Juncus diffusissimus, an addition to the flora of New York, with notes on its recent spread in the United States

Author(s): Eric E. Lamont and Stephen M. Young
Source: The Journal of the Torrey Botanical Society, 132(4):635-643. 2005.
Published By: Torrey Botanical Society
DOI: http://dx.doi.org/10.3159/1095-5674(2005)132[635:JDAATT]2.0.CO;2
URL: http://www.bioone.org/doi/full/10.3159/1095-5674%282005%29132%5B635%3AJDAATT%5D2.0.CO%3B2

Journal of the Torrey Botanical Society 132(4), 2005, pp. 635–643

Juncus diffusissimus, an addition to the flora of New York, with notes on its recent spread in the United States

Eric E. Lamont[1,2]

Local Flora Committee, Torrey Botanical Society, The New York Botanical Garden, Bronx, NY 10458

Stephen M. Young

New York Natural Heritage Program, 625 Broadway, Albany, NY 12233

LAMONT, E. E. (Local Flora Committee, Torrey Botanical Society, The New York Botanical Garden, Bronx, NY 10458) AND S. M. YOUNG (New York Natural Heritage Program, 625 Broadway, Albany, NY 12233). *Juncus diffusissimus*, an addition to the flora of New York, with notes on its recent spread in the United States. J. Torrey Bot. Soc. 132: 635-643. 2005.—The first New York State record for *Juncus diffusissimus* Buckley (Juncaceae) is reported from Suffolk County, Long Island. An historical account of the species' original range and post-1900 migration in the United States is presented. The nativity status of *J. diffusissimus* and several other species that have spontaneously migrated into new territories in eastern United States during the past 100 years is discussed.

Key words: disturbed-habitat species, *Juncus diffusissimus*, native plants, New York flora, non-native plants, plant biogeography, plant migration, slimpod rush, state record.

This report is the fourth in a continuing series of floristic studies by the Local Flora Committee of the Torrey Botanical Society. Each of the previous reports has included short notes on approximately 20 vascular plant species from the Torrey Range. This current report provides detailed information on a single species reported for the first time from the Torrey Range in 2004. For historical and background information contained in earlier reports, see Lamont and Fitzgerald (2001) and Lamont and Young (2002, 2004).

While conducting rare plant surveys on Long Island, New York, we located a population of *Juncus diffusissimus* Buckley (Juncaceae) in the Township of Islip, Suffolk County. This was the first time it had been collected in New York (Mitchell and Tucker 1997) and the first report for the Torrey Range (as delineated by Lamont and Fitzgerald 2001). Seventeen fruiting plants were located on 29 September 2004, in a marsh just east of upper Pardees Creek that flows into Orowoc Creek and ultimately empties into Great South Bay. The site is located on Long Island's glacial outwash plain, a region generally dominated by pitch pine-oak forest (Edinger et al. 2002).

We had been updating the status of rare plants occurring at a radio antenna site on the west side of Freeman Avenue, just east of upper Pardees Creek. The site supports New York's largest populations of *Pyxidanthera barbulata* Michx. and *Polygala lutea* L., each at the northernmost limit of their ranges. Other state rare species at the site includes *Eurybia spectabilis* (Ait.) Nesom (= *Aster spectabilis* Ait.), *Liatris scariosa* (L.) Willd. var. *novae-angliae* Gandhi, Young & Somers, *Scleria triglomerata* Michx., and *Solidago latissimifolia* P. Mill. (=*S. elliottii* Torr. & A Gray).

The upland antenna site gradually slopes down into a red maple/tupelo swamp bordering upper Pardees Creek. The swamp forest consists of a canopy dominated by *Acer rubrum* L. and *Nyssa sylvatica* Marshall, with scattered individuals of *Pinus rigida* Miller; a shrub and liana layer dominated by *Clethra alnifolia* L., *Ilex verticillata* (L.) A. Gray, *Rhododendron viscosum* (L.) Torr., *Smilax rotundifolia* L., and *Vaccinium corymbosum* L., with scattered individuals of *Salix discolor* Muhl. and *Viburnum dentatum* L. var. *lucidum* Aiton; and a sparse ground layer of *Impatiens capensis* Meerb., *Osmunda cinnamomea* L., and *Viola cucullata* Aiton.

The northwestern portion of the antenna site borders the red maple/tupelo swamp, and supports a marshland community dominated by

[1] We thank Kerry Barringer for coordinating herbarium loans and providing work space at BKL. We are indebted to many botanists for checking specimens at various herbaria, sharing observations, providing data, and commenting on earlier drafts of this manuscript; we gratefully acknowledge Steven Clemants, Andrew Doran, Janet Ebert, Peter Fauth, Misty Franklin, Christopher Frye, Richard Gardner, Andrew Greller, Paul Harmon, Jack Holt, Wesley Knapp, Marcus Koenen, John Kunsman, Geoffrey Levin, William McAvoy, Melissa Moser, Christine Niezgoda, Thomas Patrick, Bruce Sorrie, Brent Steury, John Townsend, Alan Weakley, Troy Weldy, George Yatskievych, and Peter Zika.

[2] Corresponding author: E-mail: elamont@optonline.net

Received for publication July 26, 2005, and in revised form November 25, 2005.

herbs and graminoids, including *Bidens connata* Muhl., *Carex* spp., *Epilobium coloratum* Biehl., *Eupatorium pilosum* Walt., *Euthamia graminifolia* (L.) Nutt., *Juncus canadensis* J. Gay, *Juncus effusus* L., *Onoclea sensibilis* L., *Panicum* spp., *Rubus hispidus* L., *Scirpus cyperinus* (L.) Kunth, *Solidago rugosa* Mill., and *Thelypteris palustris* Schott. Seventeen closely grouped individuals of *Juncus diffusissimus* were located in this marsh on 29 September 2004. Two voucher specimens were collected, one consisting of an entire plant and deposited at The New York Botanical Garden (NY), the other of the upper plant without rhizomes and deposited at the New York State Museum at Albany (NYS).

Taxonomic History and Distinguishing Characteristics. Buckley (1862) first described *J. diffusissimus* as a distinct species based on specimens collected from northeastern Texas. Engelmann (1868) recognized *J. diffusissimus* as a variety of *J. acuminatus* Michx., and published the new combination *J. acuminatus* var. *diffusissimus* (Buckley) Engelmann; but his treatment was never widely accepted. Engelmann also had recognized *Juncus debilis* A. Gray as a variety of *J. acuminatus* and published the combination *J. acuminatus* var. *debilis* (A. Gray) Engelmann. All three taxa are superficially similar, but can be distinguished from each other by the following key:

1. Mature capsule 4–6 mm long, nearly or quite twice as long as the perianth; inflorescence conspicuously diffuse . . . . . *J. diffusissimus*
1. Mature capsule 2–4 mm long, equaling or slightly longer than the perianth; inflorescence not conspicuously diffuse.
   2. Perianth 2.5–3.5 (-3.9) mm long; capsule about equaling the perianth . . *J. acuminatus*
   2. Perianth 1.8–2.3 (-2.5) mm long; capsule exserted . . . . . .*J. debilis*

Juncus diffusissimus is easily recognized by the combination of its diffusely branched, widely spreading inflorescence (usually constituting a third of the height of the plant), and its linear, prismatic, golden brown capsules that are about twice as long as the tepals and therefore protrude conspicuously from the perianth at the fruiting stage. The common name, slimpod rush, is derived from the conspicuous fruit character.

Juncus diffusissimus usually occurs in sandy or soft mucky substrates and shallow water along marshy shores and sloughs; occasionally it is found in wet, wooded habitats. It can be an aggressive colonizer of wet, sandy, alluvial outwash, ditches, and clearings (Kirschner 2002).

Past and Present Distribution. Herbarium searches at BKL, DOV, DUKE, GA, HHH, HUH, ILLS, MO, NY, NYS, OSC, PH, WTU, and WVU (abbreviations follow Holmgren et al. 1990) and a review of published literature reveal that *J. diffusissimus* has significantly expanded its range during the past 100 years.

Early collections (Table 1) reveal an original range that included northeastern Texas, central and eastern Oklahoma and Kansas, the southern half of Missouri, Arkansas, Louisiana, Mississippi, Alabama, northwestern Georgia, central and western Tennessee and Kentucky, and southernmost Illinois and Indiana (Fig. 1). The northern range limit was restricted to non-glaciated regions. The original eastern limit cannot be precisely determined, but it probably extended to the west of the Appalachian Mountains (Shanks 1941). The pre-1900 distribution of *J. diffusissimus* in Illinois is not clear because the earliest collection that we could find dated to 1960 (Table 1). We found no collections of *J. diffusissimus* from Illinois at HUH, ILLS, NY, and US, and the earliest collection at MO dated to 1976. This gap in data might reflect a lack of early collections, or *J. diffusissimus* may have been rare in Illinois.

The data derived from our herbarium search confirms the original range reported by Small (1903), Robinson and Fernald (1908), and Britton and Brown (1913) as extending from ''Indiana and Kansas to Georgia and Texas''. This early range delineation reported in the literature also confirms our assertion that before 1900, *J. diffusissimus* did not occur on the Atlantic coastal plain of eastern United States.

In 1902, William Palmer collected *J. diffusissimus* from the vicinity of Charleston, South Carolina; apparently, this collection documented the first occurrence on the Altantic coastal plain (Table 1). Seaports such as Charleston were the sites of entry for many non-native plants introduced to eastern United States (Porcher and Rayner 2001, Lamont 1994). We located no other collections of *J. diffusissimus* from the Atlantic coastal plain from 1903 to 1926.

In 1927, *J. diffusissimus* was collected for the first time from southeastern Virginia (Table 1). During the 1930s, it was collected several other times from that region by M. L. Fernald (vouchers at HUH, NY, and US) and in 1940, it was collected for the first time from northern Florida (Table 1). Batson (1952) reported the first occurrence of *J. diffusissimus* from North Carolina, based upon his collection from 1950 (Table 1).

Table 1. Some early collections of *Juncus diffusissimus* in the United States.

Year	State	Location and habitat	Collector (herbarium)
1868	Alabama	Mobile Co., Mobile; in ditches	Mohr (US)
1868	Oklahoma	[Caddo Co.], between Fort Cobb & Fort Arbuckle	Palmer (NY, US)
1870	Kansas	Bourbon Co., banks of rivulets	Hall (HUH, NY)
1872	Texas	Waller Co., Hempstead; low places	Hall (HUH, NY, US)
1875	Indiana	Jefferson Co., Hanover	Coulter (NY)
1885	Arkansas	Pulaski Co.; wet places	Hasse (NY)
1891	Mississippi	Harrison Co., Biloxi	Tracy (US)
1892	Missouri	Ripley Co., Bay Mill; bogs	Mackenzie (NY)
1895	Louisiana	Orleans Parish, New Orleans	Palmer (NY)
1900	Georgia	Whitfield Co., w of Barren Hills	Harper (US)
1902	South Carolina	Charleston Co., Charleston	Palmer (US)
1922	Tennessee	Carroll Co., Hollow Rock; muddy soil	Svenson (BKL)
1927	Virginia	Isle-of-Wight Co., Carrsville; ditch	Wiegand & Manning (HUH)
1928	West Virginia	Boone Co., without specific locality	Botanical Expedition WVU (WVU)
1934	Kentucky	Nelson Co., Nazareth; edge of pond	Agnus (NY)
1940	Florida	Bay Co., Panama City; wet clearing	Martin (NY)
1950	North Carolina	Columbus Co., roadside margin bordering Lake Waccamaw	Batson (DUKE)
1954	Ohio	Pike Co., Jackson Twp., in wet sand	Bartley & Hicks (US)
1960	Illinois	Massac Co., Midway; creek bank	Evers (ILLS)
1966	Maryland	Anne Arundel Co., n of Friendship Airport	Balters (US)
1987	California	Sacramento Co., American River floodplain	Wymer (UC)
1993	Delaware	New Castle Co., Summit Bridge; dredge spoil, pond edge	Ebert & Holt (DOV)
1994	Washington	Cowlitz Co., Castle Rock; sandy shoreline	Kollock & Wilson (OSC)
1999	Connecticut	Hartford Co., Hartford; under power lines	*fide* Clemants[1]
2001	Pennsylvania	Chester Co., Eagle; wet, disturbed sands	Ebert & Holt (PH)
2003	Oregon	Columbia Co., Dibblee Point, river shore	Zika (OSC, WTU)
2004	New York	Suffolk Co., Islip; freshwater marsh	Lamont & Young (NY, NYS)

[1] Clemants (2000, and pers. comm.) reported *J. diffusissimus* from Connecticut, but we were unable to locate a voucher at CONN, HUH, or elsewhere.

In 1952, Gleason reported two distinct regions of distribution for *J. diffusissimus*: one, west of the Appalachian Mountains, extending from ''southern Indiana to Missouri and Oklahoma, south to Alabama and Texas''; the other, ''along the coastal plain from southeastern Virginia to South Carolina''. Once again, our herbarium research confirms Gleason's (1952) general distribution pattern for the mid-1900s; however, Gleason must not have been aware of several pre-1950 collections from Georgia and the 1940 collection from Florida (Table 1). During and after the 1950s, numerous voucher specimens were collected from all physiographic regions of the southeastern states, including the coastal plain, piedmont, ridge and valley, and mountain provinces.

The pre-1900 status of *J. diffusissimus* in West Virginia and Ohio is relatively unclear. Although the original range of the species might barely have extended into these two states, we speculate (based upon published literature and our herbarium research) that *J. diffusissimus* began colonizing West Virginia in the late 1920s and 1930s (see Martin 1939), and Ohio in the 1950s. During the past 50 years, *J. diffusissimus* has been collected from at least ten counties in West Virginia and six in Ohio.

In 1966, *J. diffusissimus* was collected in Anne Arundel County, Maryland (Table 1), but it was not until the late 1980s and early 1990s that it was more commonly collected west of Chesapeake Bay, Maryland, and in the vicinity of Washington, D.C. (Fleming and Kanal 1992, Steury 2002). In 1993, *J. diffusissimus* was collected in New Castle County, Delaware (Table 1), and in the early 2000s, it was collected in the Delmarva Peninsula, including Wicomico and Worcester counties, Maryland (Knapp, pers. comm.), and Northampton County, Virginia (McAvoy, pers. comm.). Knapp (pers. comm.) reported, ''The habitat it grows in here in Maryland is similar to its habitat in the Southeast,

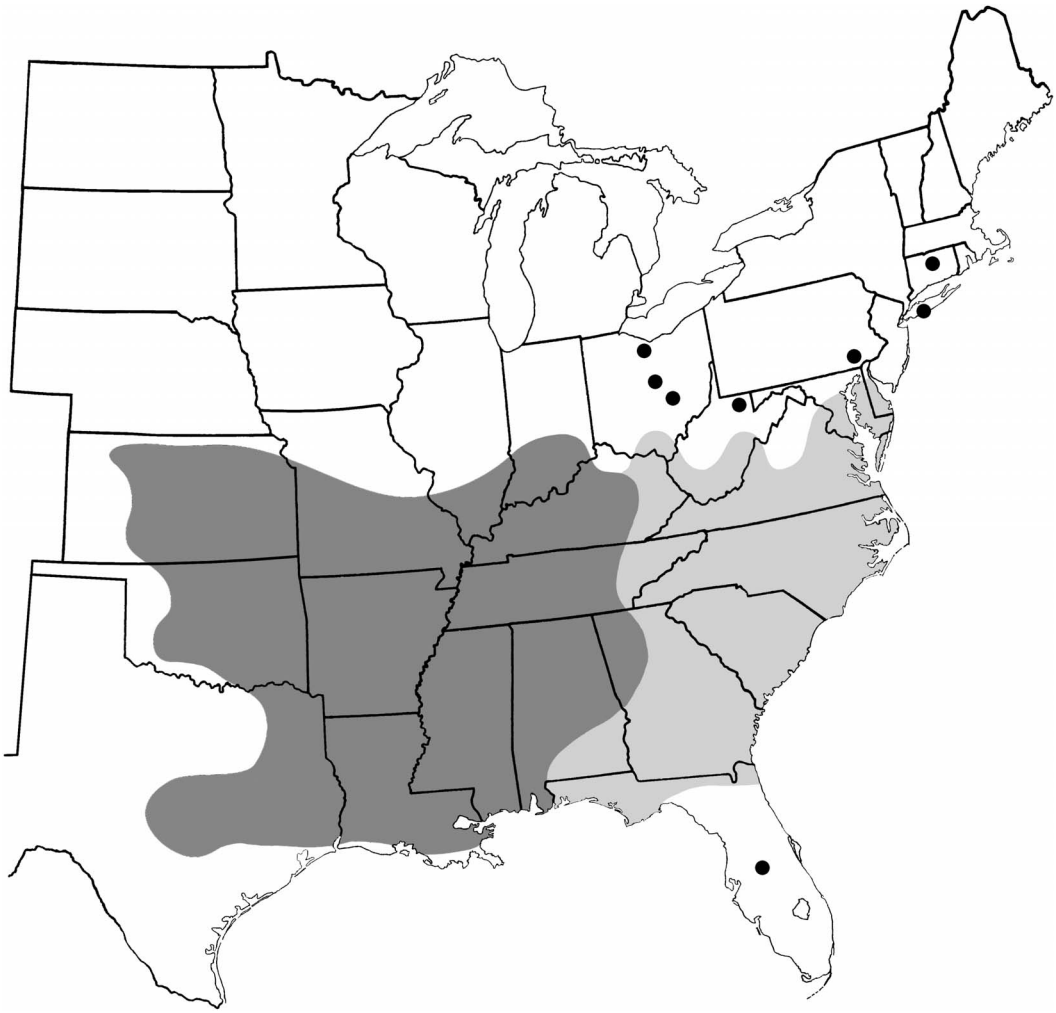

FIG. 1. Distribution of *Juncus diffusissimus* in central and eastern United States. Dark shaded area indicates original range (see text); light shaded area indicates post-1900 expanded range; dots indicate post-1975 disjunct populations.

heavily to moderately disturbed, exposed, sandy soils, that are seasonally saturated. Typically, I see it growing in ditches, logging roads, and seepages.''

The most recent new state records of *J. diffusissimus* from eastern United States are based upon collections from Chester County, Pennsylvania; Hartford County, Connecticut; and Suffolk County, New York (Table 1). Each occurrence consisted of a single population occurring in disturbed, mesic to seasonally wet, sandy soils. At the Pennsylvania and New York sites, surface soils had been scraped by heavy machinery within recent years; in 2001, the Pennsylvania population consisted of ''at least several hundred plants'' (Holt, pers. comm.). The Connecticut population occurs under power lines. McVaugh's (1958) report of *J. diffusissimus* from Columbia County, New York, is ''probably based on records of *J. debilis*, with which there is some nomenclatural confusion'' (Clemants 1990). The specimens [*Hoysradt s.n.*, 8 Sept 1878; and *Carey s.n.*, without date] upon which this report was based were apparently deposited at Missouri Botanic Garden, but no specimens matching this species, or annotated as such by McVaugh, have been seen there (*fide* Clemants); nor are the two specimens in the Hoysradt Herbarium at Hartwick College, Oneonta, New York (*fide* Fauth). Deam's (1940) report of *J. diffusissimus* occurring from ''New York to Indiana and Kansas, southward to Texas

and Georgia'' might also be based upon the Hoysradt and Carey collections.

On the west coast of the United States, *J. diffusissimus* has been recently collected from Sacramento, Butte, and Contra Costa counties, California; Cowlitz County, Washington; and Columbia County, Oregon (Table 1). The California populations occur in the Sacramento Valley floristic province along the American River floodplain, Sacramento River delta, and Georgiana slough (Hrusa, pers. comm.). In Washington, Zika (pers. comm.) reported, ''The plant is naturalized along the Cowlitz River corridor south of Mt. St. Helens. I've collected it there several times, and seen moderately large populations'' (also see Zika et al. 2000). In Oregon, it was collected in 2003 along ''the south shore of the Columbia River in disturbed, sandy, seasonally wet soils, in full sun'' (Zika, pers. comm.).

In 1996, Balslev reported *J. diffusissimus* from Peru, based upon the following voucher specimen: Lambayeque, Chilcayo, Río Reque, 25 m, 20 Dec 1977, *Quiroz 25* (AAU, MO, NY). Balslev (1996) commented, ''Its stray occurrence in Peru, documented here for the first time and only by a single collection, is separated from its main area of distribution by 3000–4000 km; it can be explained only by random long-distance dispersal caused by humans or migrating birds. In Peru its habitat is aquatic, according to the herbarium label.''

Native versus Non-native Status. Along the Atlantic seaboard, *J. diffusissimus* has been listed as a native species in Florida, Georgia, South Carolina, North Carolina, and Virginia (Fernald 1950, Radford et al. 1968, Godfrey and Wooten 1979, Gleason and Cronquist 1991, Harvill et al. 1992, Wunderlin 1998, and Weakley 2005), but it is currently considered non-native in Delaware (McAvoy and Bennett 2001), Maryland (Frye and Knapp, pers. comm.), and Pennsylvania (Kunsman, pers. comm.).

Distinction between native and non-native status of a vascular plant species is usually unambiguous. However, in the specific case of a native species spontaneously expanding its range, no consensus of opinion has been established among botanists on determining the nativity status of the species in its newly colonized territory. Furthermore, discussion of this specific case is conspicuously absent in the literature.

Historically, extensive attention has been given to the nativity status of vascular plant species in eastern United States (e.g., Cutler 1785, Schweinitz 1832, Martindale 1876, Brown 1878, Burk 1877, Fernald 1905, Fletcher 1916, Rehder 1936, Rollins 1953). Recently, Mehrhoff (2000), Nesom (2000), Yatskievych and Raveill (2001), and Sorrie (2005) have presented excellent discussions and historical reviews of the topic. The term ''native'' or ''indigenous'' is traditionally used for those species that occurred within a defined geographic region prior to European contact; ''non-native'' or ''nonindigenous'' refers to species that appear to have arrived sometime after AD 1500 (Mehrhoff 2000). Based upon a strict application of these terms as traditionally defined, *J. diffusissimus* should be considered non-native in all states on the eastern seaboard because the species did not occur there before European contact.

In the overwhelming majority of cases, a strict application of these two terms, as traditionally defined, will yield a correct nativity status for a species. However, in our opinion, these traditional definitions are deficient and often misleading when dealing with North American species that have spontaneously migrated into new territories, and the inconsistent application of these terms has resulted in confusion and contradictions in assigning nativity status to certain species.

In an effort to show that the questionable nativity status of *J. diffusissimus* in the eastern states is not an isolated case or anomaly, we draw attention to five other examples of North American species that also have spontaneously, and often aggressively, migrated into regions north of Chesapeake Bay during recent years.

1. *Eclipta prostrata* (L.) L. [=*E. alba* (L.) Hassk.] is a species primarily of moist or wet disturbed sites, muddy banks and shores, marshes, alluvial meadows, and floodplain forests. Voss (1996) described it as ''apparently a native American plant of weedy habit in moist ground''. Its range and nativity status has been defined as: ''native to the New World and widespread in the tropics and warm-temperate climates'' (Fisher 1988); ''native to the New World, now pantropical, and north in our range to Massachusetts, southern Ontario, and Wisconsin'' (Gleason and Cronquist 1991); native from ''Massachusetts west to Wisconsin, south to Florida and Texas, and into the tropics'' (Weakley 2005). It has been considered native to Florida (Wunderland 1998), Virginia (Harvill et al. 1992), and New Jersey (Hough 1983, NatureServe 2005), although Anderson (1997) considered it non-native in New Jersey, and McAvoy and Bennett (2001) considered it non-native in

Delaware. Young and Weldy (2005) considered it native to New York, but Taylor (1915) considered it ''naturalized from Tropical America'' and House (1924) considered it ''naturalized from the South''; Mitchell and Tucker (1997) commented, ''the native status of this species in New York is in question; it is a somewhat weedy Coastal Plain native that is rare this far north.'' Fernald (1950) listed it as native from Florida to Long Island, New York, but non-native in Massachusetts. It also has been listed as non-native in Massachusetts by Seymour (1982), Sorrie and Somers (1999), and Sorrie (2005).

2. *Eupatorium serotinum* Michx. has been long considered native from Florida to New Jersey (Fernald 1950, Hough 1983, Anderson 1997, McAvoy and Bennett 2001). Cronquist (1952, 1980), Gleason and Cronquist (1991), and Young and Weldy (2005) considered it native to southeastern New York, but Mitchell and Tucker (1997) listed it as non-native in New York. During the past 50 years, *E. serotinum* has become more widely established in sandy, disturbed habitats in southeastern New York and adjacent New Jersey, Connecticut, and Massachusetts (Lamont and Young 2002, Sorrie 2005). Weakley (2005) also noted the recent range expansion of *E. serotinum* in the Southeast: ''This species was apparently largely or strictly coastal in our area [Georgia, the Carolinas, and Virginia], but has spread inland rapidly along corridors of disturbance. . . '' Similar observations have been reported by other botanists, and have been summarized by Weldy (pers. comm.): ''My experience with *Eupatorium serotinum* in Virginia indicates the possible presence of two ecotypes. The first occurs along the back edges of brackish and freshwater marshes, and in bottomland woods (where filtered light reaches the ground) along the edges of freshwater/tidal streams. It also has been reported from bottomland woods in the Ridge and Valley province of Virginia, disjunct from the coastal plain and any tidal influence. In both physiographic regions, *E. serotinum* is considered native, but is a minor component in plant communities and never develops aggressive tendencies. The second ecotype occurs in dry, sandy, disturbed, upland sites with *Pinus virginiana* or *P. taeda*. Often, just after a clear cut or in a building lot, *E. serotinum* will become the dominant species. It is very aggressive and almost invasive in habit. Some Virginia botanists have speculated that this upland form is of recent origin with a genetic component contributing to its aggressive habit. If this scenario is accurate, it may be the upland ecotype that has been spreading northward and colonizing sandy, disturbed habitats in southeastern New York.'' Voss (1996) reported the recent range expansion of *E. serotinum* into southern Michigan, noting, ''Not until the 1960s and 1970s did it show up in other counties...along railroads, disturbed roadsides and dooryards, thickets on old dunes''; and Sorrie (2005) reported increased occurrences in Massachusetts from 1933 to present, along roadsides and railroad corridors.

3. *Heterotheca subaxillaris* (Lam.) Britt. & Rusby is a species primarily of dry, often sandy soils, especially in disturbed sites (Cronquist 1980); it is a conspicuous component of coastal dunes, sand-flats, and sandhills in southeastern United States (Wunderland 1998, Weakley 2005). The original range and nativity status of this species along the eastern seaboard has been much debated. Semple (1996) defined the eastern range of *H. subaxillaris* as extending along the coastal plain from Florida to Long Island, New York. Likewise, Cronquist (1980) considered the range north of Florida as extending ''mainly on the coastal plain to Delaware and Long Island'', but added it was ''perhaps not native northeastward.'' Later, Cronquist revised his opinion and specifically designated *H. subaxillaris* ''adventive'' north of Delaware (Gleason and Cronquist 1991). Fernald (1950) considered *H. subaxillaris* ''chiefly as an adventive weed'' north of Florida ''to Delaware and southern New Jersey'', and suggested that the original range extended from Florida to Arizona and Mexico (also see Utall 1954). Weakley (2005) considered it ''apparently native'' to Virginia, but Harvill et al. (1992) considered it non-native in Virginia. McAvoy and Bennett (2001) listed *H. subaxillaris* native to Delaware. In New Jersey, it has been listed as both native (Hough 1983, NatureServe 2005) and non-native (Anderson 1997). *Heterotheca subaxillaris* was first collected in New York in 1950 (Utall 1954) along sandy, disturbed roadsides in southern Queens County on Long Island. Since then, it has aggressively migrated eastward into southern Nassau and Suffolk counties, and is common in coastal sands on Long Island's outwash plain and barrier islands (Lamont, pers. obs.).

4. *Juncus torreyi* Coville is a species primarily of moist to wet, usually sandy shores, often in shallow water (Clemants 1990). In western United States, it commonly occurs ''along streams, rivers, washes, and ditchbanks, at mar-

gins of ponds and lakes, about seeps and springs, and in saline or alkaline, moist to wet meadows, marshes and swamps'' (Welsh et al. 1987). In regions north of Chesapeake Bay, it often occurs along wet roadsides and railroad tracks, ditches, sandy excavations, and sandy borders of lakes and rivers (Fernald 1950, Seymour 1982, Magee and Ahles 1999). The original range of *J. torreyi* largely extended west of the Appalachian Mountains to the Pacific coast states; more recently, it has been considered ''adventive along railroads and roadsides in New England and New Jersey'' (Clemants 1990). Fernald (1950) also considered it ''locally adventive'' in New England, and Sorrie (2005) listed it as non-native in Massachusetts. However, Haines and Vining (1998) considered *J. torreyi* native to Maine, and noted its inclusion on the state's native rare plant list; likewise, Magee and Ahles (1999) listed it as native to New England. Although *J. torreyi* has been long considered native in western New York (Torrey 1843), it is probably a more recent immigrant to southeastern New York (Taylor 1915, House 1924). In New Jersey, Anderson (1997) considered it non-native, but Hough (1983) considered it native. McAvoy and Bennett (2001) listed *J. torreyi* as native to Delaware, and Harvill et al. (1992) listed it as native to Virginia.

5. *Plantago pusilla* Nutt. is a species of dry, usually sandy soils. Weakley (2005) indicated that the original range of this species is not known, but it is currently common in the south-central prairie states, becoming increasingly uncommon to rare in the eastern seaboard states. Its nativity status in the Northeast is uncertain. *Plantago pusilla* is considered native in Massachussets (Sorrie and Somers 1999), non-native in Rhode Island (Gould et al. 1998), both native (Tucker 1995, Seymour 1982) and non-native (NatureServe 2005) in Connecticut, non-native in New York (Mitchell and Tucker 1997), native in New Jersey (Anderson 1997, Hough 1983), and non-native in Delaware (McAvoy and Bennett 2001).

These five species, plus *Juncus diffusissimus*, all share some common attributes: 1) each often exhibits a weedy habit in its original range, 2) each has spontaneously migrated into new territories in eastern United States during the past 100 years, and 3) each has tendencies to aggressively colonize newly disturbed, often sandy habitats (with the possible exception of *Plantago pusilla*). Mehrhoff (2000) recognized native species that exhibit aggressive or invasive tendencies as ''native explosive species'', but he did not elaborate nor provide examples.

Finally, we briefly call attention to another group of plant species that also may challenge traditional concepts of nativity status. Included in this group are individuals or populations that may be recognized as ''one or a few original founders'' involved in the Founder Principle proposed by Mayr (1942) and expanded by Cronquist (1988). Often, most ''founder'' individuals or populations do not persist very long beyond the extreme limits of their original range. Examples of putative ''original founders'' (aka ''peripheral isolates'') in southeastern New York include *Cyperus plukenetii* Fern., *Eleocharis tortilis* (Link) Schultes, *Ellisia nyctelea* (L.) L., *Fimbristylis caroliniana* (Lam.) Fern., *Muhlenbergia capillaris* (Lam.) Trin., *Panicum anceps* Michx., *Polygala mariana* Mill., *Rhynchospora pallida* M. A. Curtis, *Rhynchospora torreyana* A. Gray, *Rubus chamaemorus* L., *Saccharum giganteum* (Walt.) Pers., and *Scirpus longii* Fern.

These 12 species share the following common attributes in New York: 1) historically, all have been documented from only one occurrence; 2) apparently, they did not maintain viable populations for more than a few seasons; 3) all are currently considered extirpated; 4) none were included in Torrey's (1843) *Flora of New York*; and 5) all are considered to have been growing outside of cultivation.

Should these 12 species be considered among the rarest native plants ever to have occurred in New York? Or, should they be considered non-persisting, non-native waifs? Or, should they be considered ''native waifs'' (an oxymoron, according to Nesom's (2000) definitions of the two terms)?

Summary and Conclusion. Our research reveals the original range of *Juncus diffusissimus* extended from Kansas to eastern Texas, east to southern Indiana and northwestern Georgia (Fig. 1). It is a species primarily adapted to wet, sandy or soft mucky soils, sometimes occurring in naturally disturbed habitats. These wetland sites are frequently visited by migrating birds, well-known agents of seed dispersal.

In the early 1900s, *J diffusissimus* was collected for the first time from the coastal plain of South Carolina and southeastern Virginia. In 1940 and 1950, it was collected for the first time from Florida and North Carolina, respectively. Yet, all major floristic manuals published from

the 1950s to the present list *J. diffusissimus* as native to the southeastern states.

All plants can and do migrate, although with various speeds and to various distances. During the past century, many species native to North America, including those adapted to disturbance, have spontaneously expanded their range onto and along the Atlantic coastal plain. Some species have spontaneously migrated along corridors of natural disturbance, others along corridors of human-induced disturbance. Often, these species occur in both natural and human-induced disturbance in their original range. Within newly colonized territories, these species do not always fit into traditionally defined categories of nativity status, and frequently, different authors will publish a different nativity status for the same species occurring in the same region or state.

Should species such as *J. diffusissimus* and others mentioned in the text, be considered native or non-native in eastern United States? When a native species spontaneously migrates across artificial, human-defined, political boundaries and becomes established within an adjacent territory, should it be considered native or non-native in the new region? Questions such as these cannot be consistently answered with traditionally defined nativity status terms. Although we are not prepared at this time to present new guidelines for determining the nativity status of vascular plant species, we propose that such guidelines must take into account the spontaneous migration of plants over time.

Literature Cited

ANDERSON, K. 1997. A check list of the plants of New Jersey. New Jersey Audubon Soc., Rancocas Nature Center, Mount Holly, NJ.

BALSLEV, H. 1996. Juncaceae. *In* Flora Neotropica Monograph 68: 1–167. The New York Botanical Garden, Bronx.

BATSON, JR., W. T. 1952. The rushes of North and South Carolina. J. Elisha Mitchell Sci. Soc. 68: 93–101.

BRITTON, N. L. AND A. BROWN. 1913. An illustrated flora of the northern United States and Canada, 2nd ed. Vol. 1: The pteridophyta, gymnospermae and monocotyledoneae. Charles Scribner's Sons, New York.

BROWN, A. 1878. Plants introduced with ballast and on made land. Bull. Torrey Bot. Club 6: 255–259.

BUCKLEY, S. B. 1862 [1863]. Descriptions of new plants from Texas, No. 2. Proc. Acad. Nat. Sci. Philadelphia 14: 5–10.

BURK, I. 1877. List of plants recently collected on ships' ballast in the neighborhood of Philadelphia. Proc. Acad. Nat. Sci. Philadelphia 10: 105–109.

CLEMANTS, S. E. 1990. Juncaceae (Rush Family) of New York State. *In* R. S. Mitchell [ed.], Contributions to a flora of New York State VII. New York State Mus. Bull. 475.

CLEMANTS, S. E. 2000. *Juncus diffusissimus*, p. 251. *In* Flora of North America Editorial Committee. Flora of North America north of Mexico. Vol. 22, Magnoliophyta: Alismatidae, Arecidae, Commelinidae (in part), and Zingiberidae. Oxford Univ. Press, New York, NY.

CRONQUIST, A. 1952. Compositae, the Composite Family, p. 323–545. *In* H. A. Gleason, The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada. Vol. 3: The sympetalous dicotyledoneae. The New York Botanical Garden. Hafner Press, New York, NY.

CRONQUIST, A. 1980. Asteraceae. *In* L. S. Radford et al. [eds.]. Vascular flora of the southeastern United States, Vol. 1. Univ. North Carolina Press, Chapel Hill, NC.

CRONQUIST, A. 1988. The evolution and classification of flowering plants, 2nd ed. The New York Botanical Garden, Bronx, NY.

CUTLER, M. S. 1785. An account of some of the vegetable productions, naturally growing in this part of America, botanically arranged. Mem. Amer. Acad. Arts 1: 396–493.

DEAM, C. C. 1940. Flora of Indiana. Dept. of Conservation, Div. of Forestry, Indianapolis.

EDINGER, G. J., D. J. EVANS, S. GEBAUER, T. G. HOWARD, D. M. HUNT, AND A. M. OLIVARO [eds.]. 2002. Ecological communities of New York, 2nd ed. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Dept. Environ. Conserv., Albany, NY.

ENGELMANN, G. 1868. A revision of the North American species of the genus *Juncus*, with a description of new or imperfectly known species. Trans. Acad. Sci. St. Louis 2: 424–498.

FERNALD, M. L. 1905. Some recently introduced weeds. Mass. Hort. Soc., Boston, pp. 12–22.

FERNALD, M. L. 1950. Gray's manual of botany, 8th ed. American Book Co., New York.

FISHER, T. F. 1988. The dicotyledoneae of Ohio, Part 3: Asteraceae. Ohio State Univ. Press, Columbus.

FLEMING, P. AND R. KANAL. 1992. Newly documented species of vascular plants in the District of Columbia. Castanea 57: 132–146.

FLETCHER, E. 1916. Wool-waste plants at Westford, Massachusetts. Rhodora 18: 143–144.

GLEASON, H. A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada. Vol. 1: The pteridophyta, gymnospermae and monocotyledoneae. The New York Botanical Garden. Hafner Press, New York.

GLEASON, H. A. AND A. CRONQUIST. 1991. Manual of vascular plants of northeastern United States and adjacent Canada, 2nd ed. The New York Botanical Garden, Bronx, NY.

GODFREY, R. K. AND J. W. WOOTEN. 1979. Aquatic and wetland plants of southeastern United States: Monocotyledons. Univ. Georgia Press, Athens.

GOULD, L. L., R. W. ENSER, R. E. CHAMPLIN, AND I. H. STUCKEY. 1998. Vascular flora of Rhode Island. The Biota of Rhode Island, Vol. 1. Rhode Island Nat. Hist. Survey, Kingston, RI.

GRAY, A. 1867. Manual of the botany of the northern United States, 5th ed. Ivison, Blakeman, Taylor & Co., New York.

HAINES, A. AND T. F. VINING. 1998. Flora of Maine: a

manual for identification of native and naturalized vascular plants of Maine. V. F. Thomas Co., Bar Harbor, ME.

HARVILL, JR., A. M., T. R. BRADLEY, C. E. STEVENS, T. F. WIEBOLDT, D. M. E. WARE, D. W. OGLE, G. W. RAMSEY, AND G. P. FLEMING. 1992. Atlas of the Virginia flora, 3rd ed. Virginia Botanical Associates, Burkeville, VA.

HOLMGREN, P. K., N. H. HOLMGREN, AND L. C. BARNETT [eds.]. 1990. Index Herbariorum. Part I: The herbaria of the world, 8th ed. Regnum Veg. 120.

HOUGH, M. Y. 1983. New Jersey wild plants. Harmony Press, Harmony, NJ.

HOUSE, H. D. 1924. Annotated list of the ferns and flowering plants of New York State. New York State Mus. Bull. 254.

KIRSCHNER, J., et al. 2002. Juncaceae 2: *Juncus* subg. *Juncus*. *In* Species Plantarum: Flora of the World, Part 7: 1–336.

LAMONT, E. E. 1994. *Lespedeza striata* (Fabaceae), an addition to the flora of New York, with notes on its introduction and spread in the eastern United States. Bull. Torrey Bot. Club 121: 377–378.

LAMONT, E. E. AND J. M. FITZGERALD. 2001. Noteworthy plants reported from the Torrey Range—2000. J. Torrey Bot. Soc. 128: 409–414.

LAMONT, E. E. AND S. M. YOUNG. 2002. Noteworthy plants reported from the Torrey Range—2001. J. Torrey Bot. Soc. 129: 363–371.

LAMONT, E. E. AND S. M. YOUNG. 2004. Noteworthy plants reported from the Torrey Range—2002 and 2003. J. Torrey Bot. Soc. 131: 394–402.

MAGEE, D. W. AND H. E. AHLES. 1999. Flora of the northeast: a manual of the vascular flora of New England and adjacent New York. Univ. Massachusetts Press, Amherst.

MARTIN, R. F. 1939. The rushes of West Virginia. Castanea 4: 39–50.

MARTINDALE, I. C. 1876. The introduction of foreign plants. Bot. Gaz. 2: 55–58.

MAYR, E. 1942. Systematics and the origin of species from the viewpoint of a zoologist. Columbia Univ. Press, New York.

MCAVOY, W. A. AND K. A. BENNETT. 2001. The flora of Delaware: An annotated checklist. Delaware Natural Heritage Program (Document No. 40-05/01/01/01), Smyrna, DE.

MCVAUGH, R. 1958. Flora of the Columbia County area, New York. New York State Mus. Bull. 360.

MEHRHOFF, L. J. 2000. Immigration and expansion of the New England flora. Rhodora 102: 280–298.

MITCHELL, R. S. AND G. C. TUCKER. 1997. Revised checklist of New York State plants. New York State Mus. Bull. 490.

NATURESERVE. 2005. NatureServe Explorer: an on-line encyclopedia of life. Version 4.6. Retrieved 27 October 2005 from NatureServe, Arlington, VA. <http://www.natureserve.org/explorer>

NESOM, G. L. 2000. Which non-native plants are included in floristic accounts? Sida 19: 189–193.

PORCHER, R. D. AND D. A. RAYNER. 2001. A guide to the wildflowers of South Carolina. Univ. South Carolina Press, Columbia.

RADFORD, A. E., H. E. AHLES, AND C. R. BELL. 1968. Manual of the vascular flora of the Carolinas. Univ. North Carolina Press, Chapel Hill.

REHDER, A. 1936. On the history of the introduction of woody plants into North America. Nat. Hist. Mag., pp. 245–257.

ROBINSON, B. L. AND M. L. FERNALD. 1908. Gray's manual of botany, 7th ed. American Book Co., New York.

ROLLINS, R. C. 1953. How many species of vascular plants grow without cultivation in Massachusetts? Rhodora 55: 361–362.

SCHWEINITZ, L. D. DE. 1832. Remarks on the plants of Europe which have become naturalized in a more or less degree, in the United States. Ann. New York Lyceum 3: 148–155.

SEMPLE, J. C. 1996. A revision of *Heterotheca* sect. *Phyllotheca* (Nutt.) Harms (Compositae: Astereae): the prairie and mountain goldenasters of North America. Univ. Waterloo Biology Series 37.

SEYMOUR, F. C. 1982. The flora of New England: a manual for the identification of all vascular plants including ferns and fern allies growing without cultivation in New England, 2nd ed. Phytologia Memoirs V.

SHANKS, R. E. 1941. The genus *Juncus* in Tennessee. J. Tenn. Acad. Sci. 16: 345–352.

SMALL, J. K. 1903. Flora of the southeastern United States. Published by the author, New York.

SORRIE, B. A. 2005. Alien vascular plants in Massachusetts. Rhodora 107: 284–329.

SORRIE, B. A. AND P. SOMERS. 1999. The vascular plants of Massachusetts: a county checklist. Natural Heritage and Endangered Species Program, Massachusetts Div. Fisheries Wildlife, Westborough, MA.

STEURY, B. W. 2002. The vascular flora of Cove Point, Calvert County, Maryland. The Maryland Naturalist 45: 1–28.

TAYLOR, N. 1915. Flora of the vicinity of New York. Mem. New York Bot. Gard. 51: 1–683.

TORREY, J. 1843. A flora of the state of New-York. 2 vols. Carroll & Cook Printers, Albany.

TUCKER, G. C. 1995. The vascular flora of southeastern Connecticut: an annotated checklist. Mem. Connecticut Bot. Soc. No. 3.

UTALL, L. J. 1954. *Heterotheca subaxillaris* on Long Island, New York. Rhodora 56: 182–183.

VOSS, E. G. 1996. Michigan Flora. Part III: Dicots (Pyrolaceae—Compositae). Cranbrook Instit. Sci. Bull. 61.

WEAKLEY, A. S. 2005. Flora of the Carolinas, Virginia, and Georgia. Working draft of 10 June 2005. Retrieved 30 September 2005 from University of North Carolina Herbarium, Chapel Hill. <http://www.herbarium.unc.edu/WeakleysFlora.pdf>

WELSH, S. L., N. D. ATWOOD, S. GOODRICH, AND L. C. HIGGINS [eds.]. 1987. A Utah flora. Great Basin Naturalist Mem. 9. Brigham Young Univ. Press, Provo.

WUNDERLIN, R. P. 1998. Guide to the vascular plants of Florida. Univ. Press of Florida, Gainesville.

YATSKIEVYCH, G. AND J. A. RAVEILL. 2001. Notes of the increasing proportion of non-native angiosperms in the Missouri flora, with reports of three new genera for the state. Sida 19: 701–709.

YOUNG, S. M. AND T. W. WELDY [eds.]. 2005. New York rare plant status list. New York Natural Heritage Program, Albany.

ZIKA, P. F., E. R. ALVERSON, AND L. WILSON. 2000. Noteworthy collections. *Carex longii* (Cyperaceae). Madroño 47: 213–216.