.A. **Tennessee:** Morgan Co., Clifty Creek, just NW of Harriman, shady, forested cobble bars & sandy soil of first terrace floodplain, plants in full flower, forms dense patches, 4 Sep. 2024, *A. Dattilo, C. Elam & R. McCoy s.n.* (TENN-V-0257166); Rhea Co., Soak Creek, along Cumberland Trl., shady, cobble strewn back channel & first terrace island, basally disposed, patch forming from long rhizome, 9 Oct. 2024, *A. Dattilo & L. Pounds s.n.* (TENN-V-0257167); Roane Co., left bank of Piney Creek about 1000 ft. upstream of the confluence with Whites Creek, sandy alluvial soils of dry braided channel growing in full shade, creeping stoloniferous rhizomes produce colonies of sterile basal leaves, plant beginning to flower, 25 Aug. 2025, *A. Dattilo, E. E. Schilling & S. Scarborough 2025-02* (TENN-V-0257384); Roane Co., Whites Creek gorge, full shade on upper terrace, sandy soil, basal leaves form dense patches, plant in late flower, cylindrical inflorescence, 9 Oct. 2024, *A. Dattilo & L. Pounds s.n.* (TENN-V-0257165, TENN-V-0257164); Roane Co., Whites Creek gorge, sandy soils in shade just upslope from open cobble bar, forms dense colonies of basal leaves, 9 Oct. 2024, *A. Dattilo & L. Pounds s.n.* (TENN-V-0257162); Roane Co., sandy bottom in shade along Whites Creek, basal rosettes generally present, flowering stalks arising in summer separately from the rosettes, 13 Oct. 2010, *L. Pounds s.n.* (TENN-V-0216314).

Additional specimens examined. *Solidago arenicola:* U.S.A. **Alabama:** Blount Co., NW of Cleveland 1.34 mi. at Locust Fork, 28 July 2013, *K. Anderson et al. 383* (APSC); Blount Co., Locust Fork Branch just S of Swan Covered Bridge, 7 Sep. 2002, *R. Kral & B. Keener 93190* (TENN, isotype). **Georgia:** Walker Co., Lookout Mtn., Rock Creek at downstream edge of ford on Ford Rd., 4 Sep. 2010, *M. Medley s.n.* (VSC); Walker Co., Lookout Mtn., Rock Creek on large cobble-gravel bar, 25 Sep. 2010, *M. Medley s.n.* (LSU); Dade Co., Lookout Mtn., Rock Creek on scoured sandy bank, 25 Sep. 2010, *T. Patrick 18990* (GA). **Kentucky:** McCreary Co., Big South Fork boulder bar, 9 Sep. 2010, *T. Littlefield 2010-033* (EKY); Pulaski Co., Rockcastle River boulder bar, 28 Aug. 2008, *T. Littlefield 2008-038* (EKY). **Tennessee:** Morgan Co., large cobble bar, 22 Aug. 2006, *D. Estes 09227* (APSC); Cumberland Co., Daddy's Creek, 600 m upstream of Antioch Bridge, 15 Sep. 2013, *D. Rodgers & M. Brock 106* (APSC); Cumberland Co., Daddy's Creek, 350 m downstream of Yellow Creek confluence, 16 Aug. 2014, *D. Rodgers et al. 404* (APSC); Cumberland Co., Daddy's Creek, 2.5 km downstream of Yellow Creek confluence, 29 Aug. 2015, *D. Rodgers et al. 951* (APSC); Morgan Co., N/E side of Clear Creek, downstream from Lily Bridge, 2 Sep. 2018, *T. Witsell & D. Estes 18-0491* (APSC); Morgan Co., gravel bar 0.4 mi. downstream of Jett Bridge, 20 Aug. 1980, *P. A. Schmalzer 1615* (TENN); Morgan Co., gravel bar just upstream from Nemo Bridge, 1

Oct. 1980, *P. A. Schmalzer et al. 1617* (TENN); Morgan Co., sandy soil along Emory River at Camp Austin, 16 Sep. 1970, *P. Sommers et al. 46460* (TENN).

Solidago ayuhwasi: U.S.A. **Tennessee:** Polk Co., Hiwassee River at river Mi. 55, rock outcrops, 23 Sep. 2014, *A. Dattilo s.n.* (APSC0035844); Polk Co., Hiwassee River at river Mi. 55, rock outcrops, 23 Sep. 2014, *A. Dattilo s.n* (APSC0035846); Polk Co., Hiwassee River at confluence of Coker Creek, crevices of rock outcrops, 24 Sep. 2014, *A. Dattilo s.n.* (APSC); Polk Co., Hiwassee River just upstream of McFarland, rock outcrops, 25 Sep. 2014, *A. Dattilo s.n.* (APSC); Polk Co., Hiwassee River at river Mi. 58, rock outcrops in scour zone, 25 Sep. 2014, *A. Dattilo s.n.* (APSC); Polk Co., Hiwassee River, phyllite ledges, 3 Oct. 1975, *R. Kral 62768* (TENN).

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Appendix 1. Sources of newly reported ITS sequences for *Solidago* species including the U.S. state or Canadian province where specimens were collected. Those generated from Sanger sequencing (all vouchers at TENN) are noted with GenBank numbers (PZ######). Those assembled from Sequence Read Archive data are noted with SRR numbers (SRR########).

Solidago arenicola B. R. Keener & Kral, Alabama, SRR24075265; *S. auriculata* Shuttlew. ex S. F. Blake, Tennessee, PZ221226, DNA 5568; *S. austrina* Small, South Carolina, SRR24075313; *S. cumberlandensis* Dattilo, Tennessee, PZ221240, DNA 5907; PZ221239, DNA 5909; PZ221241, DNA 5908; *S. curtisii* Torr. & A. Gray, Tennessee, PZ221227, DNA 5129; *S. erecta* Banks ex Pursh, New Jersey, SRR24075215; *S. faucibus* Wieboldt, Tennessee, PZ221228, DNA 5570; *S.*

flaccidifolia Small, North Carolina, PZ221229, DNA 5130; *S. flexicaulis* L., Tennessee, PZ221230, DNA 4623; *S. gattingeri* Chapm. ex A. Gray, Tennessee, PZ221231, DNA 5571; *S. glomerata* Michx., Tennessee, PZ221232, DNA 5131; *S. gracillima* Torr. & A. Gray, Florida, SRR24075253; *S. jejunifolia* E. S. Steele, Minnesota, SRR24075347; *S. kralii* Semple, Georgia, SRR24075207; *S. lancifolia* (Torr. & A. Gray) Chapm., North Carolina, PZ221233, DNA 5623; *S. odora* Aiton, Tennessee, PZ221234, DNA 5132; *S. pallida* (Porter) Rydb., South Dakota, SRR24075316; *S. porteri* Small, Alabama, SRR24075198; *S. racemosa* Greene, Kentucky, SRR24075329; *S. rigidiuscula* (Torr. & A. Gray) Porter, Ontario, SRR24075204; *S. roanensis* Porter, Tennessee, PZ221235, DNA 5133; *S. rupestris* Raf., Tennessee, PZ221236, DNA 5572; *S. sphacelata* Raf., Tennessee, PZ221237, DNA 5134; *S. spithamaea* M. A. Curtis ex A. Gray, Tennessee, PZ221238, DNA 5573.

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