

Obed Wild and Scenic River and Big South Fork National River and Recreation Area

National Park Service
U.S. Department of the Interior
Inventory and Monitoring Division
Appalachian Highlands Network



Cumberland Rosemary: 2023 Status Report

Importance: A Threatened Species

Cumberland rosemary (*Conradina verticillata*) is a federally-listed threatened species endemic to the upper Cumberland Plateau in Tennessee and Kentucky. Big South Fork National River and Recreation Area (BISO) and Obed Wild and Scenic River (OBRI) contain 89% of all remaining populations of this imperiled species, and Obed Wild and Scenic River contains almost 75% of the total, as well as the largest known population remaining in existence. The Obed Wild and Scenic River is the most significant remaining stronghold for this species. Cumberland rosemary, like other plant species found in the same open cobble bar/riverscours prairie habitat, thrives in part due to the regular occurrence of scouring floods. Regular floods eliminate competing woody species that would shade out and eliminate these unique plants, which rely on grassy openings. Populations of this rare species are threatened by water pollution, changes in river flow patterns, and non-native invasive plants.

Objective

Determine current status and track long-term trends in abundance, cover, and size class distribution within selected park populations.

Status and Trends

The Cumberland rosemary populations in the parks have been monitored since 2001, with National Park Service (NPS) and state (Tennessee and Kentucky) personnel conducting complete censuses at a limited number of accessible populations by counting and measuring all plants at those sites. Many previously unknown populations of rosemary were discovered during an effort by NPS crews to map cobble bars between 2005 and 2010. Prior to this project, the location and extent of most of these populations were unknown due to their inaccessibility at the bottom of deep river gorges lined by sheer cliffs, where many can only be reached by boat when flows are high.



Cumberland rosemary (*Conradina verticillata*). NPS photo.

National Park Service staff conducted rosemary monitoring at 17 sites in February of 2023, eight at Big South Fork National River and Recreation Area (NRA) and nine at Obed Wild and Scenic River (WSR). Compiling all data collected since 2001 for eight rosemary populations at Big South Fork NRA and since 2007 for 10 populations at Obed WSR, it appears that two of the BISO populations are generally increasing in number of plants (clumps). Two are stable to slightly increasing, one is stable to slightly decreasing, two are generally decreasing, and one is decreasing dramatically and may soon be extirpated (one historical population has already been extirpated). Areal extent increased for six populations between 2022 and 2023 but is still lower than the 2017 maximum for all populations. Longer-term trends in this measure are more difficult to interpret because year-to-year values are quite variable, although they are generally downward.



Left and above, APHN staff monitor Cumberland Rosemary (*Conradina verticillata*) at Obed Wild and Scenic River, with assistance from park, federal and state partners. NPS photos / APHN staff.

Status and Trends (continued)

Count data from the last eight years at Obed WSR suggest one population is stable to slightly increasing, one population is more or less stable, two populations are stable to slightly decreasing, two populations rose then fell, three populations are decreasing, and one has been extirpated (although it only comprised a single plant). Data prior to 2016 are less reliable, but longer-term trends suggest OBRI population numbers are generally stable or slightly increasing for three sites, rising and then falling for three sites, and generally decreasing for the remaining three.

Areal extent increased from 2022 to 2023 for three of the populations monitored; all populations but one show a drop in this measure over the last five years. Longer-term trends in areal extent (where available) are mostly downward.

Monitoring is planned for the same 17 sites in February of 2024. In addition, APHN staff hope to repeat the rosemary mapping project at some point in the next five years to look for population-level changes in the distribution of this rare plant, beginning at Obed WSR.

Discussion and Agency Collaboration

Rosemary counts were conducted by seven APHN personnel with assistance from one BISO employee, one person from the Tennessee Department of Environment and Conservation (TDEC) Division of Natural Areas, and the U. S. Fish and Wildlife Service (USFWS) species lead for Cumberland rosemary.

The NPS protocol for rosemary monitoring is the same as the States of Tennessee and Kentucky, which should permit integration of data across the range of the species. However, some past monitoring has been conducted during the growing season when tall grasses and other dense vegetation can obscure the low-growing rosemary, making detection difficult and calling into question the accuracy of growing-season results. The NPS staff now conduct monitoring in winter, when other vegetation is less of a hindrance to accurate counts of the evergreen rosemary (see photos to the right).

The U. S. Fish and Wildlife Service (FWS) published a five-year status review of Cumberland rosemary in July of 2018. The Appalachian Highlands Network contributed monitoring data for this project. Review recommendations included better coordination and data sharing between the network and state resource agencies (TDEC and Kentucky State Nature Preserves Commission), assessing impacts of recreation on rosemary populations, using APHN cobble bar monitoring data to inform analysis of rosemary data, and targeted monitoring efforts for locations where data are lacking, among others. We hope to continue working closely with state resource agencies on rosemary monitoring. Joint monitoring efforts help ensure consistent data collection methods and thereby improve analyses using data from multiple agencies. Notice of the 2023 five- year status review was published in the federal register on May 13, 2022, and APHN data were submitted to the park for transfer to the FWS to support this effort.



Rosemary monitoring site at Big South Fork National River and Recreation Area in September 2021. NPS photo / APHN staff.

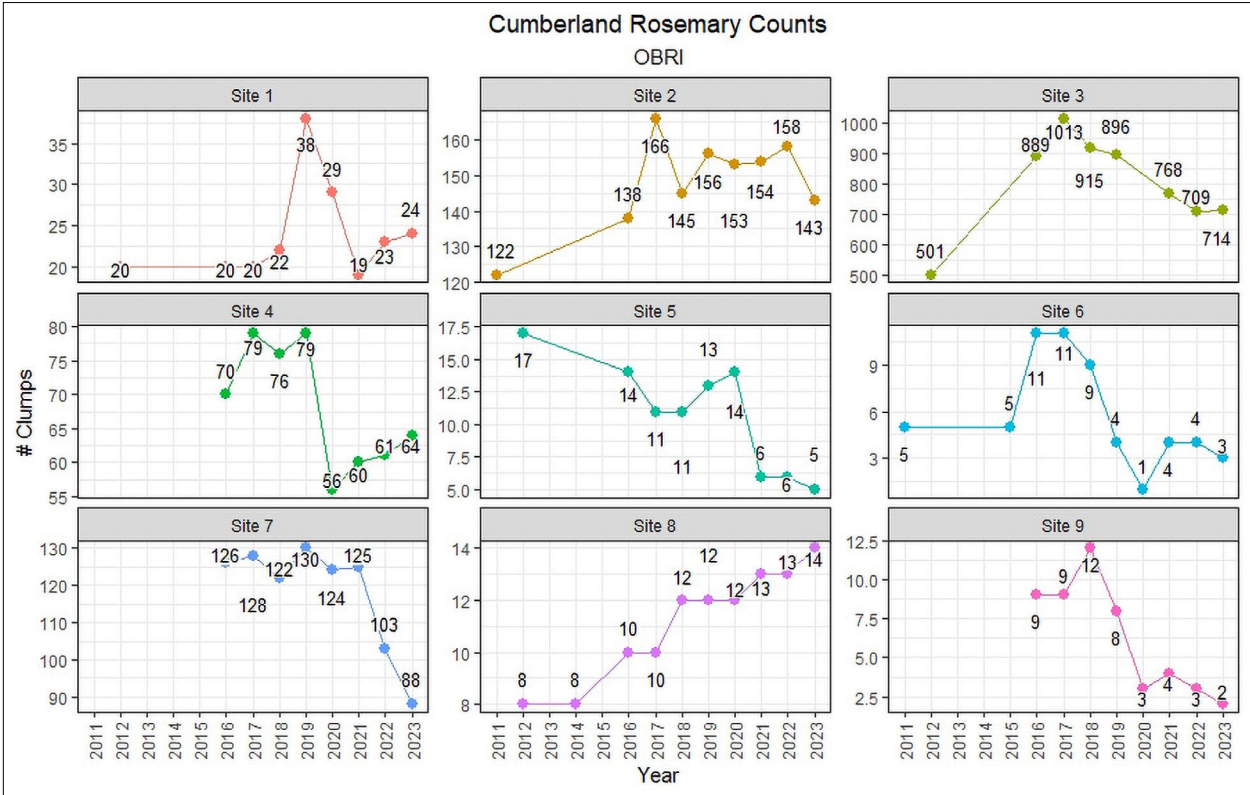


The same rosemary monitoring site in March 2021. NPS photo / APHN staff.

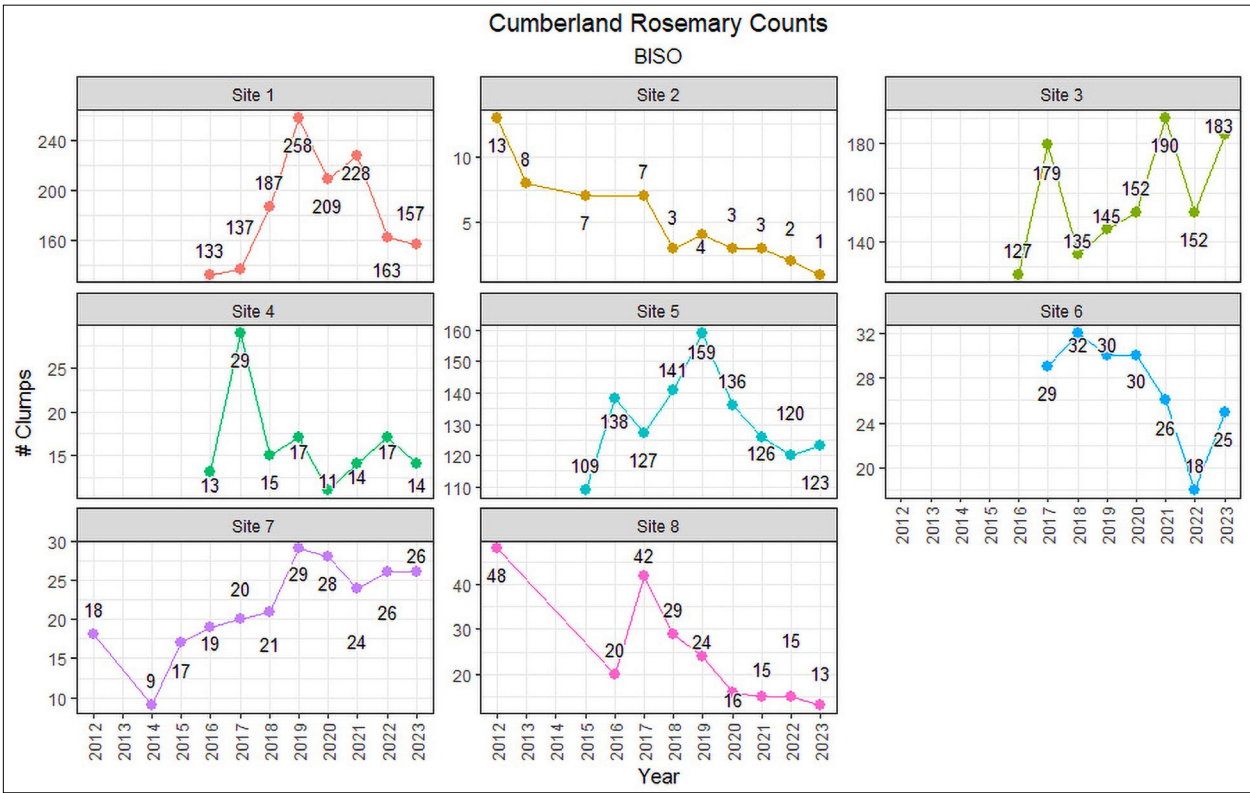
Management Applications

- Provide critical status information on this protected species to park management
- Identify sites in need of control efforts for invasive exotic plants
- Provide feedback on the timing and success of park management and restoration activities
- Support park resource protection planning and land health reporting efforts

Cumberland Rosemary Monitoring Data, Compiled from All Sources, OBRI 2011–2023 and BISO 2012–2023 (Provisional Data)



Rosemary count data from Obed Wild and Scenic River (above) and Big South Fork National River and Recreation Area (below). Intermittent counts dating back to 2001 (Big South Fork) and 2007 (Obed) are not shown to save space. Note y-axis scales vary between sites to accommodate the wide range of clump counts.



Cumberland Rosemary Monitoring Data, Compiled from All Sources, OBRI 2011–2023 and BISO 2012–2023 (Continued)

Table 1. Cumberland Rosemary Overall Assessment of Trends and Data Quality 2001–2023 (Provisional Data).

Park	Measure	Condition Status/Trend*	Resource Condition Comments and Interpretation
Big South Fork National River and Recreation Area (Eight Monitored Sites)	Number of plants		Two populations mostly increasing, two populations stable to slightly increasing, one stable to slightly decreasing, two generally decreasing, one decreasing dramatically.
	Overall cover of rosemary		Six populations increased from 2022 to 2023 but all show a net decrease from 2017 to 2023. Longer-term trends more variable.
Obed Wild and Scenic River (Nine Monitored Sites)	Number of plants		Over the last eight years: one population stable to slightly increasing, one population more or less stable, two populations stable to slightly decreasing, three populations generally decreasing, two increasing, then decreasing.
	Overall cover of rosemary		Three populations increased from 2022 to 2023, but all decreased from 2017 to 2023. Longer-term trends (where available) are mostly downward, although eight sites increased from 2016 to 2017.

Table 2. Symbol Key.

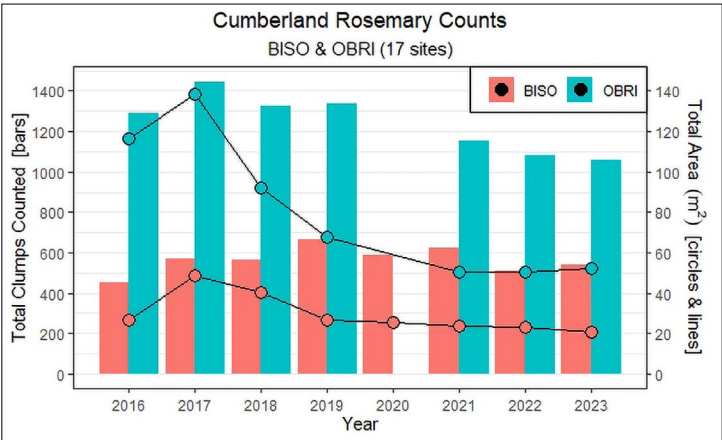
Symbol	Condition Status	Symbol	Trend in Condition	Symbol	Confidence in Assessment
	Warrants Significant Concern		Condition is Improving		High
	Warrants Moderate Concern		Condition is Unchanging		Medium
	Resource is in Good Condition		Condition is Deteriorating		Low

* General trends, not necessarily statistically significant. Some data prior to 2016 were collected during the growing season, when detectability is lower and counts may therefore be less accurate.

Key Points for 2023

- 2023 was the eighth consecutive year in which the Appalachian Highlands Network completed winter counts and cover measurements at a majority of monitoring sites. This more-consistent monitoring should provide a better understanding of population conditions and trends. We hope to build a 10-year dataset for more-detailed trend analysis.
- Intense scouring from record-setting high flows in recent years may be contributing to the decline in rosemary cover since 2017. Flood stage at BISO’s Leatherwood Ford gage and OBRI’s Lilly Bridge gage were the highest on record during a high flow event in March 2021, the former exceeding the record set in 2020 by nearly 3 feet (0.9 meters). While it is flood adapted, Cumberland rosemary may be scoured out by repeated intense floods.

- Several populations are declining, and smaller ones could disappear. For example, BISO Site 2 has declined from more than 100 to only two clumps, while OBRI sites 6 and 9 each have fewer than five clumps (with OBRI 5 not much better off).
- Data compiled across sites for each park since more-consistent monitoring began in 2016 indicate that counts are somewhat variable with no clear trend at Big South Fork NRA and an overall downward trend in counts at Obed WSR. Cover has almost uniformly fallen at both parks, and especially Obed WSR, after a high in 2017. See graph below.



Summary of Cumberland rosemary counts since monitoring began in 2016.

For More Information

[APHN website](https://www.nps.gov/im/APHN/index.htm)
(<https://www.nps.gov/im/APHN/index.htm>)
[Evan Raskin, Assistant Data Manager/Biologist](#)
(evan_raskin@nps.gov)