

NEW EXOTIC ADDITIONS AND OTHER NOTEWORTHY RECORDS FOR THE FLORA OF NORTH CAROLINA

DERICK B. POINDEXTER

Department of Biology
Appalachian State University
Boone, North Carolina 28608
poindexterdb@appstate.edu

ALAN S. WEAKLEY

North Carolina Botanical Garden, Campus Box 3280,
University of North Carolina
Chapel Hill, North Carolina 27517
weakley@unc.edu

MICHAEL W. DENSLOW

Department of Biology & Department of Geography and Planning
Appalachian State University
Boone, North Carolina 28608
md68135@appstate.edu

ABSTRACT

Thirty exotic taxa are reported from northwestern North Carolina. These taxa are either new additions to the vascular flora of the state, provide voucher substantiation for reports in Weakley (2011), or supply additional occurrence records for taxa rarely attributed to North Carolina.

Floristic research continues to provide updated records and fill distribution gaps for vascular plant taxa within the southeastern United States (Hartman & Nelson 1998; Ertter 2000). This work is a direct effort of a broad community of botanists that thrive upon the promulgation of botanical information and discovery. The significance of such field research is the detection of novel additions to a floristic region, which subsequently improve our understanding of plant biogeography, species diversity, and heighten awareness of the potential for exotic invasion.

Weakley (2011) has provided the latest installment documenting the flora of the southern and Mid-Atlantic U.S. The nature of this work is dynamic and has progressively evolved both in geographic scope and taxonomic breadth to accommodate the tremendous number of taxa that were not treated by previous works (e.g., *Manual of the Vascular Flora of the Carolinas* [Radford et al. 1968]). This floristic treatment is broadly inclusive in nature and subsequently recognizes the presence of adventive, persistent, and clearly naturalized taxa (the former two of which are often excluded from traditional regional floras). Likewise, this work has been revised on a near annual basis since 2005 and made available online “free of cost” in an effort to attain the utmost accuracy in representing the plant life of this region. This revision of the known taxa for the southern and Mid-Atlantic United States is an enormous task that has resulted in a large number of noteworthy collections papers, such as the one presented here, over the last half century (e.g. Leonard 1971; Pittillo & Brown 1988).

Because of the extensive additional botanical exploration that has occurred in the region since the publication of the landmark *Manual of the Vascular Flora of the Carolinas* (Radford et al. 1968), changing criteria relative to the inclusion of alien species (see next paragraph), and changing taxonomic opinions, about 1200 additional taxa are recognized for the Carolinas, an increase of nearly one third in the documented flora of the two-state region. Most of this increase represents newly documented and established alien species but also represents over 300 native species found to be a component of the two-state flora and over 100 newly described species (Weakley 2005; Weakley 2011).

There is a tendency to avoid mention of aliens in floras and in “new records” papers of this kind until they are demonstrably well-established and widespread. Some floras have used a “minimum number of counties” criterion for the inclusion of aliens. But invasive aliens that can cause significant ecological and economic damage are best managed when their discovery is documented and publicized early on in their establishment process and when means to identify them are provided in local and regional floras so that the discovery and recognition of other populations is facilitated. Pyšek et al. (2004) and others have emphasized that the very inconsistent inclusion of alien species in floras, and the lack of standardized criteria and terminology to describe the degree of their establishment, complicates many kinds of studies as well as conservation management. Here we try to convey the status of the alien species reported (as best it can be determined based on the information currently available to us) and to provide documentation that supports their inclusion in some manner in future floras.

As a direct result of the ongoing studies of vascular plant diversity in the Southern Appalachians (with a current emphasis on the plants of Alleghany County, NC, by the first author), we here acknowledge the presence of several new additions and multiple updated distributional records to North Carolina’s flora from the northwest portion of the state.

The status of each exotic taxon (i.e., naturalized, adventive, or uncertain) is noted, with apparent first vouchered reports, including specimens (as signified by an asterisk [*]) substantiating attribution in Weakley (2011). We are defining these exotic categories, modified from Nesom (2000), as follows: “naturalized” = a population of plants that appear to be inadvertently introduced into the flora and well-established (i.e., persistent for several seasons) and “adventive” = a waif or sporadic introduction (usually a single individual or limited number of plants) that is doubtfully capable of sustaining itself for more than one season. Plants that are merely persistent from local cultivation and thus not showing signs of escape or migration are not considered here. For the sake of brevity, voucher specimen citations include only the primary collector.

APIACEAE

1. *Anthriscus sylvestris* (L.) Hoffm. subsp. *sylvestris – This European native, commonly referred to as Wild Chervil, has endured a convoluted history in North Carolina, first being misidentified as *Conioselinum chinense* (L.) Britton, Sterns, & Poggenb. (Mellichamp et al. 1987) and then correctly verified based on further examination (Mellichamp et al. 1988). However, the authors admitted to the ambiguity of the collection locality at Roan Mountain (Carver’s Gap) and suspected that the plant was present in both Tennessee and North Carolina. The population from which their collections were made is located entirely within Tennessee, so no specimens have been accurately attributed to North Carolina. Voucher specimens are here documented from Alleghany, Ashe, and Watauga counties, which provide a source for the North Carolina attribution in Weakley (2011). Each population of this biennial taxon was clearly established at its respective locality.

Voucher specimens: **Alleghany Co.:** Laurel Springs. Located along NC Hwy 18 S ca. 100 m from Pine Fork Baptist Church, near jct. w/ Dixon Rd. Growing in wet roadside ditch, under a large rock outcrop. Ruderal/culturally disturbed habitat. 30 + individuals. 36°26.601'N, 81°13.029'W, elev. 924 m. 21 May 2008, *D.B. Poindexter 08-217* (BOON, NCU). **Ashe Co.:** Fleetwood. Located along US 221 traveling south, at the jct. with Mulatto Mountain Rd. (SR 1145). Growing along the roadside. 4-5 individuals. 36°18'17.5"N, 81°30'19.7"W, elev. 899 m. 30 May 2008, *D.B. Poindexter 08-235* (BOON, NCU). **Watauga Co.:** North of Boone. Located along Howards Creek Rd. (SR 1306), ca. 85 m north of the jct. with Curley Maple Rd. (SR 1323). Growing along a mesic, roadside embankment. 15-20 individuals. 36°16'22.3"N, 81°42'56.8"W, elev. 1183 m. 30 May 2008, *D.B. Poindexter 08-227* (BOON, NCU).

2. *Heracleum mantegazzianum Sommier & Levier – Giant Hogweed is a native of Eurasia, with a biennial or monocarpic perennial growth duration. It is an extremely robust herb, often attaining heights of 5 m or more. Sap of this species contains phytotoxic furocoumarins that can cause dermatitis and blindness in susceptible individuals (Jahodová et al. 2007). In North America, its current naturalized distribution is confined to the northernmost states and provinces, reaching its southernmost limit in New Jersey. This record for North Carolina is a new range extension for this taxon, but only a single individual was observed and thus Giant Hogweed is perhaps best treated as adventive. Since this species is a federally listed “noxious weed” (USDA, NRCS 2011) it has high management priority in the state. Consequently, the plant was recently removed by the North Carolina Department of Agriculture (Rick Iverson, pers. comm.), but it will require annual monitoring to make sure that the seed bank is not viable and the plant is fully eradicated.

Voucher specimens: **Watauga Co.:** near Blowing Rock. Located along Edmisten Rd., near the Blue Ridge Parkway, at the jct. with US 321. Growing in a drainage ditch 50 m N of the jct. Rare (a single individual observed), ca. 2-3 m tall, rays of central umbel 86. Exotic, robust biennial/monocarpic perennial herb. 36°9'1.69"N, 81°39'37.09"W, elev. 1055 m. 4 August 2011, *D.B. Poindexter 11-133* (BOON).

ASTERACEAE

The three taxa of *Centaurea* documented below are found at nearby stations in Virginia (Wieboldt et al. 2011) and are perhaps derived from those populations. All three taxa listed here were clearly naturalized. Likewise, the collections of *Centaurea jacea* and *C. ×moncktonii* currently represent the most southern stations (within the southeastern USA) known to the authors for these two taxa. Based on the regularity with which these three entities are appearing in the mountains of North Carolina, we can predict with some confidence that additional species within this complex (e.g., *Centaurea nigra* L.) will soon be discovered within the state.

***3. *Centaurea jacea* L.** – Brown Knapweed is a perennial European native that thrives in open disturbed areas, particularly along roadsides. This plant was accounted for in North Carolina by Weakley (2011) and basis for this documentation is provided below. This plant (along with the following two taxa within the same genus) will undoubtedly become more common in the state with continued anthropogenic activity.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Sparta. Located at the jct. of Bledsoe Rd. and US 21 northwest of Sparta and across from the County Fairgrounds/Emerson Black Building. Growing in gravelly soils in a parking area at the jct. Occasional, exotic perennial forb/herb. 36°31'3.23"N, 81°8'43.28"W, elev. 903 m. 3 September 2008, *D.B. Poindexter 08-1114* (BOON); Located off of US Hwy 21, north of Sparta at G & B Oil. Naturalized in yard and along the roadside.

Occasional, exotic perennial forb/herb. 36°30'53.9"N, 81°8'9.4"W, elev. 893 m. 23 August 2008, *D.B. Poindexter 08-965* (BOON, NCU); Prathers Creek Township, Scottville. Located along US 221, at Bruner Sides Farm, ca. 0.2 mi east of the NC 113 jct. Growing along roadside drainage area. Scarce, exotic perennial forb/herb. 36°29'3.8"N, 81°16'47.7"W, elev. 877 m. 28 August 2008, *D.B. Poindexter 08-992* (BOON).

***4. *Centaurea nigrescens* Willd.** – Tyrol Knapweed is currently known from a single locality in Alleghany County. This perennial European native is well-established at this site and consists of approximately 50-100 individuals. Like its sister taxa, it prefers disturbed roadsides and field margins. This species is rapidly increasing in abundance in the northern Piedmont of Virginia (Weakley 2011) and its discovery in North Carolina is not surprising considering its rate of expansion. Tyrol Knapweed is also known from Tennessee (Chester et al. 2009), and has apparently been collected in Florida (Keil & Ochsmann 2006).

Voucher specimens: **Alleghany Co.:** Prathers Creek Township, Peden. Located along Weaver Rd. (SR 1302). Growing in disturbed roadside habitat, ca. 0.4 mile from the jct. with Topia Rd. (SR 1303). Growing in culturally disturbed, ruderal habitats bordering the road. Infrequent, exotic perennial forb/herb. 36°29'52.60"N, 81°19'0.06"W, elev. 778 m. 19 August 2009, *D.B. Poindexter 09-942* (BOON); same locality, 28 August 2009, *D.B. Poindexter 09-1007* (BOON); 15 September 2010, *D.B. Poindexter 10-485* (NCU).

***5. *Centaurea ×moncktonii* C.E. Britton** – Of the three sister taxa documented in this report, Meadow Knapweed has been the most frequently encountered by the first author. It is a fertile perennial of introgressive origin involving members of the *Centaurea jacea* species complex. This hybrid is ostensibly derived from the parent species *Centaurea jacea* and *C. nigra* L. with possible genetic influence from other species including *C. nigrescens* (Keil & Ochsmann 2006).

Voucher specimens: **Alleghany Co.:** Cranberry Township, Laurel Springs. Located along Elk Knob Rd. (SR 1143), ca. 0.5 mi south of the NC 18/NC 113 jct. Growing in a culturally disturbed roadside habitat, on the east side of the road. Infrequent, exotic perennial forb/herb. 36°25'3.6"N, 81°14'50.5"W, elev. 873 m. 28 August 2009, *D.B. Poindexter 09-1002* (BOON, NCU). **Ashe Co.:** Fleetwood. Located along US 221, ca. 0.65 km north of Twin Bridges Dr. Growing in field-like roadside near the South Fork of the New River. Scarce. 36°17'44.99"N, 81°29'53.28"W, elev. 876 m. 28 August 2009, *D.B. Poindexter 09-1019* (BOON, NCU).

BETULACEAE

***6. *Betula pendula* Roth** – European White Birch is a striking tree with bright white bark, commonly found as an ornamental species in the southeastern United States. It has been documented in nearby localities in Virginia (Wieboldt et al. 2011). In Alleghany County, this tree was found escaped in an abandoned and overgrown lot. The few small saplings that were present at this site have recently been destroyed for apparent urban development. The Watauga County population is thriving along a very steep road cut, where the bases of small trees are enveloping exposed rocks. The sporadic spacing of individuals and shallow soils inhabited by these trees indicate that they are clearly naturalized and not intentionally planted.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Sparta. Located at the jct. of Ballpark Rd. and Estep St. A couple of small saplings present, growing in an abandoned lot. Rare, exotic tree. 36°29'56.07"N, 81° 6'49.62"W, elev. 876 m. 8 June 2009, *D.B. Poindexter 09-504* (BOON, NCU). **Watauga Co.:** Deep Gap. Located along US Hwy 421 S, near jct. with Orchard Rd. (SR 1362).

About 10-15 saplings to small trees were observed growing in thin, rocky soils and on outcrops of a road cut embankment. 36°13.312'N, 81° 29.031'W. 29 April 2007, *D.B. Poindexter 07-99* (BOON, NCU).

CAMPANULACEAE

7. *Campanula rapunculoides* L. – The only previously known collection of Rampion Bellflower from North Carolina is from a Watauga County specimen (1 August 1954, *Brown & Brandon s.n.*, BOON) annotated by H. E. Ahles in 1964. Locality data on the label was vague, consisting of “roadsides, meadows.” This record was presumably used as the sole voucher for *C. rapunculoides* in Radford et al. (1968). Here we provide additional records to corroborate the naturalized occurrence of this perennial species in the state. This species is often cultivated for its large, showy blue flowers. It is well-documented to the north in Virginia, particularly in montane counties (Wieboldt et al. 2011) and is also attributed to Tennessee (Chester et al. 2009).

Voucher specimens: **Alleghany Co.:** Glade Creek Township, Edmonds. Located along Glade Valley Rd. (SR 1444), 65 m south of the NC 18 jct. Growing on a roadside embankment, on the west side of SR 1444. Not growing in an obviously planted area, appearing to be adventive or escaping from nearby cultivated populations. Rare, exotic perennial forb/herb. 36°33'26.6"N, 80°56'7.6"W, elev. 869 m. 16 June 2009, *D.B. Poindexter 09-578* (BOON). **Avery Co.:** Roseborough. Located along Roseboro Rd. traveling south, ca. 0.3 mi past Grassy Prong Rd. (FR 192) and ca. 0.6 mi prior to Rockhouse Creek Rd. (FR 451). Growing in a disturbed ditch line on the right-hand side of the road. 36°1.935'N, 81°47.978'W. 2 July 2007, *D.B. Poindexter 07-326* (BOON).

CARYOPHYLLACEAE

8. *Sagina procumbens* L. – Northern Pearlwort is a species of perennial plants native to Eurasia and presumably boreal North America, although questionably so (Weakley 2011). Occurrences of this taxon in the southeastern USA are traditionally treated as introductions. According to Weakley (2011), this species has only been collected in North Carolina once, from a gravel parking lot at Roan Mountain (Mitchell County) and was assumed to be an adventive introduction. Below we cite an additional collection from Alleghany County that was found in an area of heavy disturbance (crevices of a brick walkway). It is very doubtful that the property owners intentionally planted this species, and its abundance and perennial nature suggest that it has been established at this old homesite for an indefinite period of time. Thus we are interpreting this record as a naturalized population at this site.

Voucher specimens: **Alleghany Co.:** Located along Prathers Creek Church Rd. (SR 1163B) at address 1547, ca. 0.95 mi northeast of the Doughton Mountain Rd. (SR 1149) jct. Growing in cracks of a brick walkway in front of an old farmhouse. Infrequent 36°28'30.3"N, 81°14'14.2"W, elev. 1022 m. 5 August 2010, *D.B. Poindexter 10-442*(BOON, NCU)

CHENOPODIACEAE (now included in the AMARANTHACEAE)

***9. *Bassia scoparia* (L.) A.J. Scott** – This annual Eurasian native is most commonly found in waste areas, usually as a mere waif in the southeastern USA (Weakley 2011). Commonly referred to as Summer-cypress, this exotic has been documented with regularity in Virginia (Wieboldt et al. 2011) and is also attributed to the flora of Tennessee. A single record is known from North Carolina based on a collection from Davidson County (5 November 1946, *O.F. McCrary s.n.*, NCSC). The exotic status of this collection is unclear due to the lack of an explicit statement regarding the nature of its occurrence.

The specimen cited below was clearly from an adventive population, but it should be noted that these plants were producing mature fruit. This species, as well as several others discussed below, are often attributed to ballast, wool-mills, bird seed contaminate, or similar situations that are primarily affected by industrial practices (i.e., the importation of plant materials for feed). The potential for feed impurities, or even exotic seed itself, to produce species that sparingly naturalize in a region due to human practices is not uncommon. Several of the plants listed within this report as bird seed waifs have been likewise documented in Great Britain and are known to “casually” naturalize (Hanson & Mason 1985).

Voucher specimens: **Ashe Co.:** West Jefferson. Located at the Z. E. Murrell residence, 1011 Calloway Gap Rd. This taxon is within the "*scoparia* complex" and exhibits an excessive villous pubescence similar to material referred to as var. *subvillosa*. Waif growing under a bird feeder. 36°17'37.70"N, 81°22'51.02"W, elev. 917 m. 22 August 2007, *D.B. Poindexter 07-707* (BOON).

10. *Dysphania pumilio (R. Brown) Mosyakin & Clemants – This annual species, commonly known as Clammy Goosefoot, is becoming an increasingly common weed of disturbed areas in Virginia and is expected to expand its naturalized range. Weakley (2011) reports a current known distribution in the eastern USA of Piedmont areas extending from the District of Columbia to Georgia, with the exception of North Carolina. The population documented here is not confidently deemed “naturalized” and should perhaps be treated as merely adventive until additional populations are discovered.

Voucher specimens: **Ashe Co.:** Growing around perimeter of a vegetable garden. Apparently introduced as seed contaminant, but proliferating in disturbed areas near the area of cultivation. 36°16'16.89"N, 81°31'48.70"W, elev. 963 m. 23 June 2010, *D.B. Poindexter 10-367* (BOON, NCU).

HYACINTHACEAE

11. *Chionodoxa luciliae Boiss. – Glory-of-the-snow is a species of perennial plants native to western Turkey and widely cultivated in the USA (McNeill 2002a). Although sparingly documented from a few northern states, McNeill (2002a) suggests that it is likely to escape elsewhere, noting “lawns” as the typical naturalized habitat. This plant was found near areas of cultivation but growing in adjacent lawn areas in Alleghany County, intercalated with denser areas of grass. Considering the small population size and habitat, this species is probably best treated as adventive.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Sparta. Located along Cherry Street where the road makes a 90 degree turn, at a house adjacent to (south of) Dr. Terry Johnson's dental office. Growing in the residential lawn, escaped from nearby cultivation. Scarce (but several flowering and non-flowering plants noted), exotic perennial herb. 36°30'30.74"N, 81°6'57.84"W, elev. 893 m. 31 March 2011, *D.B. Poindexter 11-06* (BOON).

12. *Hyacinthoides* × *massartiana Geerinck (syn. ***Hyacinthoides* × *variabilis*** P. D. Sell)
– The Hybrid Bluebell is a fertile perennial, derived from *Hyacinthoides hispanica* (Mill.) Rothm. (Spanish Bluebell) and *H. non-scripta* (L.) Chouard ex Rothm. (English Bluebell). As their colloquial names suggest, both parents are natives of Europe but are geographically disparate and isolated. In Great Britain, recent attention has been focused on the negative impacts of hybridization on the native English Bluebell populations (Kohn et al. 2009). Due to regular cultivation of the Spanish Bluebell in Great Britain, risks of assimilation are great. Rix (2004) noted that the Hybrid Bluebell was not only often sold under the alias of “Spanish Bluebell” but is a rather aggressive weeds due to its vegetative and sexual modes of reproduction. Rix (2004) also provided a detailed description and illustrations of

both rather delicate parents as well as the more robust hybrid (intermediate but larger, perhaps due to hybrid vigor). McNeill (2002b) indicated that the hybrid is regularly cultivated in the USA and well-established in Washington and also suggested that the hybrid is probably established elsewhere. Owing to likely confusion with its parents, its use in the nursery trade, as well as its fertile nature (often occurring without either parent), Hybrid Bluebell is very likely to be much more common than voucher specimen records suggest.

Voucher specimens: **Alleghany Co.:** Cranberry Township, Laurel Springs. Located along the Blue Ridge Parkway, 0.15 mi east of NC 18. Growing along the banks of Meadow Fork Creek, under shrubs in alluvial soil (ca. 20 m north of the road). Definitely not cultivated. Rare, exotic perennial forb/herb. 36°23'28.8"N, 81°14'34.6"W, elev. 865 m. 1 May 2009, *D.B. Poindexter 09-132* (BOON).

LAMIACEAE

***13. *Clerodendrum trichotomum* Thunb. var. *ferrugineum* Nakai** – This small tree, native to east Asia, has been attributed to North Carolina based on the several sources (Kartesz 2011; USDA, NRCS 2011). This record for the state is derived from Moldenke (1980) for Surry County. It is unclear based on this publication whether the author was referencing physical voucher specimens (none are known to the authors), site records of naturalized populations, or simply cultivated populations. Weakley (2011) attributed this plant to North Carolina (see documentation below). This plant (formerly placed within the Verbenaceae) is very attractive and presumably entered the regional flora through the nursery trade. Harlequin Glory-bower has been collected from legitimately naturalized colonies in Ashe and Wilkes County. It seems to prefer disturbed riparian areas and is showing up with greater regularity, which suggests that this taxon is increasing in its invasiveness, particularly in the mountains and adjacent foothills of North Carolina.

Voucher specimens: **Ashe Co.:** Jefferson. Located along NC 16 N, 0.8 mi north of the US 88 jct. and ca. 0.5 mi south of the US 221 jct. Growing on the west side of the road in a culturally disturbed habitat above a small stream. Infrequent (12 individuals), exotic small tree. 36°25'44.57"N, 81°26'25.80"W, elev. 894 m. 3 October 2010, *D.B. Poindexter 10-488* (BOON, NCU). **Wilkes Co.:** Along South Fork of Reddies River, Vicinity of Wilbar, along NC 16, for several miles. Habitat: roadsides and streambanks. 29 September 2002, *A.S. Weakley 7201* (NCU).

***14. *Prunella* aff. *laciniata* (L.) L.** – Cutleaf Self-heal is a perennial, Eurasian native that was attributed to North Carolina by Radford et al. (1968). Interestingly, this record was admittedly based on no known voucher specimens. Below we provide documentation of a similar taxon from a mixed population containing the sister species *Prunella vulgaris* L. in a shady, disturbed site in Alleghany County. The precise determination of this specimen is somewhat problematic. It only differs morphologically from *P. vulgaris* in the presence of obvious lobed-pinnatifid leaves, which are characteristic of *P. lacinata*. Otherwise, pubescence is very thin and leaf venation patterns are more characteristic of *P. vulgaris*. It is possible that this voucher represents either a teratological morphotype or perhaps a hybrid introduction of *P. x intermedia* Link (= *P. lacinata* x *P. vulgaris*). Šegota et al. (2009) have enumerated the various differences in hybrids within the genus, but due to morphological plasticity, an unequivocal determination cannot be made. Ultimately, material such as this could have been responsible for the early, unsubstantiated report of *P. laciniata* in North Carolina. This taxon was quite rare at this site, consisting of only six observed individuals.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Twin Oaks. Located off of Nile Rd. (SR 1405) traveling east, at a logging road entrance on the right just prior to Dirt Nose Dr. This site is the Reeves' Property. Growing in semi-disturbed woodland margin adjacent to stream. Rare, exotic perennial forb/herb. 36°33'24.80"N, 81° 8'1.70"W, elev. 753 m. 22 July 2009, *D.B. Poindexter 09-833* (BOON).

MALVACEAE

15. *Anoda cristata* (L.) Schlecht. – This annual species is native to the southwestern USA as well as Central and South America (Weakley 2011). Spurred *Anoda* has only been documented from North Carolina based on a single collection from Mecklenburg County (2 October 1958, *H.E. Ahles 50200*, NCU) and was included in Radford et al. (1968). This taxon was found at a “waste ground” site in Charlotte according to the label data. In Ashe County, this plant was one of the three adventive species documented as derived from bird seed waste. Interestingly, this is one of the species noted by Hanson & Mason (1985) as a sporadic bird seed alien in Great Britain. *Anoda cristata* has also been documented from multiple counties in the Piedmont and Coastal Plain of Virginia (Wieboldt et al. 2011).

Voucher specimens: **Ashe Co.:** West Jefferson. Located at the Z. E. Murrell residence, 1011 Calloway Gap Rd. This plant was found as a waif, growing under a bird feeder in the front yard. 36°17'37.70"N, 81°22'51.02"W, elev. 917 m. 19 September 2007, *D.B. Poindexter 07-780* (BOON).

PAPAVERACEAE

16. *Macleaya cordata (Willd.) R. Brown – Plume-poppy is a perennial native of east Asia and often cultivated. It has been sparingly attributed to the flora of Virginia (Wieboldt et al. 2011) and reported as naturalized by Kral (1981) in Tennessee. In North Carolina it has been attributed to the mountains as a rare persistent or escaped species (Weakley 2011). Basis for this documentation is provided below. The collection listed from Watauga County was from a rather small but almost certainly escaped/sparingly naturalized population inhabiting an overgrown, disturbed roadside margin. No exhaustive searches were made for the cultivated source for this population.

Voucher specimens: **Jackson Co.:** well established on banks of lake at High Hampton inn, Cashiers. 22 August 1981, *C.R. Bell s.n.* (NCU). **Watauga Co.:** Valle Crucis. Located along NC 194, ca. 0.8 mi sw of the Broadstone Rd. jct. Across from the Taylor House Inn. Growing along a disturbed roadside, next to a power line pole. Rare. 36°11'56.14"N, 81°47'5.34"W, elev. 829 m. 17 July 2009, *D.B. Poindexter 09-821* (BOON, NCU).

PLANTAGINACEAE

17. *Digitalis grandiflora Mill. – This biennial (or occasionally perennial) species, commonly referred to as Yellow Foxglove, has been documented from several northern boreal areas of North America (Kartesz 2011; USDA, NRCS 2011). This species is a Eurasian native that is rarely cultivated in North Carolina and has never been documented for the flora. In Alleghany County, it was found in a small, apparently naturalized population in the floodplain and adjacent embankment of a large reservoir.

Voucher specimens: **Alleghany Co.:** Cherry Lane Township, Roaring Gap. Located within the main property of Roaring Gap Club, northeast of US Hwy 21, along the crest of the Blue Ridge Escarpment. Found along the southern extension of Lake Louise, at the dam crossed by Roaring Gap Dr. (SR 1478) near the club entrance. Growing in the flood plain on the south side of the road. 36°23'52.07"N, 80°58'58.10"W, elev. 879. 4 June 2010, *D.B. Poindexter 10-306* (BOON).

***18. *Linaria maroccana* Hook. F.** – Moroccan Toadflax is an annual, native to northern Africa. It has been documented from Virginia, presumably as a waif (Weakley 2011; Wieboldt et al. 2011). In Alleghany County, a single individual was found in a dry field near Roaring Gap. This record most certainly represents an adventive introduction, as no other individuals were found the following season. Like other showy members of the genus, *Linaria maroccana* is likely to appear sporadically within our flora due to its regular cultivation.

Voucher specimens: **Alleghany Co.:** Cherry Lane Township, Roaring Gap. Located along US 21 S, ca. 0.1 mi prior to Olde Beau Blvd., at High Meadows Restaurant. Growing on the edge of a dry, sterile old field in the southeast corner of the parking lot. Rare, exotic annual forb/herb. 36°24'25.4"N, 80°59'31.1"W, elev. 852 m. 10 September 2008, *D.B. Poindexter 08-1232* (BOON).

19. *Veronica chamaedrys* L. – This Eurasian native, commonly referred to as Germander Speedwell, is a perennial species that is more common than the literature indicates (Radford et al. 1968; Weakley 2011). Radford et al. (1968) presumably based their documentation on a specimen that was collected in Jackson County, within the southwestern mountains of North Carolina (16 May 1964, *W.C. Grimm s.n.*, NCU). However, additional specimens were collected as early as 1970 from the northwest mountains. In addition, this species was documented by Livengood (1972) along the Blue Ridge Parkway (a unit of the National Park Service) in Watauga County. Based on the specimen record, Germander Speedwell continues to persist along the Blue Ridge Parkway, where roadside mowing efforts have likely disseminated seeds of this species.

Voucher specimens: **Alleghany Co.:** Cranberry Township, Laurel Springs. Located at the on-ramp jct. of NC 18 and the Blue Ridge Parkway, 0.1 m east of NC 18. Growing under a shrub in the median of the jct. Frequent, exotic perennial forb/herb. 36°23'28.43"N, 81°14'36.99"W, elev. 866 m. 1 May 2009, *D.B. Poindexter 09-134* (BOON). **Ashe Co.:** Fleetwood. Located at 373 Cranberry Ln. Well-established/naturalized in a residential lawn. Frequent. 36°16'15.89"N, 81°31'48.78"W, elev. 957 m. 9 May 2009, *D.B. Poindexter 09-193* (BOON). **Watauga Co.:** Deep Gap on the Blue Ridge Parkway, 14 May 1970, *S. Scott 50* (BOON); Sim's Pond, roadside of Blue Ridge Parkway near bridge, 16 May 1971, *J.M. Carr s.n.* (BOON); same location, 18 May 1971, *M. Livengood 33* (BOON); SE of Foscoe. Located along the Blue Ridge Parkway, 0.5 mi W of Price Lake. Growing along mowed roadside and in forest ecotone. Frequent, exotic perennial herb/forb, 36°8'0.5"N, 81°44'34.4"W, elev. 1056 m. 19 May 2011, *D.B. Poindexter 11-105* (BOON);

POACEAE

***20. *Arrhenatherum elatius* (L.) J. Presl & C. Presl var. *bulbosum* (Willd.) Spenn.** – The typical variety of this species is a rather common constituent of meadows, fields, and roadsides in the state. The variety reported here, *Arrhenatherum elatius* var. *bulbosum*, has not yet been attributed to our flora. Tuber Oatgrass is a perennial native of Europe that was cultivated for its moniliform tubers during the Bronze Age (Weakley 2011). Typical Tall Oatgrass lacks tubers and derives its perennial habit from a cormose base. Specimens cited here from Watauga County are not heavily naturalized. Additional plants have been observed from this county at the Appalachian State University Farm, where they have been inadvertently introduced into cultivated fields.

Voucher specimens: **Watauga Co.:** Valle Crucis. Located along Red Tailed Hawk Rd., first residence on the left just west of the Dewitt Barnett Rd. jct. (ca. 0.3 mi NE of the Broadstone Rd. jct.). Growing in riparian zone of Watauga River and in adjacent cultivated areas. Infrequent. 36°12'31.61"N, 81°46'8.02"W, elev. 813 m. 17 July 2009, *D.B. Poindexter 09-823* (BOON, NCU).

***21. *Eragrostis tef* (Zuccagni) Trotter** – This annual, native to Africa and commonly known as Teff, has been documented from South Carolina near wool-combing mills and currently appears to be adventive in Alleghany County. It was found in the margin of a field, where it had presumably been cultivated for fodder, with a few individuals later germinating and persisting in disturbed soils.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Twin Oaks. Located off of New Haven Rd. (SR 1403), along driveway to the Roupe residence, ca. 0.3 mi south of the divergence of Nile Rd. (SR 1405) jct. Growing in old field that is mowed for hay. Frequent, exotic annual graminoid. 36°33'12.04"N, 81° 8'33.84"W, elev. 802 m. 9 September 2009, *D.B. Poindexter 09-1042* (BOON, NCU).

***22. *Glyceria declinata* Bréb.** – Waxy Mannagrass is a European native that is apparently becoming ever more common in North America based on an expanding distribution noted from range maps and text of various sources (Weakley 2011; Kartesz 2011; USDA, NRCS 2011). The establishment of this species in disturbed stream areas of North Carolina is likely a consequence of the plant's perennial habit. The records cited below substantiate the occurrence information provided by Weakley (2011).

Voucher specimens: **Alleghany Co.:** Piney Creek Township, Piney Creek. Located at the Stokes Tract of the New River State Park off of Deer Valley Rd., along the east side of the New River, ca. 0.8 mi from the Virginia State Line. This site is directly across the river from the Alleghany Access of the NRSP. Growing in small stream. Occasional, exotic perennial graminoid. 2 June 2008, *D.B. Poindexter 08-243* (BOON, US). **Watauga Co.:** East of Boone along Laxon Creek, 36°14'52.58"N, 81°34'38.50"W, elev. 906 m, locally common in *Alnus/Salix* riparian community, 20 May 2008, *M.W. Denslow 2577* (BOON, NCU).

23. *Hordeum jubatum* L. subsp. *jubatum* – Foxtail Barley is a perennial, native to the western USA. This taxon is treated as introduced in the eastern USA, where it seems to prefer medians of larger road systems. This inherently disturbed habitat is perhaps conducive to the halophytic preference of this syanthrope, where roads are heavily salted during winter months, thus providing necessary environmental conditions for Foxtail Barley. This plant was attributed to North Carolina by Radford et al. (1968) and considered very rare. The only known specimens to the authors are from Wake County in the Piedmont. The specimens cited below provide additional distribution records that confirm its naturalized presence in mountains of North Carolina.

Voucher specimens: **Alleghany Co.:** Cherry Lane Township, Glade Valley. Located along US 21, ca. 0.3 mi southeast of the Glade Valley Rd. (SR 1444) jct. Growing in the gravel parking area of a construction company. Infrequent, exotic perennial graminoid. 36°27'56.05"N, 81°3'2.24"W, elev. 808 m. 12 June 2010, *D.B. Poindexter 10-321* (BOON, NCU). **Watauga Co.:** Boone. Located just outside (ca. 1 mi) of city limits, N on US 421, at latitude 36° 13.482' N and longitude 81° 37.247' W (3269 ft elev.). Growing along margins of median in disturbed (likely high salinity) soils. 22 August 2007, *D.B. Poindexter 06-181* (BOON).

24. *Panicum miliaceum* L. subsp. *miliaceum – Broomcorn Millet in an annual species, native to Eurasia, and often cultivated as wildlife forage crop in the southeastern USA (Weakley 2011). This plant also is frequently found in greenhouse pots containing nursery plants, where it germinates with

ease (pers. obs.) as well as a bird feed waif (Hanson & Mason 1985). Documentation from North Carolina is based on sight records, with no previous specimen data known to the authors. This particular subspecies is far more widespread across the continental United States than subsp. *rudemale* (Kitagawa) Tzvelev. The collection cited below provides a voucher record and expands the distributional records for this plant in North Carolina. This population is most likely adventive.

Voucher specimens: **Alleghany Co.:** Prathers Creek Township, Stratford. Located along Walnut Branch Ch. Rd. (SR 1332), ca. 0.75 mi north of US 221 (west of Stratford). Growing between the road margin and an old barn. Rare, exotic annual graminoid. 36°30'43.8"N, 81°14'26.8"W, elev. 860 m. 5 August 2010, *D.B. Poindexter 10-444* (BOON, NCU).

***25. Pennisetum alopecuroides** (L.) Spreng. – Chinese Fountaingrass is a perennial species native to east Asia. It has been sparingly documented northward in Virginia but not in North Carolina (Weakley 2011). Although this plant is utilized in cultivation, the population documented here exemplifies its ability to escape and become established in disturbed environments. Several clearly naturalized colonies were noted from a roadside ditch in Alleghany County.

Voucher specimens: **Alleghany Co.:** Piney Creek Township, Piney Creek. Located along NC 113, 110 m north of the Len Rd. (SR 1322) jct. Growing in a culturally disturbed ditch on the east side of NC 113. This plant is obviously naturalized. Scarce, exotic perennial graminoid. 36°32'20.3"N, 81°18'2.1"W, elev. 877 m. 18 September 2009, *D.B. Poindexter 09-1135* (BOON, NCU).

***26. Puccinellia distans** (Jacq.) Parl. – This Eurasian perennial was found in the same locality as *Hordeum jubatum* in Watauga County. Commonly referred to as European Alkali Grass, it is the most widespread exotic within this genus in North America and appears to be migrating along highway corridors that have saline soils from vehicular transport or additional vectors. Likewise, this route of dispersal has been documented in Great Britain (Scott & Davison 1982).

Voucher specimens: **Watauga Co.:** Boone. Located just outside of the city limits (ca. 1 mi), traveling N on US 421. Growing along the margins of highway median in disturbed (likely high salinity) soils. Approximately 12+ individuals. 36°13.482'N, 81°37.247'W, elev. 3269 ft. 15 June 2007, *D.B. Poindexter 07-213* (BOON).

***27. Setaria viridis** (L.) P. Beauv. var. **major** (Gaudin) Posp. – This annual taxon, known as Giant Green Foxtail, is native to Eurasia. According to Weakley (2011) it has not been documented in North Carolina. The population observed was moderate in size (ca. 30+ individuals) but found in areas of heavy recent disturbance. This suggests that the plant may be simply adventive due in part to its annual nature, and thus naturalization cannot be unequivocally confirmed at this time.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Twin Oaks. Located along Nile Rd., ca. 0.4 mi west of the River Rd. jct. Growing in disturbed roadside soils. Occasional, exotic annual graminoid. 36°34'4.49"N, 81° 6'44.10"W, elev. 711 m. 9 September 2009, *D.B. Poindexter 09-1037*(BOON, NCU).

RHAMNACEAE

***28. Frangula alnus** Mill. – Glossy Buckthorn is a shrub or small tree that is listed as a Noxious Weed in several areas of the northeastern USA (USDA, NRCS 2011). At present, this plant is

apparently rare in the southeastern USA (Weakley 2011; USDA, NRCS 2011). The first collections of this species from North Carolina were collected by D. Pittillo along the Blue Ridge Parkway in Buncombe County in 1999 (D. Pittillo, pers. comm.). However, no specimens of this collecting event could be located (K. Matthews & D. Pittillo, pers. comm.). A new population of this species was discovered in Watauga County, where a plant was found growing spontaneously at the edge of a deciduous forest near a residence. The single observed individual suggests that this species is merely adventive at the moment. Accurate distribution records of this species are critical due to the impacts it may have on native vegetation (Frappier et al. 2003).

Voucher specimen: **Watauga Co.:** Northeast of Boone, Timberlane Drive growing spontaneously near residence, one plant seen. 36°14'20.04"N, 81°39'54.00"W, elev. 1017 m. 9 May 2010, *M.W. Denslow* 2659 (BOON, NCU, WCUH).

ROSACEAE

29. *Prunus tomentosa Thunb. – Nanking Cherry is a shrub or small tree that is native to Asia. It is often cultivated and according to Weakley (2011) naturalized in Maryland and Pennsylvania. Rhoads and Block (2007) noted that the habitat for this taxon in Pennsylvania usually is a sandy area. In Alleghany County, it was found below a residential area on a very steep, unkempt road bank devoid of any other cultivated plants but dominated by various naturalized species and successional taxa. In this area where it was obviously not planted, we speculate that it was deposited by an animal (most likely an avian vector) from a seed source nearby. Although only a single individual was noted, the possibility for additional escaped plants in the vicinity is great. “Naturalized” is too strong of a word for currently describing the growth habit of this species until further escapes are found. Consequently, this record should perhaps be treated as adventive at present.

Voucher specimens: **Alleghany Co.:** Gap Civil Township, Sparta. Located near the city limits, traveling southeast on US 21 ca. 30 meters past Ballpark Rd. near the Little River. 36°29'51.77"N, 81°6'31.10"W, elev. 845 m. 25 March 2011, *D.B. Poindexter 11-05* (BOON, NCU).

ZYGOPHYLLACEAE

30. *Tribulus terrestris* L.– This species is an annual, native to Mediterranean Europe. Although this record of Puncture-weed (just as those of *Anoda cristata*, *Bassia scoparia*, and *Panicum miliaceum* subsp. *miliaceum*) is clearly a waif, it demonstrates the ability of the plant to germinate, reach anthesis, and fruit in an area that could be perceived as climatically unsuitable. With our dynamic global climate pattern, coupled with human influence, adventives such as this may become a more common component of our landscape. Consequently, acknowledging their presence now, despite their current ephemeral nature, will only increase awareness of their presence in the future. This taxon has been rarely found in the Coastal Plain of North Carolina. It is considered a noxious weed (USDA, NRCS 2011) that has only been documented from New Hanover County in North Carolina (Radford et al. 1968). This documentation provides a second county occurrence.

Voucher specimens: **Ashe Co.:** West Jefferson. Located at the Z.E. Murrell residence, 1011 Calloway Gap Rd. This plant was found as a waif growing under a bird feeder in the front yard. 36°17'37.70"N, 81°22'51.02"W, elev. 917 m. 22 August 2007, *D.B. Poindexter 07-708* (BOON).

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REFERENCES

- Chester, E.W., B.E. Wofford, D. Estes, and C. Bailey. 2009. A fifth checklist of Tennessee vascular plants. *Sida, Botanical Miscellany* No. 31.
- Ertter, B. 2000. Floristic surprises in North America north of Mexico. *Ann. Missouri Bot. Gard.* 87: 81–109.
- Frappier, B., R.T. Eckert, and T.D. Lee. 2003. Potential impacts of the invasive exotic shrub *Rhamnus frangula* L. (Glossy Buckthorn) on forests of southern New Hampshire. *Northeastern Naturalist* 10: 277–296.
- Hanson, C.G. and J.L. Mason. 1985. Bird seed aliens in Britain. *Watsonia* 15: 237–252.
- Hartman, R.L. and B.E. Nelson. 1998. Taxonomic novelties from North America north of Mexico: A 20-year vascular plant diversity baseline. *Monogr. Syst. Bot.* 67: 1–59.
- Jahodová, Š., L. Fröberg, P. Pyšek, D. Geltman, S. Trybush, and A. Karp. 2007. Taxonomy, identification, genetic relationships and distribution of large *Heracleum* species in Europe. Pp. 1–19, in P. Pyšek et al. (eds.). *Ecology and Management of Giant Hogweed (Heracleum mantegazzianum)*. Wallingford and Cambridge, Massachusetts.
- Kartesz, J.T. 2011. North American Plant Atlas. The Biota of North America Program (BONAP), Chapel Hill, North Carolina <<http://www.bonap.org/MapSwitchboard.html>> 28 Aug 2011.
- Keil, D.J. and J. Ochsmann. 2006. *Centaurea*. Pp. 181–194, in *Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico, Volume 19: Magnoliophyta: Asteridae (in part): Asteraceae, part 1*. Oxford University Press, New York.
- Kohn, D.D., P.E. Hulme, P.M. Hollingsworth, and A. Butler. 2009. Are native bluebells (*Hyacinthoides non-scripta*) at risk from alien congenics? Evidence from distributions and co-occurrence in Scotland. *Biol. Conservation* 142: 61–74.
- Kral, R. 1981. Some distributional reports of weedy or naturalized foreign species of vascular plants for the southern states, particularly Alabama and middle Tennessee. *Castanea* 46: 334–339.
- Leonard, S.W. 1971. Additions to the flora of the Carolinas. *J. Elisha Mitchell Sci. Soc.* 87: 97–100.
- Livengood, J. M. 1972. Vascular flora of the Sim's Pond Area: a thesis. M.S. thesis, Appalachian State Univ., Boone, North Carolina.
- McNeill, J. 2002a. *Chionodoxa*, pp. 315–315. In: *Flora of North America Editorial Committee (eds.). Flora of North America North of Mexico, Volume 26: Magnoliophyta: Liliidae: Liliales and Orchidales*. Oxford Univ. Press, New York.
- McNeill, J. 2002b. *Hyacinthoides*, pp. 315–316. In: *Flora of North America Editorial Committee (eds.). Flora of North America North of Mexico, Volume 26: Magnoliophyta: Liliidae: Liliales and Orchidales*. Oxford Univ. Press, New York.
- Mellichamp, T.L, J.F. Matthews, and P.J. Smithka. 1987. New state and regional records of vascular plants in the Carolinas. *Castanea* 52: 95–111.
- Mellichamp, T.L, J.F. Matthews, and P.J. Smithka. 1988. It's *Anthriscus sylvestris*, not *Conioselinum chinensis*, new to North Carolina-Tennessee. *Castanea* 53: 81–82.

- Moldenke, H.N. 1980. A sixth summary of the Verbenaceae, Avicenniaceae, Stilbaceae, Chloanthaceae, Symphoremaceae, Nyctanthaceae, and Eriocaulaceae of the world as to valid taxa, geographic distribution and synonymy. *Phytologia Memoirs II*. Privately published, Plainfield, New Jersey.
- Nesom, G.L. 2000. Which non-native plants are included in floristic accounts? *Sida* 19: 189–193.
- Pittillo, J.D. and A.E. Brown. 1988. Additions to the vascular flora of the Carolinas, III. *J. Elisha Mitchell Sci. Soc.* 104: 1–18.
- Pyšek, P., D.M. Richardson, M. Rejmánek, G.L. Webster, M. Williamson, and J. Kirschner. 2004. Alien plants in checklists and floras: Towards better communication between taxonomists and ecologists. *Taxon* 53: 131–143.
- Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. *Manual of the vascular flora of the Carolinas*. Univ. of North Carolina Press, Chapel Hill, North Carolina.
- Rhoads, A.F. and T.A. Block. 2007. *The plants of Pennsylvania: An illustrated manual* (ed. 2). Univ. of Pennsylvania Press, Philadelphia, Pennsylvania.
- Rix, M. 2004. *Hyacinthoides non-scripta*, Hyacinthaceae. *Curtis's Bot. Mag.* 21: 20–25.
- Šegota, V., A. Alegro, and V. Hršak. 2009. Overlooked hybrids of *Prunella* L. in Croatian flora. *Nat. Croat.* 18: 287–294.
- Scott, N.E. and A.W. Davison. 1982. De-icing salt and the invasion of road verges by maritime plants. *Watsonia* 14: 41–52.
- USDA, NRCS. 2011. The PLANTS Database. National Plant Data Team, Greensboro, North Carolina. <<http://plants.usda.gov>>
- Weakley, A.S. 2005. Change over time in our understanding of the flora of the southeastern United States: implications for plant systematics, bioinformatics, and conservation. Ph.D. dissertation, Duke Univ., Nicholas School of the Environment and Earth Sciences. 3240 pp.
- Weakley, A.S. 2011. Flora of the southern and Mid-Atlantic states. Working draft of 15 May 2011. Univ. of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, North Carolina.
- Wieboldt, T.F., G.P. Fleming, C.E. Stevens, J.F. Townsend, D.M.E. Ware, and R.A.S. Wright. 2011. *Digital Atlas of the Virginia Flora*. Virginia Botanical Associates, Massey Herbarium, Department of Biological Sciences, Virginia Tech, Blacksburg. <http://www.biol.vt.edu/digital_atlas> 14 Jan 2011.