

*Conservation Assessment
for
Broad-Leaved Phlox (Phlox amplifolia Britt.)*



Photo by Steve Olson

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Hoosier National Forest



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EXECUTIVE SUMMARY

Phlox amplifolia occurs in mesic woodlands in the southern Appalachian Mountains and Interior Highlands. The species may grow individually, in small clusters, or in dense groups; however there is not sufficient information on number of occurrences to accurately determine its status. In a few states, including Georgia, Indiana, North Carolina, and Virginia, it is state listed as imperiled or critically imperiled; however, in several states the species has been reported but there is no state ranking due to insufficient data. Additionally, it is classified as a Regional Forester Sensitive Species on the Hoosier National Forest in Indiana. Some populations of *P. amplifolia* have been damaged or destroyed by mowing and grazing, and others are threatened by exotic species, including *Microstegium vimineum* and *Lonicera japonica*. There is some evidence that in Indiana, fire may increase vegetative reproduction and flowering.

The U. S. Forest Service identifies species that are sensitive within each region, i.e., Regional Forester Sensitive Species (RFSS). For each RFSS a conservation assessment is developed to help maintain viable populations of these species. The purpose of this assessment of *Phlox amplifolia* is to document the current scientific knowledge of the species. Specific objectives include the following:

- 1) describe the plant and distinguish it from other similar species,
- 2) determine the status of the species including geographical distribution and population trends,
- 3) determine ecological requirements of the species and its reproductive biology, and
- 4) identify threats to the species.

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NOMENCLATURE AND TAXONOMY

Scientific Name: *Phlox amplifolia* Britt.

Common Names: Large-leaved phlox, Broadleaf phlox, and Wide-leaved phlox.

Synonyms: *Phlox glandulosa* Shuttleworth ex Gray.

Class: Dicotyledoneae

Order: Solanales

Family: Polemoniaceae

Phlox amplifolia is a member of Polemoniaceae, which is a family of perennials found primarily in the northern hemisphere and concentrated in the western U.S. (Gleason 1963). There are approximately 50 to 60 species of *Phlox*, most of which also are found in the western U.S. with some in eastern Asia (Gleason and Cronquist 1991).

Approximately a dozen species of *Phlox* are found in the eastern U. S. (Gleason and Cronquist 1991). Wherry (1955) recognized 67 species of *Phlox*, but admitted that some of these are difficult to distinguish. *Phlox* comes from the Greek and means “flame,” which refers to the brightly colored flowers characteristic of the genus (Gleason 1963).

DESCRIPTION OF SPECIES

Plant	slightly fragrant perennial herb with short rhizomes.
Stems	1 to a few, erect up to 1.5 (2) m tall; green or often red or purple streaked.
Leaves	opposite, acuminate, entire, up to 18 cm long and 8 cm wide (usually 2-5 cm wide), rhombic-ovate to ovate, cuspidate, glabrate or usually hirsute with coarse hairs (papillose-based bristles) above and hirsute or fine-pilose below, margins ciliolate-serrulate, veins areolate (having distinct lateral veins that curve forward and unite with the next vein above to form a connecting vein); short broad petioles widening abruptly into the leaf blades; nodes 7-15.
Inflorescence	100-150 flowers in cymes in a relatively large subcorymbose panicle, conspicuously pubescent with glandular hairs, 1 dm long or broad, the leaves subtending its elongate branches much reduced and the bractlets very small.
Corolla	red to purple (sometimes pink, pale purple, lilac or white), 1.5-2 cm wide, salverform, 5 lobed, lobes 6-14 mm long, 5-10 mm wide, lobes obovate, suborbicular, or elliptic, entire, corolla tube glabrous.
Calyx	glandular stipitate, tube 3-4 mm long, lobes approximately the same length as the tube, the lobes long-subulate, sharp cuspidate to subaristate; membranes broad, subplicate.
Anthers	usually included in the corolla tube, cream to yellow; filaments short, unequally placed in the corolla tube.
Styles	united, 16-24 mm long, free for 1 mm.
Capsule moistened.	3 valved with 1 (-4) seed(s) per locule; the seeds unchanged when
Flowering	(April) May – September.

Chromosomes $2n = 14$.

(Small 1933, Fernald 1950, Steyermark 1954, Wherry 1955, Gleason 1963, Steyermark 1963, Radford *et al.* 1968, Gleason and Cronquist 1991, Smith 1994, Ketzner and Karnes 1998).

Distinguishing Characteristics

Phlox amplifolia is morphologically similar to *P. paniculata* but can be distinguished by the following characteristics (Fernald 1950, Wherry 1955, Steyermark 1963).

1. *Phlox amplifolia* has only 7-15 pairs of leaves whereas *P. paniculata* has 14-25 (-40).
2. The anthers of *P. amplifolia* are contained within the corolla tube whereas one or more in *P. paniculata* extend beyond the tube.
3. The stems of *P. amplifolia* are more pubescent (with obvious spreading hairs) than *P. paniculata*.
4. The leaves of *P. amplifolia* are wider than *P. paniculata*, i.e., (20) 40-80 mm vs. 30-60 mm.

For information on molecular relationships of *Phlox* see Ferguson *et al.* (1999).

LIFE HISTORY

Phlox amplifolia has been found growing as individual plants, in clumps, and in dense clusters (NatureServe 2001). Phloxes are pollinated by long-tongued insects including bee-flies, butterflies, and hawk-moths (Wherry 1955). Although specific pollinators have not been identified for *P. amplifolia*, the closely related *P. paniculata* is pollinated by butterflies (Grant and Grant 1965). Several species of *Phlox* are known to hybridize (Levin 1967, 1968, 1974, 1989, Levin and Schaal 1970); however, there is no evidence that *P. amplifolia* hybridizes.

Olson (1994 in NatureServe 2001) reported that after a prescribed fire *P. amplifolia* exhibited increased vegetative reproduction and flowering.

Wherry (1955) determined that phloxes exhibited variability among clones in the following characteristics: amount of glandular hairs, leaf shape, sepal shape and color, fragrance, and length of pedicels, sepals, sepal tube, corolla tube, stamens, and styles. He suggested this could be due to mutations, intercrossing, or introgressive hybridization.

Of the phloxes, *Phlox amplifolia* ($2n=14$) has the most symmetrical karyotype, which indicates it may be the most primitive species of the genus (Smith and Levin 1967).

HABITAT

The typical habitat of *P. amplifolia* is mesic woodlands especially along streams but the species also is located in a variety of woodlands including rocky wooded slopes, open woods, thickets, dry woods on sandy or rocky slopes of streambanks, sandstone ledges and crests of mixed hardwood ridges, wooded floodplains, and alluvial woods (Small 1933, Deam 1940, Fernald 1950, Wherry 1955, Gleason 1963, Steyermark 1963, Radford *et al.* 1968, Gleason and Cronquist 1991, Medley 1993, Yatskievych 2000, NatureServe 2001). It can be found in high elevations in the Appalachian Mountains (Fernald 1950, Gleason 1963, NatureServe 2001) but in North Carolina it is described as on low to mid elevations (NatureServe 2001). Oftentimes the species grows on east- or south-facing slopes in filtered light in dry to moist soil on limestone or sandstone (NatureServe 2001).

DISTRIBUTION AND STATUS

Wherry (1955) speculated that *Phlox* did not evolve until late in the Tertiary because only one species crossed the Bering Strait before the Pleistocene. He further speculated that *P. amplifolia* and *P. paniculata* had a common ancestor that survived the last xerothermic maximum in a Blue Ridge refuge. From this refuge, *P. amplifolia* arose and migrated westward, *P. paniculata* spread north and east, and plants with features of both remained closer to the refuge (Wherry 1955).

Phlox amplifolia primarily is a southeastern species found in the Appalachians and Interior Highland (Wherry 1955, Medley 1993) with populations extending westward into Arkansas and Missouri, and northward into Indiana (Figure 1). There are a few references to the infrequent distribution of the species (Radford *et al.* 1968, Medley 1993, Yatskievych 2002) but the global status has not been accurately determined. It has been listed as G3G5, indicating that there is not sufficient information on number of occurrences to definitively assess its status (Missouri Natural Heritage Program 2001, NatureServe 2001). State Heritage Status Rank is as follows:

Alabama	SR	state reported
Arkansas	SR	state reported
Georgia	S1	critically imperiled
Indiana	S2	imperiled
Kentucky	S?	unranked
Mississippi	SR	state reported
Missouri	S3?	vulnerable?
North Carolina	S1S2	critically imperiled/imperiled
Tennessee	SR	state reported
Virginia	S2	imperiled

In addition, *P. amplifolia* is a Regional Forester Sensitive Species on the Hoosier National Forest in Indiana.

Indiana

The Indiana populations of *P. amplifolia* are found in the extreme southern part of the state with the exception of one population in west central Indiana (Figure 2). The species is state threatened (Indiana Department of Natural Resources 2003) and is a Regional Forester Sensitive Species on the Hoosier National Forest. Of the ten extant populations, six occur on the Hoosier National Forest and two additional populations are located within a state park. All populations consist of less than 100 individuals and half of the populations have ten or fewer individuals; some flowering plants have been observed in all populations. Most populations occur in filtered light in mesic forests oftentimes on north-facing slopes, but plants have been found on all slope positions. Associated species include *Platanus occidentalis*, *Acer negundo*, *Leersia virginica*, *Allium tricoccum*, *Microstegium vimineum*, *Sanicula gregaria*, *Toxicodendron radicans*, *Rubus flagellaris*, *Silene stellata*, *Lonicera japonica*, *Cercis canadensis*, *Juglans nigra*, *Cornus florida*, *Liriodendron tulipifera*, *Fraxinus americana*, *Sassafras albidum*, *Desmodium paniculatum*, *Campanula americana*, *Amphicarpaea bracteata*, *Geum canadense*, *Campsis radicans*, *Anemone virginiana*, and *Phlox paniculata* (Indiana Department of Natural Resources 2003). Other associated species of *P. amplifolia* in Indiana include *Quercus alba* and *Q. velutina* (NatureServe 2001).

Most of the populations within the Hoosier National Forest are along county roads. Because these are subject to annual mowing, oftentimes shortly after flowering, seed production is probably very poor (Olson 2003). One small population on National Forest System land is along a relatively little used trail (Olson 2003).

There are five known extirpated populations in Indiana. Mowing destroyed one population and grazing destroyed another. One extirpated population occurred in a state forest, but apparently the other populations were not protected.

Five additional populations have not been observed for at least 20 years and their current status is unknown. Two populations occurred in dry woods, one on a floodplain, and one along a stream. Three of the historic populations are known to be small (2-25 individuals); population size is not available on the remaining two populations (Indiana Department of Natural Resources 2003).

Missouri

In Missouri, *P. amplifolia* is classified as S3? (Missouri Natural Heritage Program 2001). Yatskievych (2002) indicated that the species is not been well studied in the state and there is some question as to its current status. According to Steyermark (1963), populations were found in nine counties in southeastern Missouri; however, it appears that populations in four of these counties have been extirpated and, currently, extant populations are found in six counties (Figure 3).

POTENTIAL THREATS

Two Indiana populations are threatened by exotic species, *Microstegium vimineum* and *Lonicera japonica* (Indiana Department of Natural Resources 2003). Grazers apparently destroyed an Indiana population (Indiana Department of Natural Resources 2003) by trampling, soil compaction, and consumption of plants (NatureServe 2001). Another Indiana population was extirpated by mowing along a roadside (Indiana Department of Natural Resources 2003). *Phlox amplifolia* develops seeds late in the growing season (NatureServe 2001). If mowing occurs too early in the season or too frequently, then sexual reproduction cannot occur. In addition to mowing, the creation and/or maintenance of corridors are a potential threat to the species for similar reasons (NatureServe 2001).

RESEARCH AND MONITORING

Research is needed to determine the status of *P. amplifolia* and its population trends. A number of Indiana populations have not been observed for several decades and it is not known if these populations are extant. Moreover, Yatskievych (2002) stated that the Missouri populations have not been well studied and the status of the species there is questionable. Monitoring of extant populations is needed to determine population trends and the optimum environmental conditions for the species. According to Deam (1940), *P. amplifolia* is a good cultivated species and, therefore, has reasonable restoration potential into suitable habitats (NatureServe 2001). Perhaps the species can be cultivated and reintroduced into extirpated sites if the habitat is still present.

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Figure 2. Distribution of *Phlox amplifolia* in Indiana. Circles indicate counties with extant populations; Xs indicate counties with extirpated populations; ?s indicate counties with possible extant populations (Indiana Department of Natural Resources 2003).



Figure 3. Distribution of *Phlox amplifolia* in Missouri. Circles indicate counties with extant populations; Xs indicate counties with extirpated populations (Steyermark 1963, Yatskievych 2002).

