Heller's Blazingstar
(*Liatris helleri*)

5-Year Status Review:
Summary and Evaluation

Photo credit: Gary Peeples/USFWS

U.S. Fish and Wildlife Service
Southeast Region
Asheville Ecological Services Field Office
Asheville, North Carolina

July 2025

5-YEAR STATUS REVIEW
Heller's Blazingstar (*Liatris helleri*)

GENERAL INFORMATION

Current Classification: Threatened

Lead Field Office: Asheville Ecological Services Field Office

Review Author(s): Michelle Henson, Asheville Ecological Services Field Office, U.S. Fish and Wildlife Service

Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight

Date of original listing: December 21, 1987 (52 FR 44397; November 19, 1987)

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about Heller's blazingstar (*Liatris helleri*) biology, habitat, and threats to inform this status review.

We announced initiation of this review in the Federal Register on June 6, 2024 (89 FR 48437) with a 60-day comment period and received no comments. The primary sources of information used in this analysis were peer-reviewed reports, agency reports, unpublished survey data and reports, and personal communication with recognized experts. This review was completed by the U.S. Fish and Wildlife Service, Asheville Ecological Services Field Office, Asheville, North Carolina. All literature and documents used for this review are on file at the Field Office. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on Heller's blazingstar.

The North Carolina Natural Heritage Program (NCNHP) maintains species occurrence data as element occurrences (EOs). For Heller's blazingstar, principle EOs were organized into populations (parent EOs) and subpopulations (sub-EOs). Each parent EO can contain several sub-EOs, which is a smaller but geographically distinct subpopulations.

FR Notice citation announcing the species is under active review:
June 6, 2024 (89 FR 48437)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098):
8 (species with a moderate degree of threat and a high recovery potential)

Review History:

Previous 5-year reviews recommending no change in status were published on August 5, 2013, and August 26, 2020 (Service 2013, 2020).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature
We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service.

Distinct Population Segment (DPS) (61 FR 4722)
The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy does not apply.

Recovery Criteria

Recovery Plan
Recovery Plan for *Liatris helleri*, Heller's Blazing Star, signed January 28, 2000 (Service 2000)

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

Criterion 1. The eight extant populations are protected.

Criterion 2. Any necessary management actions have been undertaken for these populations by the landowners or cooperating agencies and it has been documented that this management is successfully ensuring the continued survival of these populations.

As of 2025, 10 of the 11 extant populations occur on publicly or privately owned lands that are managed for conservation. However, management actions vary among the populations. Populations under ownership of the Grandfather Mountain Stewardship Foundation are surveyed regularly and managed primarily through guest education and signage to prevent trampling (Bennett 2025, pers. comm.). Similarly, populations along the Blue Ridge Parkway are monitored annually, with signage posted to discourage off-trail access (Ulrey 2025, pers. comm.). National Park Service staff have implemented prescribed fire at these locations as part of ongoing habitat management efforts. One population at the North Carolina Plant Conservation Preserve is managed through occasional woody stem removal near the rocky outcrop, though this occurs infrequently and irregularly. None of the populations located on private land have any recognized land management practices in place. While prescribed fire has been applied

consistently at a few sites, it is not implemented consistently across the species' range and does not appear to be part of a coordinated management strategy. Criterion not met.

Criterion 3. Through introduction and/or discovery of new populations, at least one additional self-sustaining population exists within the species' historical range (it is believed that at least nine populations are required to ensure that the species will not become endangered in the foreseeable future).

Two populations have been discovered since the revision of the recovery plan (Service 2000). In 2018, the Dun Vegan Mountain population consisted of eight plants, and the Lost Cove Cliffs population included 22 plants (Service 2020). Currently, only one plant has been found at the Dun Vegan population and is not considered self-sustaining. The Lost Cove Cliff population has not been surveyed since the last 5-year review, making it difficult to assess the current population size, trends, or whether this population is self-sustaining. Criterion not met.

Criterion 4. All nine populations and their habitat are protected from present and foreseeable human-related and natural threats that may interfere with their survival.

All extant populations are unprotected from present and foreseeable human-related and natural threats. While most populations are under some form of protection, trampling from high volume recreation and fire suppression remain ongoing and significant threats to the species, jeopardizing its continued survival. These threats are discussed in detail below. Criterion not met.

Biology and Habitat Summary

Abundance, trends, and demographics

Heller's blazingstar is a narrow-ranging perennial endemic to the southern Appalachian Mountains in western North Carolina. The species occurs at mid-to-high elevations between 1,000 to 2,000 meters (3,281 to 6,562 feet) above sea level, and grows in shallow acidic soils on rock outcrops, cliffs, or overhangs (Service 2000). The plant emerges from a corm-like rootstock, producing narrow leaves and a showy floral spike that blooms from July to September (Godt and Hamrick 1996). A variety of bees, butterflies, and moths serve as pollinators, while seeds are primarily dispersed by wind (Clark 2019).

When the species was listed in 1987, seven populations were documented, and the recovery plan recognized eight extant populations (Service 1987, 2000). However, neither document provided estimates of the species' total abundance across its range. In the 2013 5-year review, the Service identified 11 extant populations with 17 subpopulations and estimated a total of a 'few thousand individuals' in the review (Service 2013). The 2020 5-year review reported no change in distribution, documenting 11 extant populations with 16 subpopulations and an estimated 5,000 individuals throughout the species' range (Service 2020).

Currently, there are 11 extant populations with 15 subpopulations, as well as two extirpated populations, one possibly extirpated population, and six possibly extirpated subpopulations (Table A.1). The two extirpated populations have not been documented for more than 30 years (one in population last seen in 1894 and one last seen in 1984). The potentially extirpated

population and the six subpopulations have not been seen in over two decades, and their current status remains uncertain. Since the last 5-year review, a previously misidentified population (population 14 / EO 29.000 in Table A.1) has been added to the list of extant populations, and three new subpopulations have been identified (EOs 35.025, 35.033, 31.034 in Table A.1).

Based on our 2020 assessment, there were approximately 5,000 plants (Service 2020). Currently, there are an estimated 3,400 plants across the species' range. While these estimates are lower than previous years, inconsistencies in survey methods and reporting units limit the comparability of the current estimate to those used in previous five-year reviews, making it difficult to draw definitive conclusions about population trends. Additionally, surveying can be challenging due to the high elevation rock outcrops and steep-sided vertical cliffs where the species occurs. As a result, one population and five subpopulations have not been censused in over five years (Table A.1) and surveys remain incomplete at those populations.

Extant populations occur in Ashe, Avery, Burke, Caldwell, and Watauga counties in North Carolina. No new counties have been added to the species distribution since the listing rule (Service 1987) or recovery plan (Service 2000).

Genetics

The North American genus *Liatris*, which is comprised of 40-50 species, has been characterized as a genus of "unusual difficulty" (Gaiser 1946). Species of *Liatris* are broadly sympatric and morphological distinctions between species in the genus are often unclear due to high variability and hybridization. To address these challenges, Clark et al. (2019) developed a set of genetic markers to clarify the species boundaries between Heller's blazingstar (*Liatris helleri*) and its closely related congener, turgid blazingstar (*Liatris turgida*). The authors designed 17 microsatellite markers that will serve as a novel genetic tool for delineating the taxonomic boundaries between closely related species and help guide future management strategies for the recovery of the species.

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act. A summary of this assessment is detailed below.

Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range

Although several populations occur on protected land, trampling even within protected areas continues to pose a significant threat to Heller's blazingstar, largely due to the high volume of recreational activities (i.e. hiking and rock climbing) in close proximity to the majority of populations. All but one population along the Blue Ridge Parkway are located near popular hiking trails. While signs have been implemented to educate visitors and discourage off trail activity, evidence of trampling has been observed at these populations (Ulrey 2025, pers. comm.). In the Linville Gorge Wilderness, Heller's blazingstar populations occur adjacent to mapped trails and informal social trails, which increases trampling pressure and habitat degradation. These impacts have likely contributed to observed declines in both population size and habitat quality.

In North Carolina's High Country, the proposed Northern Peaks State Trail would span approximately 40 miles, connecting Boone to West Jefferson through the Amphibolite Mountains, a region known for its unique geology and high biodiversity. The planned route passes through Three Top Mountain Game Lands, where known populations of Heller's blazingstar occur. In 2022, the NC Natural Heritage Program was contracted to conduct biological surveys at Three Top Mountain to identify and mitigate potential impacts to rare species and sensitive habitats. As a result, the trail corridor was revised and rerouted to avoid the ecologically sensitive areas where rare species occur (NCNHP Permit Letter, 2024). The remaining sections of the trail will be finalized following additional future surveys by NCNHP. Although trail planners are actively avoiding areas with rare plant populations, the risk of visitor-created social trails remains a significant concern for Heller's blazingstar and other rare species limited to remote, inaccessible habitats. Signs will be installed along the trail to encourage visitors to remain on designated paths; however, observations from other high-use recreation areas suggest that informal trail creation is common and difficult to prevent despite such efforts. The unintended consequence of increased visitation, proliferation of social trails, and noncompliance with signage can result in habitat degradation and direct impacts to Heller's blazingstar. As such, recreational pressure remains a substantial and ongoing threat to the species' persistence.

In addition, fire suppression continues to pose a significant threat to the survival of Heller's blazingstar. Quintana-Ascencio et al. (2024) investigated the population demographics of the species and found that fire had substantial positive effects on recruitment. The authors developed integral projection models and simulated scenarios of prescribed fire every 10 years. Their findings indicated that decadal fire return intervals contribute to the stability of population growth rates and extinction probabilities. Additionally, the authors observed evidence of growth overcompensation, where plants that had been burned in the previous year demonstrated higher growth and reproductive success compared to unaffected plants. In the absence of fire at this interval, encroachment by shrubby ericaceous (plants in the heather family – Ericaceae) vegetation may displace the species and alter the frequency of future fires in its habitat, jeopardizing the species' long-term viability. Natural or prescribed fire may not be frequent enough on the landscape to maintain appropriate habitat for Heller's blazingstar. Further research is necessary to gain a comprehensive understanding of the role of fire for the ecology, biology, and resiliency of Heller's blazingstar into the future.

Factor B: overutilization for commercial, recreational, scientific, or educational purposes

Currently, Heller's blazingstar is not known to be threatened by overutilization. However, the species is at high risk for poaching as it occurs in high volume recreational areas and in some areas near hiking trails. Reports from the 2020 5-year review include two known poaching incidents in the Linville Gorge Wilderness and Grandfather Mountain State Park (Service 2020). To our knowledge, there are no reports of poaching since the last 5-year review. However, those working with the species should report incidents to the Service.

Factor C: disease or predation

Browsing by mammals has been observed at subpopulations of Heller's blazingstar near the Blue Ridge Parkway (Ulrey 2025, pers. comm.). A long-term demography study conducted by

Quintana-Ascencio et al. (2024) found that herbivory was relatively low and over 90% of browsed plants survived at these subpopulations. However, browsing reduced plant diameter, the probability of reproduction, and the number of flower heads per plant. The authors speculate that browsing by rabbits (*Sylvilagus* sp.) may increase with increased shrub cover or may be a function of limited resources for the mammal. While herbivory pressure was relatively low over their study period, increased rates of browsing increase both extinction probability and uncertainty in population growth. Given the species' limited distribution, small population sizes, and poor recruitment, any external drivers that reduce survival are a threat to the species and should be monitored.

Factor D: the inadequacy of existing regulatory mechanisms

The North Carolina Plant Conservation and Protection Act (NC State Code Article 19B, § 106-202.12) provides limited protection from unauthorized collection and trade of plants listed under that statute. However, this statute does not protect the species or its habitat from destruction in conjunction with development projects or otherwise legal activities. State laws protecting rare plant species have limited authorities, and North Carolina rare plant statutes do not protect the species from habitat destruction from recreational use on federal lands (where many populations occur and remain vulnerable to this threat). In addition, USFS regulation 36 CFR 261.9 prohibits removing or damaging any plant that is classified as a threatened, endangered, sensitive, rare, or unique species (USFS 2003). Additionally, Forest Service Manual 2673 establishes policy that prohibits the removal and collection of any threatened or endangered plants on USFS lands under Federal jurisdiction except when authorized by permits (USFS 2009). Gathering and removing plants or plant parts is currently prohibited in National Park System areas unless specifically authorized by federal statute, treaty rights, or conducted under the limited circumstances authorized by existing codified regulations (NPS 2019). Although these regulations and policies should protect Heller's blazingstar on USFS and National Park Service property, lack of resources prevents monitoring of compliance and enforcement and these regulations do not provide protections from other threats like lack of prescribed fire, small population sizes, and impacts from increasing temperatures and drought.

Factor E: other natural or manmade factors affecting its continued existence.

High elevation plant species may face a disproportionately higher extinction risk in the future related to projected increases in temperature, evapotranspiration, drought intensity, and frequency of extreme precipitation events (Schoof et al. 2016, Easterling et al. 2017, Frankson et al. 2022). These altered conditions pose significant threats to species that exist near their environmental limits, especially those that are specialized to cool, humid environments (Ulrey et al. 2016). Many high-elevation endemics already exist in small populations due to microclimate availability and limited habitat extent, and some may not be able to adapt to altered climatic conditions (Culatta and Horton 2014). While high elevation habitats offer microclimatic buffering, the ability of these refugia to continue protecting populations under anthropogenic climate change is unknown. For Heller's blazingstar, future predictions may increase surrounding vegetation cover, change the frequency of prescribed fire, and alter the species' demography (Quintana-Ascencio et al. 2024). Given the narrowly restricted distribution and small population size of Heller's blazingstar, shifts in temperature, precipitation, and disturbance

regimes are likely to reduce habitat availability and suitability and may induce negative effects on the long-term persistence of the species.

Synthesis

Heller's blazingstar is a narrow-ranging perennial endemic to the southern Appalachian Mountains of western North Carolina, where it is restricted to high elevation rocky outcrops, cliffs, ledges, and balds. In the 2020 5-year review, 5,000 individuals were identified among 11 populations and 16 subpopulations across the species' range. Currently, there are 3,400 plants across 11 populations and 15 subpopulations. One population and six subpopulations have not been observed in over two decades and are therefore classified as possibly extirpated. Since the last 5-year review, three new subpopulations have been identified, and one previously misidentified population has now been accurately recognized. Although current total abundance estimates are lower than those previously reported, inconsistencies in measurement units limit direct comparisons, contributing to the uncertainty regarding its status and population trends. Threats such as trampling, lack of natural or prescribed fire, poaching, and herbivory remain significant threats to the species' survival. Additionally, increases in temperature, evapotranspiration, drought intensity, and frequency of extreme precipitation events may threaten this high elevation species in the future. Given its narrow geographic range, current condition, and persistent threats, we recommend that Heller's blazingstar continues to meet the definition of a threatened species under the Endangered Species Act.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 2000) and previous 5-year reviews (Service 2013, 2020). In the course of this status review, new and/or targeted potential recovery activities were identified and are included below.

Recovery Activities

- Identify high-use trails and implement new strategies to reduce recreational impacts to the species.
- Evaluate potential reintroduction locations, compile a list of suitable areas, and support reintroduction through the enhancement or restoration of new sites.
- Partner with conservation organizations to augment populations with greenhouse-grown individuals in populations with lower genetic diversity or abundance. Ensure outplanting reflects natural distribution patterns, supporting ecological integrity and facilitating long-term monitoring.
- Work with agency partners and land managers to implement prescribed fire at a consistent decadal fire return interval at sites containing Heller's blazingstar populations.
- Prioritize the removal of encroaching woody vegetation at outcrop habitats near populations.
- Develop outreach materials that promote stewardship and foster community engagement in the species' conservation.

Monitoring and Research Activities

- Continue to work with partners to monitor and census all populations regularly using a standardized protocol to assess population trends, trampling impacts, browsing rates, and habitat condition. Use high accuracy GPS to map and track the extent of individual patches.
- Support academic research in understanding the abiotic or biotic mechanisms that support population vigor.
- Assess the vulnerability of the species to climate change by testing physiological tolerances and future habitat suitability to inform long-term conservation strategies.
- Continue to support long-term research on population viability and demographics to understand population size and structure, recruitment and reproduction rates, and seed bank dynamics of the species.
- Support research investigating the effects of fire regimes on the ecology and life history traits of Heller's blazingstar.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of Heller's Blazingstar

Status Recommendation:

On the basis of this review, we recommend the following status for this species (50 CFR § 424.11). A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

____ Downlist to Threatened.
____ Uplist to Endangered.
____ Delist:
____ *The species is extinct.*
____ *The species is recovered.*
____ *New information indicates the species does not meet the definition of an endangered or threatened species.*
____ *The listed entity does not meet the statutory definition of a species.*
__X__ No change needed.

FIELD OFFICE APPROVAL:

Acting for **Field Supervisor, Asheville Ecological Services Field Office, U.S. Fish and Wildlife Service**

Approve GARY PEEPLES Digitally signed by GARY PEEPLES Date: 2025.07.18 11:15:23 -04'00'

APPENDIX A. SUPPORTING DOCUMENTATION

Table A.1. Summary of extant and extirpated element occurrences (EOs) of Heller's blazingstar. Each population contains the status, population number, EO number, site name, county, protection status, and last observation across the range (NCNHP 2025). Parent EOs or populations are designated by whole numbers (e.g., 27.000) and sub-EOs or subpopulations are designated by decimals under the parent or population number (e.g., 27.001, 27.002, 27.009).

Status	FWS Population	EO Number	Site Name	County	Protection	Last Observation
Extant	1	30.000	Linville Gorge and Falls	Burke	Y	2020
Extant	2	31.000	Linville Gorge and Falls	Burke	Y	2020
Extant	2	31.003	Linville Gorge and Falls	Burke		2020
Extant	2	31.004	Linville Gorge and Falls	Burke		2018
Extant	2	31.034	Linville Gorge: East Rim	Burke		2020
Extant	3	6.000	Linville Gorge and Falls	Burke	Y	2020
Extant	4	35.000	Lost Cove Cliffs	Avery	Y	2020
Extant	4	35.025	Lost Cove Cliffs	Avery		2020
Extant	4	35.033	Lost Cove Cliffs	Avery		2020
Extant	5	27.000	Grandfather Mountain	Avery	Y	2024
Extant	5	27.001	Grandfather Mountain	Avery		2024
Extant	5	27.002	Grandfather Mountain	Avery		2024
Extant	5	27.009	Grandfather Mountain	Avery		2024
Extant	5	27.012	Grandfather Mountain	Avery		2018
Extant	5	27.013	Grandfather Mountain	Avery		1991
Extant	5	27.019	Grandfather Mountain	Avery		2024
Extant	5	27.023	Grandfather Mountain	Watauga		2018
Extant	5	27.026	Grandfather Mountain	Avery		2024

Status	FWS Population	EO Number	Site Name	County	Protection	Last Observation
Extant	5	27.028	Grandfather Mountain	Avery		2018
Extant	5	27.032	Grandfather Mountain	Avery		2024
Extant	6	15.000	Three Top Mountain	Ashe	Y	2023
Extant	7	10.000	Bluff Mountain	Ashe	Y	2010
Extant	8	20.000	Paddy Mountain	Ashe	Y	2020
Extant	9	5.000	Blowing Rock Cliffs	Caldwell	N	2021
Extant	11	24.000	Dun Vegan Mountain	Avery	Y	2024
Extant	14	29.000	Linville Gorge and Falls	Burke	Y	2020
Possibly Extirpated	5	27.011	Grandfather Mountain	Avery		1990
Possibly Extirpated	5	27.016	Grandfather Mountain	Avery		1991
Possibly Extirpated	5	27.017	Grandfather Mountain	Avery		2001
Possibly Extirpated	5	27.018	Grandfather Mountain	Avery		1991
Possibly Extirpated	5	27.021	Grandfather Mountain	Avery		1995
Possibly Extirpated	5	27.022	Grandfather Mountain	Watauga		1994
Possibly Extirpated	10	8.000	Hanging Rock Mountain	Avery/Watauga		1989
Extirpated	12	7.000	Pinnacles of the Beech	Avery		1981
Extirpated	13	14.000	Roan Mountain Massif	Avery/Mitchell/Carter		1894