Tall Annual Willowherb (*Epilobium brachycarpum* C. Presl) in Ontario, Canada

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Tall Annual Willowherb (*Epilobium brachycarpum* C. Presl) is reported from Dryden, Kenora District, Ontario, Canada, based on a 2012 collection from a disturbed habitat where the species was presumably introduced. This is the first northern Ontario record of *E. brachycarpum* and the first Ontario record in more than 40 years. Previous Ontario records are discussed and mapped, and evidence for and against native status in the province is presented. Identification characteristics are provided, and distribution and habitat elsewhere in North America are discussed.

Key Words: Tall Annual Willowherb; *Epilobium brachycarpum*; Onagraceae; vascular plant; Ontario; Canada; distribution; status; identification

Introduction

In 1935, Merritt L. Fernald described a new variety of willowherb, *Epilobium paniculatum* Nutt. var. *subulatum* (Hausskn.) Fern., and cited four Ontario specimens: a John Macoun collection from Colpoy's Bay, Bruce County; a P. V. Krotkov collection from Hopkin's Harbour, Tobermory, Bruce County; his own collection from the La Cloche Peninsula, Manitoulin District; and another of his own collections from south of Little Current, Manitoulin Island. This variety was originally described as *forma subulata* by Haussknecht (1884) and elevated to varietal status by Fernald (1935) who noted that it had smaller flowers and longer and more slender pedicels than typical *E. paniculatum*. Later authors have generally not recognized var. *subulatum* and have used the name *E. brachycarpum* C. Presl for this species (e.g., Gleason and Cronquist 1991; Wagner *et al*. 2007; Brouillet *et al*. 2010+).

The current distribution and native status of *Epilobium brachycarpum* in Ontario are poorly known. It is regarded as a native plant in the province by Fernald (1935), Krotkov (1940), Morton and Venn (1990, 2000), and Newmaster *et al*. (1998), but as an introduction by Scoggan (1979) and Brunton *et al*. (1987). Gleason and Cronquist (1991) consider it "perhaps native in w. Que. and the Bruce Peninsula of Ont.". Marquis and Voss (1981), in their article on western species disjunct in the Great Lakes region, mention that the species has more-or-less weedy habits and may not be native in the east. In adjacent Michigan, the only occurrence (Houghton County in 2006) "seems clearly adventive in a gravel pit" (Voss and Reznicek 2012). It is considered a rare native plant in Ontario by Oldham and Brinker (2009) and ranked "SH," meaning of historical occurrence in the province as a native plant with no records in at least 20 years and possibly extirpated.

The first Ontario collection of *Epilobium brachycarpum* was made by John Macoun in 1871 (TRT) from Colpoy's Bay on the Bruce Peninsula. In his *Catalogue of Canadian Plants*, Macoun (1883–1890) stated that it was "abundant on newly cleared land at Oxendon, Colpoy's Bay, Georgian Bay, Lake Huron." Some of the early collections of Tall Annual Willowherb in Ontario are from locations and habitats that suggest it could have been native, e.g., "on top of cliff in open" (Fitzwilliam Island in 1932), "crevices and talus of hornblendic cliffs and ledges" (La Cloche Peninsula in 1934) and "about calcareous ledges in dry woods" (south of Little Current in 1934) (quotations from specimen labels). The species has apparently declined in Ontario, for unknown reasons. Krotkov (1940) commented that it was "not rare in open situations" on the Bruce Peninsula, and he collected it six times from five different sites between 1934 and 1936 (TRT). However, in more than 40 years of botanical exploration on the Bruce Peninsula, Joe Johnson (personal communication, 2014) has not seen the species there. Anton A. (Tony) Reznicek (personal communication, 2014), who has botanized in Simcoe County for more than 40 years, has seen the species only once there, in 1968, the most recent Ontario record of which we are aware before its collection in Dryden in 2012 (see below). Similarly in Manitoulin District, although there are at least four collections from the 1930s, *Epilobium brachycarpum* has not been seen on the island in more than 75 years despite extensive botanical surveys by John Morton and Joan Venn (2000).

On 29 July 2012, Ian D. Macdonald and Hugh D. J. McLean found *Epilobium brachycarpum* growing in disturbed ground at the edge of a motel parking lot in Dryden, Kenora District, Ontario. Their voucher specimen is deposited in NHIC, the herbarium of the Ontario Natural Heritage Information Centre (*I. D. Macdonald 120729d6*). At this site in northwestern Ontario, the species is likely adventive from further west where it is more common. Other than the early records from the Bruce Peninsula and Manitoulin District discussed

above, we know of only one other specimen of *E. brachycarpum* from Ontario, a 1968 collection by Anton A. Reznicek from a "dry rocky roadside" in Simcoe County (DAO, MICH). Scoggan (1979) reports it from Frontenac and Renfrew Counties, but there are no supporting specimens at CAN, DAO, MICH, QK, TRT, or TRTE and the species is not included in floristic lists covering these counties (Beschel *et al*. 1970; Crowder *et al*. 1996; Coulson *et al*. 2006). Figure 1 shows the distribution of *E. brachycarpum* in Ontario.

Epilobium brachycarpum is a tap-rooted annual, North America's only annual willowherb species, and the only member of *Epilobium* Section *Xerolobium* (Wagner *et al*. 2007). In addition to its annual growth habit and occurrence in drier habitats, *E. brachycarpum* can be distinguished from other Ontario *Epilobium* species by its linear to narrowly lanceolate leaves, which are slightly falcate, glabrous, with smooth margins to widely spaced, small teeth, alternate, and occasionally in fascicles (except on the stem's lower 10 cm, where they are opposite and deciduous); white deciduous coma; short (15–30 mm) fruits; glabrous (except in the inflorescence) stems; inflorescence branches that are alternate above the middle of the stem (except in depauperate individuals); and the distinctive longitudinally exfoliating epidermis of the lower portion of the stem. Figure 2 shows the identification features of *E. brachycarpum*.

It is difficult to explain how *Epilobium brachycarpum* was documented from about 10 southern Ontario sites before 1940, some of them in remote locations and in natural habitats where an introduction would be surprising, and then not seen in the province again until 1968. Were the collections from 75+ years ago from native populations with the species more recently spreading as a weed? If the early collections were from native populations and the species is weedy in much of its range, why did it apparently die out at these sites? Could the early records have been of a different and less weedy genotype, perhaps hinted at by Fernald's recognition of it as a distinct variety? We may never know the answers to these questions, but Ontario botanists should be on the lookout for this species in areas of former occurrence as well as elsewhere in the province.

In western North America, *Epilobium brachycarpum* is widespread in a variety of open, dry, and often disturbed habitats. In western Canada, it is restricted to the southern third of the prairie provinces and southern British Columbia. In Manitoba, it has been reported on open ground and old roads near Winnipeg (Scoggan 1957) and is an S1S2 ranked ("critically imperiled to imperiled") species (Chris Friesen, personal communication, 2014). It is a common native plant in southern Saskatchewan (Harms 2006), where it is sparsely distributed in native grassland, valley slopes, and along roadway margins. In Alberta, it is an S3 ranked ("vulnerable") species (ACIMS 2014, NatureServe 2014) of dry woods, prairies, shores, montane outcrops, and roadsides (Moss and Packer 1983). In southern British

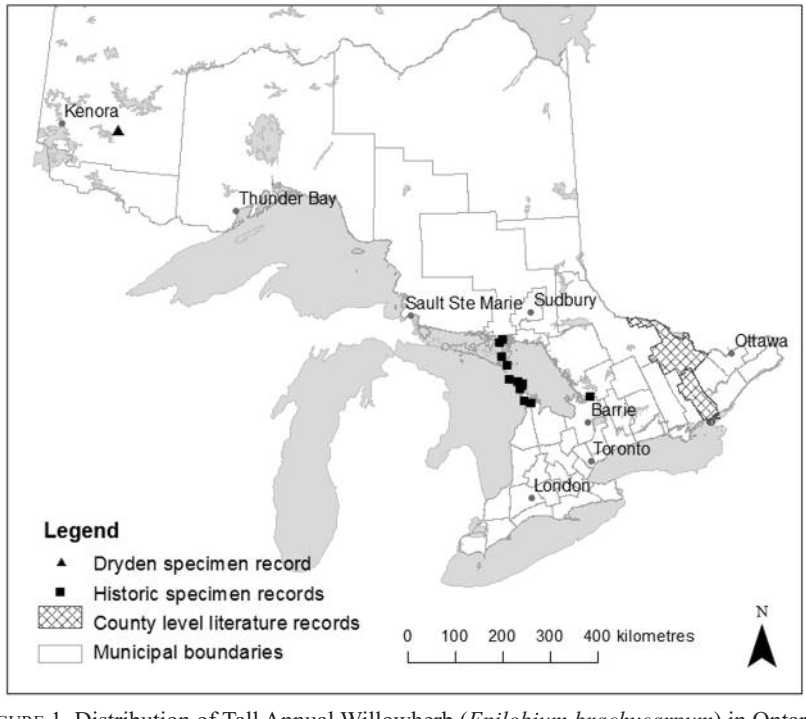

FIGURE 1. Distribution of Tall Annual Willowherb (*Epilobium brachycarpum*) in Ontario.

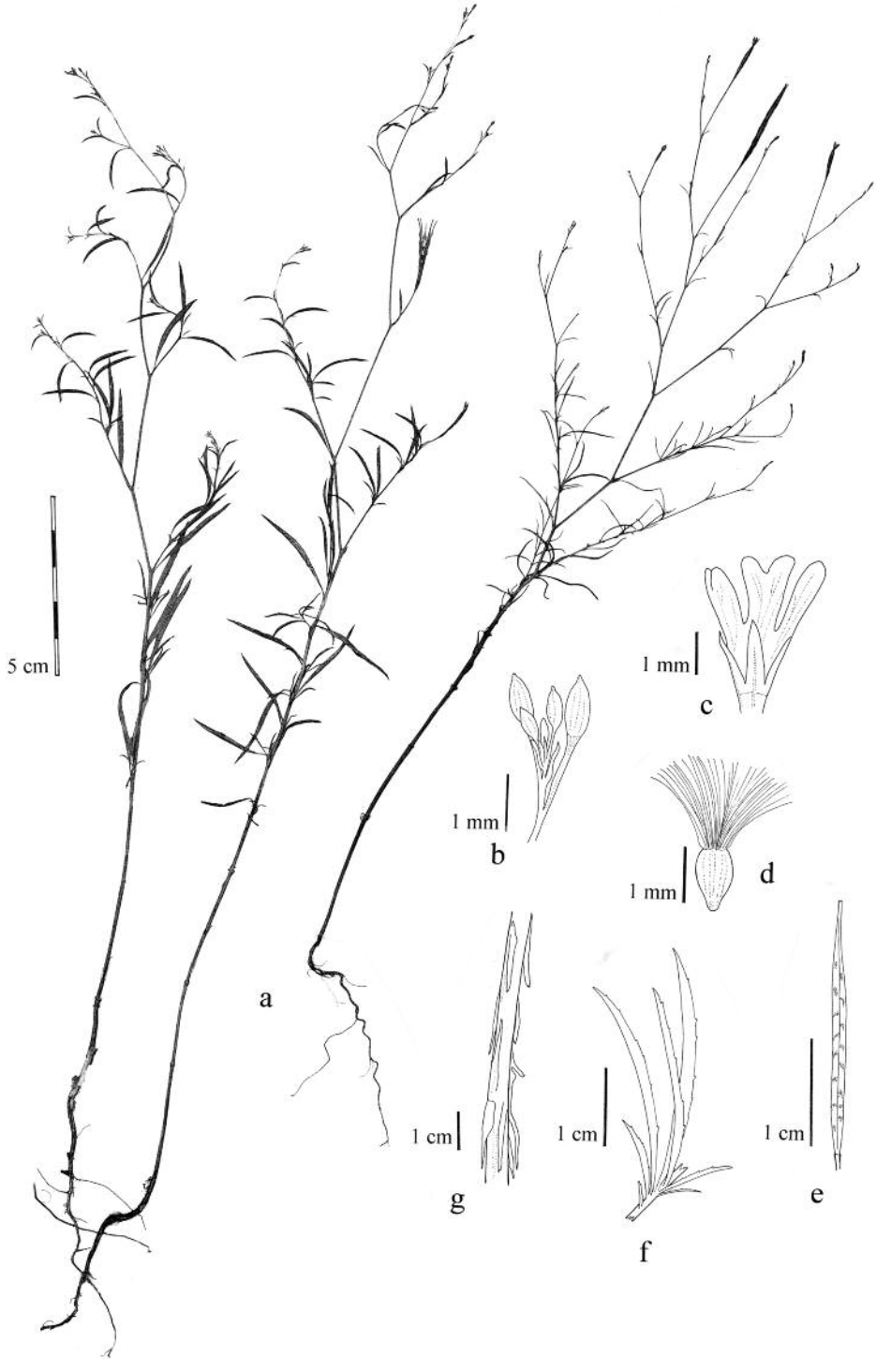

FIGURE 2. Tall Annual Willowherb (*Epilobium brachycarpum*). a. whole plants; b. buds; c. flower; d. seed; e. fruit; f. leaves (the leaves are folded and falcate, hence the teeth show only on one side); g. exfoliating epidermis of lower stem. The left and centre plants are STMU 4069, and that on the right is UAC 56760; all three are from British Columbia. STMU is an unofficial acronym for St. Mary's University, Calgary, Alberta.

Columbia, it is common east of the Coast–Cascade Mountains and south of Prince George in dry scrublands, forest openings, and disturbed areas in the lowland, steppe, and lower montane zones (Douglas *et al*. 1999; Douglas *et al*. 2002). Although Wagner *et al*. (2007) state that the species occurs in Yukon and Nunavut, we are not aware of records from these jurisdictions, nor is it listed from either by Scoggan (1979), Brouillet *et al*. (2010+), or NatureServe (2014). Across the western half of the United States, westward of New Mexico to Wisconsin, *Epilobium brachycarpum* occurs as a native species on dry soil of meadows, grasslands, steppe, woodlands, stream banks, roadsides, and valley slopes in both disturbed and undisturbed situations (Hitchcock *et al*. 1961; Lesica 2012). Outside North America, it also occurs in Argentina, where it was probably introduced and is typically a weed at the margins of cultivated fields (Solomon 1982; Wagner *et al*. 2007), and in Spain (Izco 1983) and Germany (Gregor *et al*. 2013), where it is a naturalized weed.

In Ontario, *Epilobium brachycarpum* is near its eastern range limits in North America (Kartesz 2013), although it has been reported from Pontiac County, Quebec (Scoggan 1979), with a supporting specimen at MT collected by Frère Rolland-Germain (no. 15884) in Deschênes, Quebec "sur la rivière Ottawa" on 14 July 1921, with no habitat information (Geoffrey Hall, personal communication, 2014). Rousseau (1968) considers it adventive in Quebec from western North America and Marie-Victorin (1995) mentions its occurrence on railway ballast in southern Quebec. *Epilobium brachycarpum* has recently been found as a weed in a railway yard in northern Kentucky (Kartesz *et al*. 1997), the most southerly of four states east of the Mississippi River where the species has been reported (the others are Michigan, Minnesota, and Wisconsin; Kartesz 2013). In future it may become more common as a local weed in eastern North America. In central Europe, *E. brachycarpum* is a rapidly-spreading invader, which Gregor *et al*. (2013) predict will become a serious agricultural weed, particularly in vineyards.

Specimens Examined

Canada, Ontario, BRUCE COUNTY, Colpoy's Bay, 30 July 1871, *J. Macoun 35* (TRT 15107); between the post office and Colpoy's Bay, in rocky fields and on newly cleared land, 3 August 1871, *J. Macoun* (CAN 82713); Howdenvale, in a small depression of the dry pasture, 2 August 1926, *W. R. Watson 2959* (TRT 34241); Hopkin's Harbour, Tobermory, open rocky wood, 9 August 1933, *P. V. Krotkov 7640* (TRT 34239); Spring River [typed on original label; "Creek" added in pencil above "River," and "Valley" added in pencil after "River"], rocky wood, 14 August 1934, *P. V. Krotkov 9245* (TRT 34240); Dyer Bay, stony beach, 16 July 1935, *A. S. Pease & E. C. Ogden 24802* (MICH); Dyer Bay, brulé, 11 July 1936, *P. V. Krotkov 10735* (TRT 34243); Emmett Lake, rocky woods, 22 July 1936, *P. V. Krotkov 10734* (TRT 34242); Britain Lake, open rock wood, 19 August 1936, *P. V. Krotkov 10733* (TRT 10733); Dryer's [sic] Bay village, in old sawdust on the shore, 22 August 1936, *P. V. Krotkov 10732* (DAO 134522, TRT 34244); KENORA DISTRICT, Dryden, east end of town at Best Western Motel, on south side of Trans-Canada Highway, 49°47'09.28"N, 92°49'17.27"W, unkempt dry gravelly garden along edge of parking lot of motel, associated with *Trifolium arvense, Mollugo verticillata, Silene csereii, Danthonia spicata, Pilosella aurantiaca, Anaphalis margaritacea*, 29 July 2012, *Ian D. Macdonald 120729d6 & Hugh D. J. McLean* (NHIC); MANITOULIN DISTRICT, south of Little Current, Manitoulin Island, about calcareous ledges in dry woods, 1934, *M. L. Fernald 3441* (GH; not seen, specimen cited in Fernald 1935); Leask Bay, South Bay, dry limestone, 18 July 1932, *W. Koelz 4155* (MICH); near Rattlesnake Harbor, Fitzwilliam Island, on top of cliff in open, 22 July 1932, *C. O. Grassl 5206* (MICH); Cloche Peninsula, crevices and talus of hornblendic cliffs and ledges, 29 June 1934, *M. L. Fernald 3440 & A. S. Pease* (GH, TRT 15100; GH specimen not seen, cited in Fernald 1935); Simcoe County, Matchedash Township, Conc. VI, Lot 17, dry rocky roadside, 27 July 1968, *T. Reznicek 947* (DAO 656859, MICH 1313523).

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Literature Cited

ACIMS (Alberta Conservation Information Management System). 2014. Tracking & watched lists. Government of Alberta, Edmonton, Alberta, Canada. Accessed 3 February 2015. http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-(acims)/tracking-watch-lists.aspx.

Beschel, R. E., A. E. Garwood, R. Hainault, I. D. Macdonald, S. P. van der Kloet, and **C. H. Zavitz.** 1970. List of the Vascular Plants of the Kingston Region. Fowler Herbarium of Queen's University, Kingston, Ontario, Canada.

Brouillet, L., F. Coursol, S. J. Meades, M. Favreau, M. Anions, P. Bélisle, and **P. Desmet.** 2010+. VASCAN, the Database of Vascular Plants of Canada. Accessed 25 March 2014. http://data.canadensys.net/vascan/.

Brunton, D. F., C. J. Keddy, and **W. L. Wagner.** 1987. Onagraceae. Eight pages *in* Atlas of the Rare Vascular Plants of Ontario (Part 4). *Edited by* K. M. Pryer and G. W. Argus. Botany Division, National Museum of Natural Sciences, Ottawa, Ontario, Canada. http://www.biodiversitylibrary.org/item/109262#page/611/mode/1up.

Coulson, D. P., C. Michener, and **G. Bickel.** 2006. Flora of Renfrew County: preliminary checklist of the vascular plants of Renfrew County, Ontario. Ontario Ministry of Natural Resources, Pembroke District, and Pembroke Area Field Naturalists, Pembroke, Ontario, Canada.

Crowder, A., K. E. J. Topping, and **J. C. Topping.** 1996. Plants of the Kingston Region, 1996. The Fowler Herbarium, Department of Biology, Queen's University, Kingston, Ontario, Canada.

Douglas, G. W., D. V. Meidinger, and **J. Pojar.** 1999. Illustrated Flora of British Columbia, Volume 3: Dicotylodons (Diapensiaceae through Onagraceae). Ministry of Environment, Lands and Parks, Ministry of Forests, Victoria, British Columbia, Canada.

Douglas, G. W., D. Meidinger, and **J. Pojar.** 2002. Illustrated Flora of British Columbia, Volume 8: General Summary, Maps and Keys. Ministry of Sustainable Resource Management and Ministry of Forests, Victoria, British Columbia, Canada.

Fernald, M. L. 1935. Critical plants of the upper Great Lakes region of Ontario and Michigan. Rhodora 37: 197–222, 238–262, 272–301, 324–341.

Gleason, H. A., and **A. Cronquist**. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second edition. New York Botanical Garden, Bronx, New York, USA.

Gregor, T., D. Bönsel, I. Starke-Ottich, O. Tackenberg, R. Wittig, and **G. Zizka.** 2013. *Epilobium brachycarpum*: a fast-spreading neophyte in Germany. Tuexenia 33: 259–283.

Harms, V. L. 2006. Annotated catalogue of Saskatchewan vascular plants (updated 20 November 2006). V. L. Harms, Saskatoon, Saskatchewan, Canada. Accessed 5 March 2014. http://www.npss.sk.ca/docs/2_pdf/ANNOTATED_CATALOGUE_OF_SASKATCHEWAN_VASCULAR_PLANTS20112006.pdf.

Haussknecht, C. 1884. Monographie der Gattung *Epilobium*. Gustav Fischer, Jena, Germany.

Hitchcock, C. L., A. Cronquist, M. Ownbey, and **J. W. Thompson.** 1961. Vascular Plants of the Pacific Northwest, Part 3: Saxifragaceae to Ericaceae. University of Washington Press, Seattle, Washington, USA.

Izco, J. 1983. *Epilobium paniculatum* nueva adventicia para Europa. Candollea 38: 309–315.

Lesica, P. 2012. Manual of Montana Vascular Plants. BRIT Press, Fort Worth, Texas, USA.

Kartesz, J. T. 2013. BONAP's North American Plant Atlas. Biota of North America Program, Chapel Hill, North Carolina, USA. Accessed 25 March 2014. http://bonap.net/napa.

Kartesz, J. T., P. Allen, and **J. W. Thieret.** 1997. *Epilobium brachycarpum* (Onagraceae) in Kentucky. Transactions of the Kentucky Academy of Sciences 58: 99.

Krotkov, P. V. 1940. Botanical explorations in the Bruce Peninsula, Ontario. Transactions of the Royal Canadian Institute 23: 3–65.

Macoun, J. 1883–1890. Catalogue of Canadian Plants. Parts I–V. Geological Survey of Canada, Ottawa, Ontario, Canada.

Marie-Victorin, Frère. 1995. Flore Laurentienne. Third edition. Revised and annotated by L. Brouillet, S. G. Hay, I. Goulet, M. Blondeau, J. Cayouette, and J. Labrecque. Les Presses de l'Université de Montréal, Montréal, Quebec, Canada.

Marquis, R. J., and **E. G. Voss.** 1981. Distributions of some western North American plants disjunct in the Great Lakes Region. Michigan Botanist 20: 53–82.

Morton, J. K., and **J. M. Venn.** 1990. A checklist of the flora of Ontario vascular plants. University of Waterloo, Waterloo, Ontario.

Morton, J. K., and **J. M. Venn.** 2000. The Flora of Manitoulin Island and the Adjacent Islands of Lake Huron, Georgian Bay and the North Channel. Third edition. Biology series 40. Department of Biology, University of Waterloo, Waterloo, Ontario, Canada.

Moss, E. H., and **J. G. Packer.** 1983. Flora of Alberta. Second edition. University of Toronto Press, Toronto, Ontario, Canada.

NatureServe. 2014. NatureServe Explorer: an online encyclopedia of life. Version 7.1. NatureServe, Arlington, Virginia, USA. Accessed 16 April 2014. http://explorer.natureserve.org.

Newmaster, S. G., A. Lehela, P. W. C. Uhlig, S. McMurray, and **M. J. Oldham.** 1998. Ontario plant list. Forest research information paper 123. Ontario Forest Research Institute, Ontario Ministry of Natural Resources, Sault Ste. Marie, Ontario, Canada.

Oldham, M. J., and **S. R. Brinker.** 2009. Rare Vascular Plants of Ontario. Fourth edition. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario, Canada. Accessed 16 April 2014. http://www.researchgate.net/publication/274252597_Rare_Vascular_Plants_of_Ontario_Fourth_Edition.

Rousseau, C. 1968. Histoire, habitat et distribution de 220 plantes introduites au Québec. Naturaliste Canadien 95: 49–171.

Scoggan, H. J. 1957. Flora of Manitoba. Bulletin 140. National Museum of Canada, Ottawa, Ontario, Canada.

Scoggan, H. J. 1979. The Flora of Canada. Part 4: Dicotyledoneae (Loasaceae to Compositae). Publications in Botany 7(4). National Museum of Natural Sciences, Ottawa, Ontario, Canada.

Solomon, J. C. 1982. The systematics and evolution of *Epilobium* (Onagraceae) in South America. Annals of the Missouri Botanical Garden 69: 239–335.

Voss, E. G., and **A. A. Reznicek.** 2012. Field Manual of Michigan Flora. University of Michigan Press, Ann Arbor, Michigan, USA.

Wagner, W. L., P. C. Hoch, and **P. H. Raven.** 2007. Revised classification of the Onagraceae. Systematic Botany Monographs 83: 1–240.

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