

## **Draft Amendment to the Recovery Plan for *Plagiobothrys hirtus* (Rough Popcornflower)**

**Original Approved:** [July 28, 2003](#)

**Original Prepared by:** Pacific Region, U.S. Fish and Wildlife Service, and Plant Conservation Biology Program, Oregon Department of Agriculture

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**Species Addressed in Draft Amendment:** *Plagiobothrys hirtus* (rough popcornflower)

We have analyzed the best available scientific and commercial information and find that an amendment to the recovery criteria for *Plagiobothrys hirtus* (rough popcornflower) is warranted. In this proposed modification, we discuss the adequacy of the existing recovery criteria, show amended recovery criteria, and present the rationale supporting the proposed recovery plan modification. The proposed modification of the criteria is presented as an addendum that supplements the recovery plan, superseding Section II. Recovery (pp. 21–22) of the recovery plan (Service 2003). An additional recovery action (1.1.6) is also added to the Implementation Schedule on pp. 44-48 of the recovery plan.

### **BACKGROUND INFORMATION**

Recovery plans should be consulted frequently, used to initiate recovery activities, and updated as needed. A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification. Keeping recovery plans current ensures that the species benefits through timely, partner-coordinated implementation based on the best available information. The need for, and extent of, plan modifications will vary considerably among plans. Maintaining a useful and current recovery plan depends on the scope and complexity of the initial plan, the structure of the document, and the involvement of stakeholders.

An amendment involves a substantial rewrite of a portion of a recovery plan that changes any of the statutory elements. The need for an amendment may be triggered when, among other possibilities: (1) the current recovery plan is out of compliance with regard to statutory requirements; (2) new information has been identified, such as population-level threats to the species or previously unknown life history traits, that necessitates new or refined recovery actions and/or criteria; or (3) the current recovery plan is not achieving its objectives. The amendment replaces only that specific portion of the recovery plan, supplementing the existing recovery plan, but not completely replacing it. An amendment may be most appropriate if significant plan improvements are needed, but resources are too scarce to accomplish a full recovery plan revision in a short time.

Although it would be inappropriate for an amendment to include changes in the recovery program that contradict the approved recovery plan, it could incorporate study findings that enhance the scientific basis of the plan, or that reduce uncertainties as to the life history, threats, or species' response to management. An amendment could serve a critical function while awaiting a revised recovery plan by: (1) refining and/or prioritizing recovery actions that need to be emphasized, (2) refining recovery criteria, or (3) adding a species to a multispecies or

ecosystem plan. An amendment can, therefore, efficiently balance resources spent on modifying a plan against those spent on managing implementation of ongoing recovery actions.

#### **METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT**

On July 28, 2003, we, the U.S. Fish and Wildlife Service (Service), finalized the original Recovery Plan for the Rough Popcornflower (*Plagiobothrys hirtus*) based upon the best scientific data available at the time. The recovery plan established six recovery criteria for downlisting the species from endangered to threatened. However, insufficient information existed to develop recovery criteria for delisting the species. Since the recovery plan was published, the Service has worked with the Oregon Department of Agriculture (ODA) to complete numerous research and restoration projects that have resulted in progress toward meeting downlisting criteria, as well as an improved understanding of the species' biology and needs. Most recently, the ODA completed a re-evaluation of the current threats to rough popcornflower and efforts to ameliorate them; examined current downlisting criteria and developed recommendations for changes to those criteria based upon our improved scientific understanding of the species; and developed recommendations for biologically valid delisting criteria. The recovery plan amendment proposed here is based upon these recommendations from the ODA, as further refined in collaboration with the Service.

Peer review of the updated downlisting and delisting criteria will be concurrent with the public review and comment period on the draft amendment to the recovery plan, and comments received will be incorporated into the final recovery plan amendment, as appropriate.

#### **ADEQUACY OF RECOVERY CRITERIA**

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list." Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) have also affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors (section 4(a)(1) of the Act).

#### **Recovery Criteria**

See previous version of the recovery criteria on pages 21 to 22 in Part II (Recovery) of the Recovery Plan for the Rough Popcornflower (*Plagiobothrys hirtus*) (Service 2003).

#### **Synthesis**

Rough popcornflower is a plant endemic to Douglas County, Oregon, that occurs only in swales or seasonal wet meadows where it remains submerged under standing water from late fall through spring. We listed the rough popcornflower as an endangered species due to threats resulting from habitat loss due to hydrologic alterations and land conversion, vegetation succession resulting from fire exclusion, habitat fragmentation, grazing impacts, roadside mowing and herbicide application, and competitive exclusion by native and nonnative wetland

vegetation. At the time of listing, the species was known from 17 distinct sites containing a total of approximately 7,000 plants (Service 2000, entire).

When the original recovery plan was finalized in 2003, we established six recovery criteria for considering reclassification of the species from endangered to threatened status (“downlisting”). At that time we also determined that the information available was insufficient to identify recovery criteria for delisting the rough popcornflower. Since then, our understanding of the species’ biology and life history needs has improved due to a substantial amount of work by the Service, the ODA, and additional partners in conservation including the U.S. Bureau of Land Management (BLM), The Nature Conservancy, the Oregon Department of Transportation, Douglas County Public Works, and Douglas County Soil and Water Conservation District.

A shift away from visual estimation toward utilizing more accurate Global Positioning System (GPS) and Geographic Information System (GIS) technology to measure area of occupied habitat revealed that previous estimates consistently overestimated the area occupied by rough popcornflower (Amsberry and Meinke 2016, p. 46). The variability across sites in plant communities and in the perennial and annual tendencies of rough popcornflower is now better understood. Thus, depending on local conditions, apparently healthy and self-sustaining populations of rough popcornflower plants may occur at very different densities at different sites, and the benefit of previously established plant density targets has been called into question (ODA 2019, pp. 5–6).

Following the development of population introduction protocols (Currin *et al.* 2004, pp. 102–125), multiple new populations of rough popcornflower were established (Amsberry and Meinke 2013, entire). As part of that effort, rough popcornflower was successfully introduced to two sites along tributary streams of the Umpqua River outside of the recovery units established in the recovery plan (Service 2003, pp. 5–6). The successful establishment of those extralimital populations expands the potential geographic scope for recovery of the species (Amsberry and Meinke 2016, p. 47).

The most recent survey data available as of the time of this amendment indicates that rough popcornflower is extant at 22 distinct sites. Of these, 12 are naturally occurring, 4 have been augmented, and 6 have been created. These sites are included in 8 proposed reserves<sup>1</sup> with a total population size of approximately 114,000 plants (Amsberry and Meinke 2016, pp. 6-45).

Based upon our improved understanding we have concluded it is now appropriate to revise the original downlisting criteria and to establish delisting criteria. The revision of the existing downlisting criteria includes modifications to some criteria, and elimination of others, in whole or in part.

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<sup>1</sup>As defined in the recovery plan, a reserve refers to one or more patches of rough popcornflower, located within 1 kilometer (km) (0.6 mile [mi]) of each other, that are protected from development and managed for the continued existence of the species.

## **AMENDED RECOVERY CRITERIA**

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and the species may be delisted.

Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from an endangered species to a threatened species. The term “endangered species” means any species (species, sub-species, or DPS) which is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Revisions to the Lists, including delisting or downlisting a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made “solely on the basis of the best scientific and commercial data available.” Thus, while recovery plans provide important guidance to the Service, States, and other partners on methods of minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species’ status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan, which triggers rulemaking. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

We provide both downlisting and delisting criteria for the rough popcornflower, which will supersede those included in the Recovery Plan for the Rough Popcornflower (*Plagiobothrys hirtus*) (Service 2003), as follows:

### **Downlisting Recovery Criteria**

Criterion 1. At least 9 reserves, containing a minimum of 5,000 plants each, are protected and managed to assure their long-term survival. A reserve may be composed of one or more patches of rough popcornflower located within 1 km (0.6 mi) of each other.

Justification: Here we do not suggest any changes to the actual metrics, but simply combine two of the original downlisting criteria (Downlisting Criteria 1 and 4). The number of reserves required will provide sufficient redundancy such that rough popcornflower will no longer be at risk of extinction due to catastrophic events. A minimum population size of 5,000 individuals per reserve is intended to provide sufficient resiliency to withstand stochastic events (Culotta 1995, pp. 31–32; Traill *et al.* 2007, p. 164). The maximum distance of 1 km (0.6 mi) between patches within a reserve is set to allow connectivity for pollinator-mediated gene flow

across the population. This distance was defined in Downlisting Criterion 4 in the original recovery plan, and is now incorporated into Downlisting Criterion 1 for clarity and simplicity.

Criterion 2. A minimum of 500 square meters (5,382 square feet) is occupied by the rough popcornflower within each reserve. Occupied habitat should be determined by using a GPS device to delineate patches of plant, with the GPS data then uploaded into a GIS program to calculate total area. The maximum allowable location error is +/- 3 m (9.8 ft). For patches too small to be delineated accurately, a GPS point location should be recorded along with a measurement of the occupied area.

Justification: This criterion provides for resiliency within rough popcornflower populations by ensuring that plants are spatially dispersed throughout each site, reducing the likelihood that localized impacts will affect all plants within the population. This criterion has been revised to decrease the minimum occupied area from 1,000 square meters (10,764 square feet) to 500 square meters (5,382 square feet) to better reflect improved methods for accurately measuring occupied area, as well as an improved understanding of the requirements of the species. Older methods, used at the time that the original recovery plan was developed, overestimated occupied areas by a factor of 1.58 (Amsberry and Meinke 2016, p. 5), leading to an overestimate of the minimum area required. At the time of this revision, numerous populations are apparently healthy while occupying fewer than 1,000 square meters (10,764 square feet) (Amsberry and Meinke 2016, p. 6), indicating that the threshold was set higher than is necessary for the conservation of the species.

In the original recovery plan, Downlisting Criterion 2 called for each reserve to have a minimum area of 50 square meters (538 square feet) of occupied habitat with a minimum density of 100 plants per square meter (11 square feet). Due to an updated understanding of the species formed through multiple years of survey and observation, this portion of Downlisting Criterion 2 was found to be inappropriate for the species' ecology. The perennial tendencies of rough popcornflower plants vary by population and larger perennial plants tend to grow less densely than smaller annual plants, putting some populations at an inherent disadvantage for meeting this requirement. Plant density also varies from year to year, with lower densities associated with the perennial life cycle that is promoted during wetter years, and higher densities associated with the annual life cycle that is favored under drier conditions. Other native and nonnative vegetation can co-exist with rough popcornflower within occupied habitat, which results in lower density of rough popcornflower without necessarily posing a problem for its long-term survival. In some cases, the arrangement of suitable habitat is diffuse within a site, and this arrangement can limit the amount of square meters that are densely occupied. For these reasons, the minimum density requirement from Downlisting Criterion 2 does not reflect a realistic expectation and is not necessarily even reflective of desirable conditions. Therefore, it has been removed in this modification.

Criterion 3. A minimum of nine reserves, each meeting the requirements in Downlisting Criteria 1 and 2, are distributed with at least one reserve each in the Calapooya Creek and Yoncalla Creek recovery units, and a minimum of five reserves in the Sutherlin Creek recovery unit. The remaining two required reserves may be located within any of the natural recovery units, or elsewhere within the Lower North Umpqua River (1710030111), Calapooya Creek

(1710030301), and Elk Creek (1710030303) Hydrologic Unit Code (HUC) 10 watersheds containing the recovery units.

Justification: By ensuring that populations are spatially distributed across the range of the species, we increase our confidence that the species will be able to persist in the face of catastrophic events (redundancy). The original recovery plan called for an even distribution of reserves across the known natural range of the species. Unfortunately, those requirements did not match the naturally uneven distribution of populations across the species' range, nor did it account for sites outside the known natural range that could be established or discovered in suitable habitat. By expanding the suitable area for existing populations to count toward recovery to include the full HUC10 watersheds from which the original three recovery units were derived, additional existing sites created at BLM's North Bank Habitat Management Area may now be considered when assessing recovery of the species.

Criterion 4. Over a 5-year period with a minimum of 3 individual years of monitoring, demographic data indicate that at least seven of the nine reserves have average population numbers that are stable or increasing, without decreasing trends lasting more than 2 years.

Justification: Stable or increasing population trends are an indicator of resiliency. While some inter-annual variability is expected due to demographic and environmental stochasticity, this criterion is intended to provide sufficient confidence that no large sustained declines are occurring. The requirement to conduct monitoring during a minimum of 3 years during the 5-year monitoring period reduces the likelihood of large multi-year gaps in data and increases confidence that any decreasing trends are recorded.

One criterion identified in the original recovery plan as Downlisting Criterion 6 has been removed as part of this modification. That criterion read as follows:

*“Seventy-five percent or more of the plants within each of the nine reserves are reproductive each year, with 30 percent annual seed maturation and recruitment evident in all populations.”*

We consider these metrics to be redundant with the original Downlisting Criterion 5, which required a stable or increasing trend in population numbers. Because rough popcornflower is an annual or short-lived perennial plant, sufficient reproduction can be inferred if a population shows a stable or increasing trend. Additionally, data indicate that rough popcornflower is prolifically reproductive (Amsberry and Meinke 2016, p. 48), alleviating previous concerns about seed production and recruitment. Therefore, we removed the original Downlisting Criterion 6, as we considered it duplicative with the metrics of the original Downlisting Criterion 5. The original Downlisting Criterion 5, as amended, is now Criterion 4 due to combining the original Criterion 4 with Criterion 1, as described above.

## **Delisting Recovery Criteria**

In addition to meeting the downlisting criteria above, the following criteria apply for delisting consideration:

Criterion 1. At least nine reserves will have established management plans or conservation agreements that include requirements for periodic monitoring and habitat maintenance. Habitat maintenance must prioritize the removal of woody vegetation and nonnative invasive plants.

Justification: Even when reserves are protected from development, woody succession and the establishment and proliferation of nonnative invasive plants may lead to habitat transformation and excessive competition that would cause a loss of resiliency in rough popcornflower populations. Agreements to monitor for and address these problems and others will provide confidence that protected reserves will maintain their capacity to support rough popcornflower for the foreseeable future.

Criterion 2. Seed accessions need to be collected from all 9 reserves and submitted for long-term storage at a local seed bank repository, with a minimum of 15,000 seeds per reserve stored for use in future augmentations or to re-establish each source population should one ever be extirpated.

Justification: The collection and long-term storage of seed provides a valuable contingency in the event that one or more populations become extirpated due to unforeseen or uncontrollable circumstances (e.g., seed bank depletion following unfavorable climatic conditions). Stored seed will allow for the potential re-establishment or augmentation of rough popcornflower populations, providing additional assurance that necessary levels of resiliency and redundancy are maintained for the foreseeable future. The quantity of seed required is set based upon the need to have enough seed to re-establish an extirpated population to the desired minimum population size of 5,000 plants (assuming a 50 percent germination rate), and to further augment the population as necessary.

Criterion 3. Over a 10-year period with a minimum of 7 years of monitoring, demographic data indicate that populations in at least seven of the nine recovery reserves have average population numbers that are stable or increasing, without decreasing trends lasting more than 2 years.

Justification: Stable or increasing population trends are an indicator of resiliency. While some inter-annual variability is expected due to demographic and environmental stochasticity, this criterion is intended to provide sufficient confidence that no large sustained declines are occurring. The requirement to conduct monitoring during a minimum of 7 years during the 10-year monitoring period reduces the likelihood of large multi-year gaps in data and increases confidence that any decreasing trends are recorded.

## **Rationale for Amended Recovery Criteria**

The amended recovery criteria are based upon the most up-to-date information about the species' biology and recommendations from experts within the ODA's Native Plant Conservation Program (ODA 2019, entire).

The recovery criteria reflect the best available scientific data about the species, its habitat, and any known threats. Downlisting Criteria 1 and 4 ensure that a sufficient number of resilient populations are protected from future habitat destruction due to land conversion or hydrologic alterations, and from the impacts of overgrazing (Listing Factors A, C), as well as ensuring sufficient genetic diversity is maintained (Listing Factor E). Downlisting Criterion 2 increases the resilience of rough popcornflower populations by decreasing the likelihood of extirpations due to the direct and indirect effects of stochastic disturbances and accidents (Listing Factor A). Downlisting Criterion 3 ensures a sufficient distribution of rough popcornflower populations across the range to ensure representation and redundancy of the species in the event of the loss of populations or habitat due to unforeseen or uncontrollable catastrophic events (Listing Factor A). Delisting Criterion 1 ensures resilience in populations by requiring sufficient habitat maintenance to reduce the threat posed by competing native and nonnative vegetation (Listing Factor E). Delisting Criterion 2 provides for contingencies in the event that populations are extirpated in the future due to unforeseen or uncontrollable circumstances (Listing Factors A, B, C, E). By requiring evidence of a 10-year stable or increasing trend in population counts, Delisting Criterion 3 provides high confidence that threats from hydrologic alterations, grazing, competing native and nonnative vegetation, and the use of herbicides (Listing Factors A, C, E) are not impacting the ability of rough popcornflower to maintain self-sustaining populations.

The Service uses the conservation biology principles of resiliency, representation, and redundancy (Shaffer and Stein 2000) as a lens to evaluate current and future condition of a species. The amended recovery criteria for rough popcornflower support representation by ensuring the ecological and genetic diversity of the species is conserved throughout its range. The criteria support resiliency through ensuring populations are robust and self-sustaining over time, as indicated by stable or increasing populations. The criteria support redundancy by recommending the distribution of resilient populations throughout the species' historical range. The recovery criteria are objective and measurable. Information is accurate, unbiased, and based upon the best available data known at this time.

**ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS**

Action Priority	Action Number	Action Description
2	1.1.6	Secure conservation or management agreements for nine reserves.

**COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS**

Action Number	Cost estimates, in thousands of dollars per fiscal year					
	FY1	FY2	FY3	FY4	FY5	Total
1.1.6	10	10	10	10	10	50

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