

## ***IPOMOPSIS RUBRA* (POLEMONIACEAE): DISTRIBUTION AND HABITAT**

**BRUCE A. SORRIE AND ALAN S. WEAKLEY**

UNC Herbarium (NCU), North Carolina Botanical Garden  
University of North Carolina at Chapel Hill  
Chapel Hill, North Carolina 27599-3280

**KEITH A. BRADLEY**

A. C. Moore Herbarium, Department of Biological Sciences  
University of South Carolina  
Columbia, South Carolina 29208

### **ABSTRACT**

Over most of its range, *Ipomopsis rubra* has a patchy or irregular distribution, which has led to questions regarding its native status in a number of states. The species has long been in cultivation and escapes have provided additional distribution records. Habitat analysis demonstrates fidelity to several community types, but roadsides comprise the bulk of records. We document native distribution from North Carolina to Florida west to Oklahoma and Texas, in natural habitats ranging from maritime dunes to inland sandhills, river scour zones, and rocky slopes.

*Ipomopsis* is a genus of about 30 herbaceous species, found primarily in the southwestern USA and northwestern Mexico. One species occurs from Texas eastward, *I. rubra* (L.) Wherry, a hummingbird-pollinated biennial. Our interest in this species stems from a desire to clarify its native distribution. As Shinnery (1963) indicated, this species is peculiar in having been first described from the Southeast, yet it is most abundant further west. A very showy species (Fig. 1), it was early brought into cultivation and spread locally in a number of midwestern and eastern states, whether originally native or not. For example, Darby (1860) wrote of the species that "on the Congaree, near Columbia, S.C. ... One of the most beautiful of our native plants, which has become extensively introduced into our gardens." Bartram (1791, p. 374-375) wrote that "In the loose rich soils verging round this rock [apparently a granitic flatrock near Camak, Warren Co., Georgia, fide F. Harper], grew several curious herbaceous plants, particularly one of singular elegance and beauty ... It grows erect, three feet high, with a strong stem, which is decorated with plumed or pinnatifid linear leaves ... these [branches] terminate with large tubular or funnel-formed flowers ... of a perfect rose color, elegantly besprinkled on the inside of their petals with crimson specks ... I saw a species of this plant, if not the very same, growing on the sea coast islands near St. Augustine [Florida]."

The Linnaean (1753) type of *Polemonium rubrum* L. was collected from "habitat in Carolinae citerioris arenosis." Wherry (1936) stated that Catesby sent seeds to England, "... where it was studied and described by Dillenius in 1732." Linnaeus cited the plate of this plant published by Dillenius (1732).

Wherry (1936) considered and mapped the native range of *Ipomopsis rubra* as being from southern North Carolina to central Florida, west to central Texas and southern Oklahoma. It can be surprisingly difficult to determine the native distributions of southeastern United States species, as the period of significant documentation of plant distributions via collecting followed two centuries after the European settlement of at least the regions of the Atlantic and Gulf coasts. There was thus substantial opportunity for plants to be moved around deliberately by horticultural use, or for them to adventively colonize agricultural and other disturbed ground with increased and more intensive land use following European colonization. We wished to reassess the native distribution based on the habitats and years of collection of *I. rubra* to make the best determination possible at this time of the native distribution and habitats of this interesting species.

**Methods**

We searched online databases and journal sources for records of *Ipomopsis rubra*. The SERNEC Portal ([sernecportal.org](http://sernecportal.org)) provided access to a large number of specimens from over 20 herbaria, while texts of state and regional manuals and floras were especially useful in determining native status. The PLANTS database was searched for additional states of occurrence. Label data were analyzed for similarities among habitats and then mapped to see how habitats sorted out geographically.



Figure 1. *Ipomopsis rubra*, Richmond Co., North Carolina.

## Results

Our updated map of the distribution of *Ipomopsis rubra* is shown in Figure 2. There has been a great increase in specimen records since Wherry (1936), yet the overall range remains the same. As validation, we here assess the status of *I. rubra* in several states that border, or are contained within, the native range.

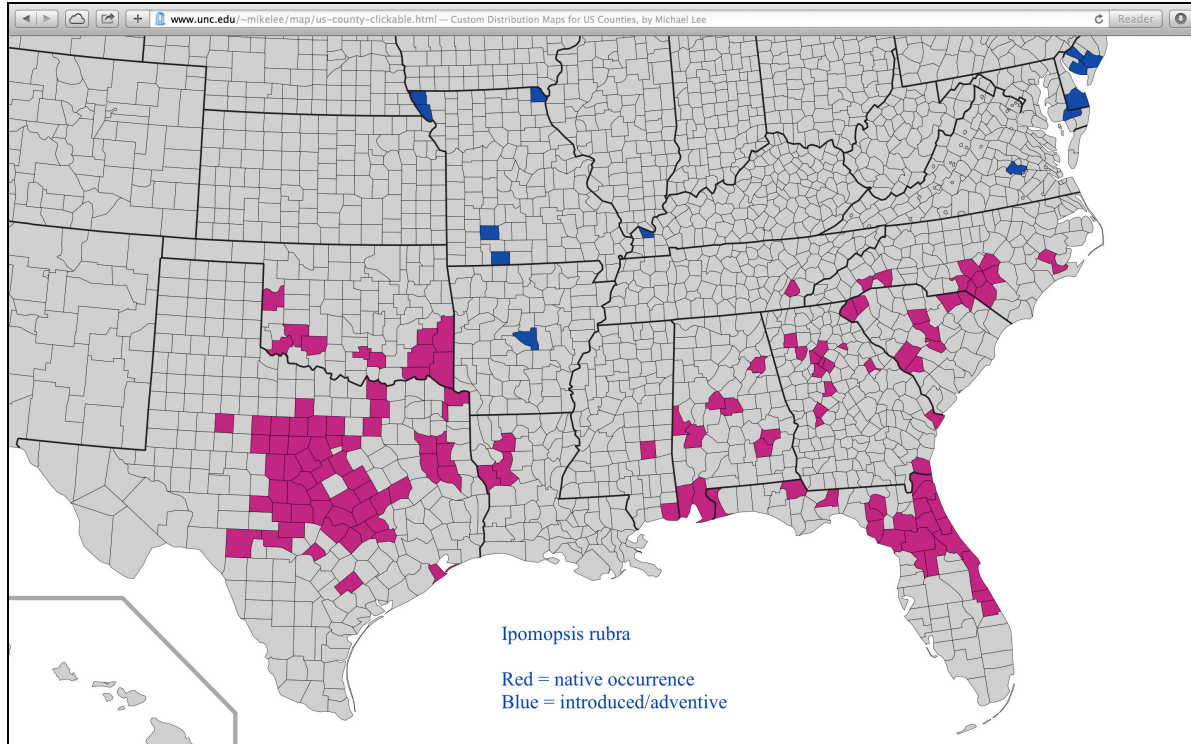


Figure 2. Range map of *Ipomopsis rubra*. Red = presumed native occurrence; blue = presumed introduced /adventive.

**Arkansas.** Wherry (1936) stated that *Ipomopsis rubra* was "Seen by Nuttall in the southeastern prairies." Gentry et al. (2013) mapped it only in Pulaski County and considered it non-native. Under *Cantua coronopifolia* Willd. (an old synonym), Nuttall (1835) stated "Hab. On the elevated prairies of Red river, where the flowers are of a bright scarlet, and spotted with a deeper tinge of colour." Nuttall's travel to the Arkansas Territory took place in 1819 (Nuttall 1821), when the prairies were still mostly wilderness, and occurrences of *I. rubra* there would have been undoubtedly natural. However, Theo Witsell (pers. com.) informs us that most of the prairies along the Red River occur in what are now Oklahoma and Texas, with a short portion in Little River and Miller counties, Arkansas. Based on these data, we cannot be sure that *I. rubra* is native in Arkansas, but it should be sought in the southwestern corner of the state.

**Louisiana.** Wherry did not map any occurrences in this state. No Louisiana specimens are found at the LSU herbarium. Thomas and Allen (1998) mapped it as a native species in Bienville, Natchitoches, and Sabine parishes in the northwestern quarter of the state. Given the proximity to numerous east Texas collections, it is likely that *Ipomopsis rubra* is native in Louisiana. A Sabine Parish collection (at GA) is from "sandy oak and pine woods."

**Mississippi.** The only inland record known to us is from a roadside in Jasper County ["along rte. 15, dry sandy and clay hillside", Ray, Jr. 6657 (NCU)]. Since this falls within the Jackson Prairie region, it may have been part of a native population. However, native status is assured in Jackson County,

where several collections were taken from vegetated dunes on Horn Island (LSU, MISS, NCU, USMS).

**North Carolina.** Wherry (1936) stated that "Specimens preserved from Craven County probably represent a native colony." However, Croom (1837) did not list this species in his flora of New Bern and vicinity. New Bern was founded in 1710, served as the state's first capital, and long has been a cultural center. We question the native status of *Ipomopsis rubra* there, as it is far disjunct from other North Carolina populations. The Sandhills region of North and South Carolina supports specimens of *I. rubra* from thirteen counties (7 NC, 6 SC). Habitats vary from "sandhills" to "pine woods," "sandy pine-oak woods border," "margins of sandy oak woods," "roadsides," and "river slope." While the natural habitat(s) of *I. rubra* seems elusive in the Sandhills region, we feel that the number of records, and the long time frame involved point towards native status. Finally, there are records from the upper piedmont (Rutherford County) and mountains (Henderson County) of North Carolina. At the former, it was collected from "Sandy floodplain of Broad River, 3 1/4 mi SW of Harris, natural colony, not an escape," 17 Jul 1956, *Freeman 56470* (UNCA, NCU). The Henderson County specimen (NCU) merely says "Hendersonville" without date.

**South Carolina.** Evidence of populations in the state extend back two centuries, but it has apparently remained a rare species throughout this time. Elliott (1821) wrote that it "Grows in in the upper districts of Carolina and Georgia. Sent me from Columbia, by Mr. Herbemont." Nicholas Herbemont, a viticulturist in Columbia, Richland County, probably sent plants from nearby. Similarly, Darby (1860) reported it along the Congaree River near Columbia. Chapman (1897) also included it for the state. In contrast, the species was not collected by William Henry Ravenel (1814-1887) or mentioned in his correspondence, nor was it mentioned prior to Elliott by Thomas Walter (1788). Only scattered occurrences are known since 1900, including the bank of the Congaree River (Richland County), a montane granitic dome (Pickens County), a creek bank (Greenville County, upper piedmont), and sandy roadsides (Barnwell and Chesterfield counties, Sandhills region).

**Tennessee.** Wherry stated that *Ipomopsis rubra* was "Recorded in McMinn County" and treated it as native. This represents the only record of *I. rubra* from the Valley and Ridge Province. The Tennessee Flora Committee (2015) did not include *Ipomopsis*, nor did Chester, Wofford, and Kral (1997). However, Chester et al. (2009) cited Gattinger (1901): "perhaps strayed from cultivation, Red Knobs. McMinn County, E Tenn." Therefore, we treat *I. rubra* as adventive or introduced to Tennessee.

**Virginia.** The sole record for the state was collected in Chesterfield County in the lower piedmont. Weakley, Ludwig, and Townsend (2012, p. 1369) have treated it as a waif.

Our analysis corroborates the native distribution as mapped by Wherry (1936), with the exception of Arkansas and Tennessee, where available evidence suggests alien status. Records from states and provinces to the north are considered to be adventive or introduced: Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, Ohio, Wisconsin, and Ontario. Our map of the native distribution (Fig. 2) shows concentrations of records in central Texas, east coast and north peninsula of Florida, piedmont of north-central Georgia, and the Sandhills region of the Carolinas and Georgia.

### Habitat Analysis

Figures 3 and 4 show the distribution of *Ipomopsis rubra* by habitat type, based on herbarium specimens. The large number of roadside records suggests that during the era of most botanical collecting (20th century), *I. rubra* has survived on open roadsides following alteration and/or conversion of natural habitats. In the Sandhills of the Carolinas and Georgia, one might suspect fire-

suppression in the longleaf pine ecosystem, particularly during the twentieth century (Frost 1998), as a causal factor in relegating *I. rubra* to roadsides. However, since the initiation of fire management in the 1970s-80s, this species has shown no evidence of moving into longleaf pine-wiregrass communities. Some other factor of its natural history than fire seems to play a role in successful germination and growth of plants.

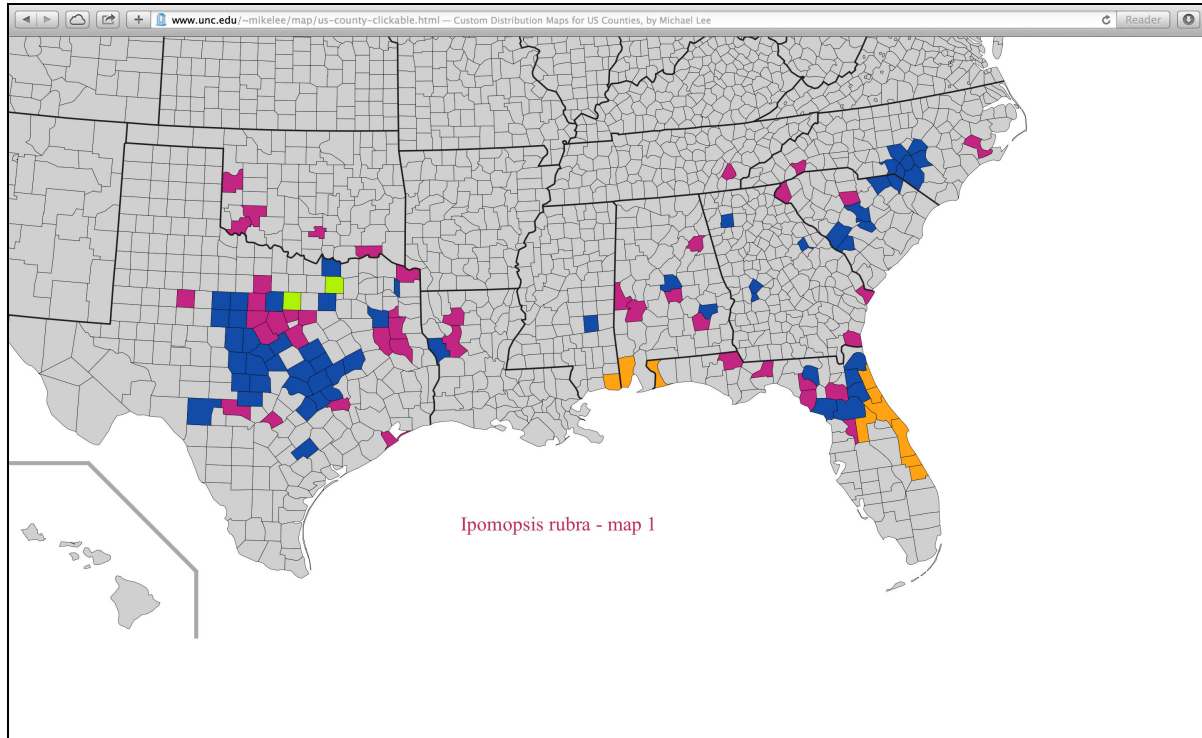


Figure 3. Habitat types of *Ipomopsis rubra*, map 1. Blue = roadsides; orange = dunes; pale green = prairies; red = unknown.

There is a distinct cluster of records from maritime dunes on the east coast of Florida and from dunes on barrier islands of the mid Gulf Coast. These collections are all from natural communities, not heavily disturbed by humans, and undoubtedly represent natural occurrences, beginning with a probable observation by Bartram in 1775 (Bartram 1791). A recent collection from St. Johns County reads "Fort Matanzas National Monument ... shrub/herb backdune with *Gaillardia pulchella*, *Helianthus debilis*, *Ilex vomitoria*, *Myrica cerifera*, *Opuntia stricta*, and *Serenoa repens*," 2003, *Giannasi & Zomlefer* 432 (GA). From Mobile Co., Alabama, a collection label reads "Little Dauphin Island, low sand dunes interspersed with shell deposits," *Lelong* 5618 (NCU). We have seen no specimens of Gulf Coast *Ipomopsis rubra* from the adjacent mainland.

A single record was taken inland from an "old dune" in Lake County, Florida (*Houck s.n.* USCH), while a second from the same county was from "high pine land, sandy soil near Eustis," (*Nash s.n.* GH, PH). These both likely refer to sand pine or longleaf pine uplands on the Lake Wales Ridge — a likely native habitat.

The greatest concentration of *Ipomopsis rubra* records is from central and eastern Texas, extending north to southern Oklahoma. We know from a very early account (Nuttall 1821) that this species was found "On the elevated prairies of Red river"; yet not a single modern specimen was taken from a prairie near that river! Have all former prairies there been converted? We have seen only two specimens specifically from prairies: Collin and Parker counties, Texas, well away from the



Red River. The Collin specimen reads "relict blackland prairie," *Baucum* 7 (LL), while the Parker label reads "Utley Prairie," *Swadek* 357 (TEX).

The great majority of specimens from central Texas and southern Oklahoma are from roadsides or do not provide habitat. It is tempting to think of them as modern roadside refugees of former prairies or of rolling oak-juniper-grass habitats of the Edwards Plateau, but without exhaustive research into historical records, such as land surveys, we cannot be definitive. A similar argument may be made regarding records from the Blackland Prairie region of Alabama and the Jackson Prairie region of Mississippi.

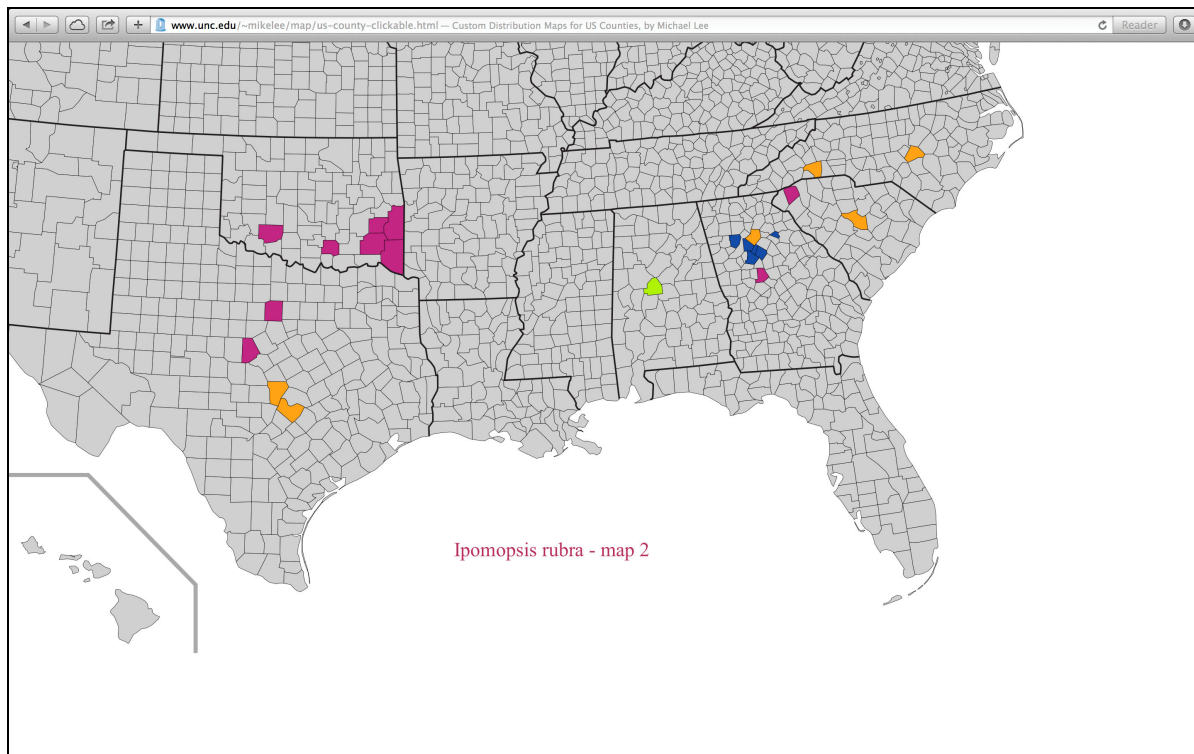


Figure 4. Habitat types of *Ipomopsis rubra*, map 2. Orange = river scour zones; blue = granitic flatrocks; pale green = limestone river bluffs; red = rocky slopes.

Figure 4 maps the distribution of a second set of habitats. A Johnston Co., Oklahoma, specimen indicated "limestone outcrop," but the other maroon records gave no specifics. At the least, it would be valuable to know the substrate rock types at the various rocky slope occurrences. One Bibb Co., Alabama, record was collected in 1977 from limestone bluffs by the Cahaba River (GA); a second record was collected there or nearby in 1884 (*Mohr s.n.* NCU). There is a distinct cluster of records (dark blue) from granitic flatrock habitats in north-central Georgia; curiously, *Ipomopsis rubra* has been recorded from only one other flatrock in the Southeast, in Pickens Co., South Carolina. River shores and scour zones are noted for a number of interesting native plant species but also attract a wide variety of adventive or escaped species. Assessing native status of plants in these habitats is not straightforward. However, river edge records go back at least to 1860 (Darby 1860, reports from Georgia and South Carolina); and a specimen from Rutherford Co., North Carolina, also points towards native status: "Natural colony, not an escape, sandy floodplain of Broad River, 3 1/4 mi SW of Harris," 17 Jul 1956, *Freeman* 56470 (NCU, UNCA).

## Discussion

From our analysis of specimen records we conclude that *Ipomopsis rubra* occurs naturally in a relatively broad range of habitat and substrate types. Records from some of these habitat types are concentrated geographically - for example, granite flatrocks and maritime dunes - but seemingly identical habitats elsewhere lack any records. In the case of the Sandhills of the Carolinas and Georgia, virtually all specimens were collected from roadsides which pass through longleaf pine uplands, mostly at the northern end of this physiographic region. However, despite the suggestion that some subset of the longleaf pine ecosystem may have been an original habitat for *I. rubra*, that cannot be confirmed at this time. Similarly, roadside records through what formerly were prairies in Alabama, Mississippi, Oklahoma, and Texas are also suggestive and supported by Nuttall's early observations (Nuttall 1821). However, we have little idea today of whether *I. rubra* was a regular component of prairie ecosystems.

In summary, the native range of *Ipomopsis rubra* has not changed significantly in the past 80 years, despite the wealth of accumulated specimen records. Within and at the periphery of this native range some populations are clearly introductions, but others are ambiguous. While early records on riverbanks (e.g., Darby 1860) may appear to be native because of the habitat and "early" date, even these could represent escapes from cultivation from nearby cities. However, the earliest observations, particularly by Bartram in 1775 both on the coast at Saint Augustine, Florida, and a flatrock in Georgia, indicate a broad native range in appropriate ecosystems at an early date. These occurrences could not as easily be explained by use as an ornamental.

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