

Fire Management Species Profile

LITTLE BLUESTEM

(Schizachyrium scoparium (Michaux) Nash)

FWS Ranking: Not ranked

State Ranking: S5 (Secure) or SNR (Not Ranked)

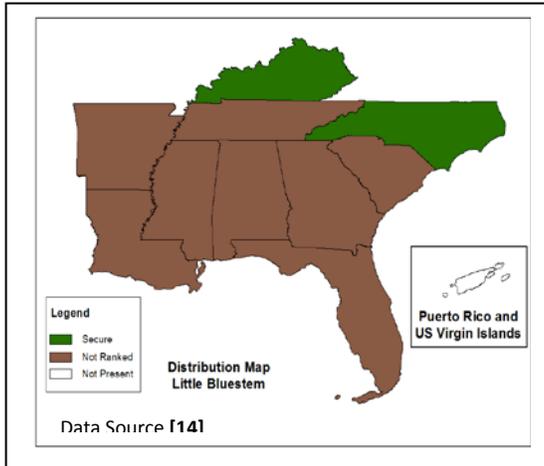


Photo: Sue Wilder / USFWS

Bio Facts

Life Form: Erect bunchgrass, 2-4 ft. tall, tufted flowering stems to 6 ft. tall.

Flowering: July to October

Pollination: Wind

Habit: Warm-season perennial

Wetlands Status [21]: Facultative (FAC)

Fire Adaptation: Higher rates of growth occur with increased fire frequency. Spring, fall and winter burns are preferable to summer burns.

Landscape Conservation Cooperatives (LCC): All except in PR and VI

Landfire Zones: All zones except PR and VI

Desired Vegetation Structure and Fire Components	
Criteria	Monitoring Variables
Canopy/Sub-canopy	Little bluestem grows best in high light and open conditions, and decreases in dominance in the understory as cover of the canopy and sub-canopy increase. It can remain a minor component under complete canopy closure.
Mid-story	Decreases in abundance as mid-story increases, but can remain as a minor component under complete mid-story closure. Exhibits variable tolerance to mid-story tree densities.
Shrub	Increased density of woody shrubs in the absence of frequent fire reduces the abundance of little blue stem as it is outcompeted by more shade tolerant species. Exhibits variable shrub densities per acre..
Ground Cover	Little bluestem can be the dominant grass species in open grassland communities that are frequently burned. It can also occur as a minor component of ground cover in mixed-grass and mixed-pine or -oak woodland and forest communities.
Fire Regime	Fire Return Intervals vary depending on community type. In southern grasslands and woodlands 1 to 10 year fire return intervals are reported.
Seasonality	Spring and fall fires are best for increased production. Plants will not recover from hot summer burns where basal buds below the soil surface or basal leaf meristems are killed.
Fuel Models	Little bluestem can be found in any live or dead grass or grass-mix fuel model including all GR, GS fuel models. It may be a minor component and contribute to fire spread in shrub and timber fuel models where grass litter may contribute to fire spread (SH and TU fuel models).
Burn Severity	Moderately-high to High burn severity (CBI>2.5) where significant soil surface heating occurs could be detrimental to the basal buds of little bluestem that are found just below the soil surface.
Fire Behavior	Plants will re-sprout from top-kill of stems as long as fire line intensity does not include deep soil burning and consumption.
Landscape Considerations	Plants used for wildlife forage and cover as well as grazing, haying and restoration of grassland vegetation. May not be ideal species for immediate widespread restoration needs due to seed dispersal distance limitations and poor seedling vigor.

The objective of the Fire Management Species Profile project is to identify habitat management objectives that are specific, measurable, achievable, clearly communicated among habitat management professionals, and are firmly based in the best available science. Their use is intended to guide habitat managers in setting local objectives for habitat management in fire-adapted ecological systems. Fire management objectives are specific to habitat conditions in which maintenance and improvement, rather than restoration, of habitat condition is the goal.

Desired Habitat Conditions

The desired habitat conditions for little bluestem vary considerably depending on geographic location, soil type and landform position [20]. In general, little bluestem occurs in a variety of habitats including open pine and oak stands; tallgrass, mixed-grass, coastal and bluestem prairies; and oak savannas, forests and glades [20]. It is considered an early to mid-successional species and occurs on sites with frequent disturbance (e.g. fire, and grazing).

In the southeastern US, little bluestem is a dominant component of the herbaceous vegetation of open pine forests and pine savannas that are frequently burned [5]. While it is most abundant in habitats with low stand densities (less than 75 stems per acre > 4 inch diameter trees), little bluestem can occur in areas with greater stand densities (200 stems per acre >4 inch diameter trees) [8]. Little bluestem occurs in habitats with little to no midstory and can tolerate some partial shading from surrounding taller vegetation [8]. It will decline in later successional stages but can remain as a minor component within the site [1, 5, 12, 20]. Little bluestem occurs in habitats with coarse, well drained soils with little available nitrogen [6, 8, 20, 25].

Species Information and Life History

Distribution: Little bluestem is widely distributed across North America and ranges from eastern Canada south to Florida, west to Arizona, and north to Alberta, Canada. It occurs in every state in the lower 48 except Nevada [20]. Historically, it did not occur naturally in California, Idaho, Washington, or British Columbia, but is now considered naturalized in these states and provinces [20]. Varietal distributions of little bluestem occur with *S. scoparium* var. *scoparium* widespread throughout the U.S., and *S. scoparium* var. *divergens* and *S. scoparium* var. *stoloniferum* found primarily in the southern states [20, 22, 26].

Plant Classification: Little bluestem is highly variable, with several varieties recognized in the southeastern U.S. including little bluestem (*S. scoparium* var. *scoparium*), eastern little bluestem (*S. scoparium* var. *divergens*), shoreline little bluestem (*S. scoparium* var. *littorale*), and creeping bluestem (*S. scoparium* var. *stoloniferum*) [11]. This species profile will focus on *S. scoparium* var. *scoparium* since little literature is available at the varietal level.

Plant Communities: Little bluestem has been described as a component in over 20 ecosystems and many more plant communities [20]. A warm-season bunchgrass, little bluestem can be a dominant species of the herbaceous layer. The species is typically found in open grasslands, woodlands and open pine forests. In the southeastern U.S., little bluestem is found in longleaf pine, loblolly pine, slash pine, shortleaf pine, Virginia pine and pitch pine stands [20]. It is commonly found in many grassland communities, including prairies, savannas and glades. Furthermore, little bluestem can occur in wet and dry plant communities from wet pine flatwoods to xeric dry sandhill communities [20]. In southern grasslands and woodlands, little bluestem is an early- to mid-successional species, declining in abundance with increasing succession of shrubs and trees. Little bluestem can remain a minor component of late-successional communities [1, 12, 19, 20].

Life History: Little bluestem is a warm-season, full-sun loving perennial bunchgrass that can form clumps up to 10 in. diameter. It does not commonly grow from rhizomes, but new tillers grow from basal buds below the soil surface [20]. Stem heights average about 3 ft. tall, but can reach 6 ft. tall. Little bluestem can occur in clumps with over 100 stems per clump in some cases [24]. Leaves are generally flat, long (8-14 in.) and slender [20]. Roots are deep (to 4 ft.) and fibrous, fine, and host mycorrhizae [1, 20].

Plants are wind-pollinated and flowers occur in pairs of spikelets [20]. Timing of flowering generally occurs along a north-south gradient with early flowering occurring in northern populations (July-August) and late flowering occurring in southern populations (October) [13, 18]. Similarly, early flowering has been shown for higher elevation populations in the Blue Ridge Mountains compared to coastal populations [13, 18]. Herbivory of flowers by insects (Cecidomyiid midge, *Contarinia watsii*) has been reported [3, 18, 20].

Little bluestem seeds are predominantly wind-dispersed but may also be dispersed by animals [20]. Seed dispersal is limited to short distances of 5-6 ft. from parent plants, which may limit immediate dispersal into disturbed sites [20]. Little bluestem exhibits poor seed viability and seedling vigor [4, 20]. Seeds require 30-60 days cold stratification for germination and approximately 10 months to break dormancy [4, 20]. Little bluestem exhibits slow germination rates (4-6 days for 50% germination under optimum germination temperatures from 68 to 86° F [4, 20]). Little bluestem exhibits very poor seedling vigor (survival index= 1.8, 1- very poor, 5 – excellent) and this may limit its use in restoration efforts [4].

Fire Effects: Little bluestem is typically found in plant communities that are maintained by frequent fire [8, 9, 10, 16, 23]. In Louisiana for example, in the absence of frequent fire, bluestem and other species that make up the herbaceous component of bluestem-longleaf pine communities are suppressed by more competitive, mid-story species, such as wax myrtle (*Morella cerifera*) [7]. Further, Haywood et al. [5] studied the effects of two different fire regimes on longleaf pine communities in Louisiana and found that biennially burned stands (burned biennially over a 10 year period) were characterized as having a sparse canopy, few woody plants, and a well-developed herbaceous layer dominated by little bluestem. In contrast, a stand that was fire-suppressed for at least five years had 67% canopy cover, a taller understory layer, and sparser herbaceous component. In stands that were burned biennially, little bluestem (*S. scoparium* var. *divergens*) had a 95% frequency of occurrence compared to 8% on the unburned site (as measured by frequency occurrence data along transects). Similar vegetative characteristics were found during subsequent surveys by Haywood and Harris [6] at other locations in that ecosystem. As part of an experiment to determine the effects of seasonal fires on woody growth in Louisiana, Haywood et al. [5] subjected loblolly pine stands to four different treatments: no fire, and March, May, or July burns. In addition to various other vegetative characteristics (diameter at breast height (DBH) and height of loblolly pine (*P. taeda*)), the annual productivity (lbs/acre) of little bluestem was determined under each of the treatments. Although the control site (no fire) did not have any bluestem (possibly due to long-term shading by overstory trees and shrubs), annual bluestem productivity was estimated at 302, 191, and 101 pounds per acre for March, May, and July burns, respectively. Bluestems were the most common herbaceous plants on all sites subjected to fire, and results of this study indicate that, in this plant community, March fires provide the most benefit to this grass species.

Restoration and Management Considerations

Little bluestem is a valuable landscape restoration and wildlife resource. It is used for pasture, range and hay land restoration, erosion control, and forage and cover for wildlife [20]. It is a highly palatable, but not nutritious forage species and is used as hay for domestic livestock [20]. Forage production ranges from 1,400 to over 4,000 pounds per acre in prairie habitats [20]. Sites frequently burned with little bluestem produce high quality forage for Bison [15]. Continuous and deferred rotation grazing that allow bluestem to rest and regrow appear to be the most effective grazing management practices [20]. In overgrazed areas, increased shrubs and invasive species tend to appear [20].

Little bluestem is managed for upland game species (e.g., grouse, prairie chickens, pheasants, and quail) and is an important wildlife food for song birds (woodpeckers, orioles, kingbirds, sparrows, thrashers, finches, and cowbirds [2, 20]. Little bluestem provides good cover for many wildlife species including bobwhite quail, grouse and other upland game species [20].

Little bluestem is a common species used in restoration and reclamation of grassland vegetation [2, 20]. It can grow well in sites with little nitrogen and low soil fertility [25]. However, due to its somewhat limited dispersal distance and poor seedling vigor, little bluestem may not be ideal for immediate, widespread establishment and re-colonization of restoration sites [17, 20].

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