

U. S. Fish and Wildlife Service

Draft Recovery Plan for Short's Bladderpod (*Physaria globosa*)

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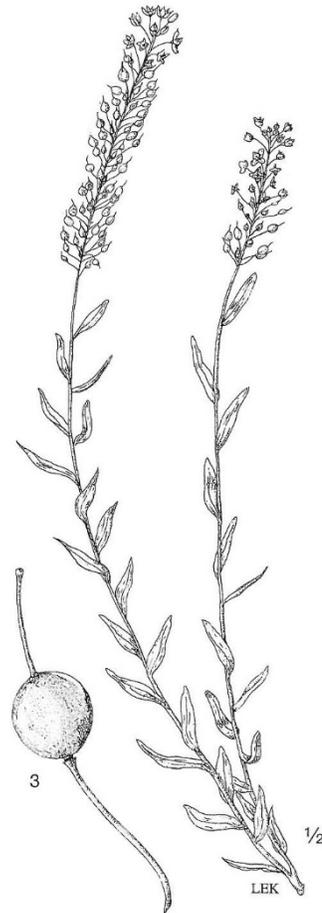
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Draft Recovery Plan for Short's Bladderpod (*Physaria globosa*)

This Recovery Plan describes criteria for determining when the Short's bladderpod should be considered for removal from the *List of Endangered and Threatened Plants* (50 CFR 17.12). It also lists site-specific actions that will be necessary to meet those criteria, and estimates the time and cost for implementing recovery actions. Brief descriptions of the species' status, habitat requirements, and limiting factors are included. A detailed discussion of these and other topics pertinent to the recovery of Short's Bladderpod can be found in the Species Status Assessment and the Draft Recovery Implementation Strategy. These supplemental documents are available at <http://www.fws.gov/cookeville>. The Recovery Implementation Strategy and Species Status Assessment are finalized separately from the Recovery Plan and will be updated on a routine basis.

Current Species Status: Short's bladderpod (*Physaria globosa*) was federally listed as endangered on August 1, 2014 (79 FR 44712), and is also listed as endangered by the three states where the species is known to occur: Indiana, Kentucky, and Tennessee. Short's bladderpod is known from 55 historical occurrences; however, only 31 occurrences are presently extant. This species has a disjunct distribution, with one occurrence near the confluence of the Wabash and Ohio Rivers in Indiana, 10 occurrences in the Kentucky River watershed in Kentucky, and 20 occurrences known from the Cumberland River watershed in Tennessee. Twenty units have been designated as critical habitat for Short's bladderpod (79 FR 50998; August 26, 2014). Short's bladderpod is assigned a recovery priority number of 8, indicating a species with moderate degree of threat and high recovery potential.

Habitat Requirements and Limiting Factors: Short's bladderpod typically grows on steep, rocky, wooded slopes and talus areas. It also occurs along tops, bases, and ledges of bluffs and infrequently on sites with little topographic relief. The species usually is found in these habitats on south- to west-facing slopes near rivers or streams, and most populations are closely associated with calcareous outcrops. The most vigorous and stable occurrences are found in sites with a relatively open overstory canopy.

The remaining populations of Short's bladderpod are in many cases small, isolated, and have limited potential for recolonization should they be extirpated. The greatest threats to this species are loss or degradation of habitat and dynamics of small populations. The main causes for habitat degradation or loss include future construction and ongoing maintenance of transportation rights-of-way; prolonged inundation and soil erosion due to flooding and water level manipulation; overstory shading due to forest succession; and competition from invasive plant species (79 FR 44712; August 1, 2014).

Recovery Strategy: The recovery strategy for Short's bladderpod is to ensure the long-term viability of the species through habitat conservation, restoration, and management where extant occurrences are present; research to assess reproductive biology, life history, and ecological factors regulating population growth; surveys to identify new populations; *ex situ* conservation and population augmentation; and increased public awareness. This effort will require collaboration with key stakeholders. Specifically, the recovery strategy calls for the development of an adaptive conservation strategy for populations occurring on lands managed by the US Army Corps of Engineers (Corps) and State and local governments. In addition, agreements with

departments of transportation, local highway departments, railroad authorities, and utility companies are required to ensure protection and suitable management of populations near rights-of-way. Collaboration between State conservation agencies and private landowners is needed to protect populations on private lands and manage habitat on conservation lands.

Recovery of Short's bladderpod, a species currently known from only 31 extant occurrences, is founded upon the ecological principles of representation, resiliency, and redundancy (Wolf et al. 2015). In the case of Short's bladderpod, representation necessitates that populations throughout the entire range of this species are a priority for conservation; thus, the entirety of the species range is important for its recovery. Redundancy requires that multiple populations should be conserved within each region in which the species occurs. Accordingly, multiple populations must be conserved in both the Cumberland and Kentucky River watersheds. Only one population has ever been documented in Indiana, and the isolated nature of this population creates vulnerabilities to catastrophic events as no other populations would likely be able to recolonize the site. Absent discovery of new populations, protecting against catastrophic events in this geographic region is best achieved through secure *ex situ* storage. Research is needed to improve scientific knowledge of biological and ecological factors that regulate population growth in order to develop adaptive management strategies. Standardized monitoring protocols will be used to measure effectiveness of conservation efforts at sustaining resilient populations. Resilience is contingent upon promoting habitat conditions that facilitate population growth to buffer against genetic, demographic, and environmental stochasticity (Wolf et al. 2015). An effective recovery strategy for Short's bladderpod is contingent upon habitat management and disturbance regimes that promote population stability and growth.

Recovery Objectives: The recovery objectives are to protect, restore, and manage habitat to provide conditions necessary to recover and ultimately remove Short's bladderpod from the *List of Endangered and Threatened Plants* (50 CFR 17.12). This will require an immediate emphasis on researching optimal disturbance regimes and habitat conditions for Short's bladderpod, developing a range-wide monitoring protocol, and implementing science-based management of the species' habitat. Where populations are unable to respond to habitat management due to low population size, augmentation using seeds or propagated plants might be necessary. Long-term monitoring of extant and newly discovered and/or reintroduced populations will be required to assess population stability, and to determine whether criteria for delisting have been met. Criteria will be reevaluated as new information becomes available.

Criteria for Delisting

- (1) Agreements have been reached with key stakeholders to conserve, restore, and manage habitat to provide ecological conditions, as described in the Species Status Assessment for Short's bladderpod (SSA), that promote growth of individuals and support resilient populations. (Addresses Listing Factor A.)
- (2) Monitoring demonstrates stable or increasing population growth rates or an average population size for at least 25 populations that is equal to or above the minimum viable size. Populations are protected by a conservation mechanism. A minimum of 6 of these populations must be located in the Kentucky River watershed and 15 populations in the Cumberland River watershed, in addition to the population in the Wabash River

watershed, in order to ensure adequate regional representation and intra-regional redundancy of resilient populations. (Addresses Listing Factors A and E.)

- (3) In lieu of satisfying criteria 1 and 2, the species could be considered for delisting if 50 resilient occurrences (as described in the SSA) are distributed among the physiographic regions where the species occurs. (Addresses Factor A and E.)

Actions Needed: The recovery actions identified in the table below are those that, based on the best available science, we believe are necessary to accomplish the recovery of Short’s bladderpod. We have included a priority number¹ and estimated cost to complete each action.

Recovery Action	Estimated Cost	Priority
1. Work with the Corps to develop and implement a conservation strategy for Short’s bladderpod on lands that the Corps owns or controls.	\$475,000	1
2. Develop and implement management agreements with departments of transportation, local highway departments, railroad authorities, and utility companies to ensure protection of populations near rights-of-way.	\$314,000	2
3. Work with state agencies and private landowners in Kentucky, Tennessee, and Indiana to obtain protection for populations on privately owned lands and to develop and implement adaptive management strategies for protected sites.	\$900,000	2
4. Establish standardized methods for monitoring of populations and habitat conditions, and initiate regular stage-specific monitoring at occurrences range-wide.	\$550,000	1
5. Conduct research that enhances knowledge of Short’s Bladderpod to facilitate the development of scientifically sound management plans and models for conducting population viability analyses.	\$360,000	1
6. Facilitate and support surveys to identify new populations.	\$90,000	2
7. Increase the representation and genetic diversity of <i>ex situ</i> collections of Short’s bladderpod in seedbanks to ensure the breadth of species diversity is conserved.	\$30,000	2
8. Augment protected populations that are unable to grow in response to habitat management due to low population size, or introduce populations into suitable, but unoccupied, managed habitat on conservation lands.	\$200,000	3
9. Continue to coordinate with Federal, State, County and City agencies to promote plant recovery and find innovative ways to increase public awareness of the need to protect this species and its habitats.	\$110,000	3

¹ Recovery actions are assigned numerical priorities to highlight the relative contribution they may make toward species recovery (48 FR 43098):

Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2 – An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.

Priority 3 – All other actions necessary to provide for full recovery of the species.

Recovery Action	Estimated Cost	Priority
Total Estimated Cost: \$3,029,000		

Estimated Cost to Delist: The cost to recover and ultimately delist Short’s Bladderpod is estimated to be \$3,029,000. Some costs are not determinable at this time, and therefore the total cost of recovery may be higher than this estimate.

Date of Delisting: If all actions are fully funded and implemented as outlined, including full cooperation of all partners needed to achieve recovery, we anticipate that recovery criteria for delisting could be met by 2063.

Literature Cited:

Wolf, S., B. Hartl, C. Carroll, M. C. Neel, and D. N. Greenwald. 2015. Beyond PVA: why recovery under the Endangered Species Act is more than population viability. *BioScience* 65:200-207.