Draft Amendment to the Recovery Plan for *Ranunculus acriformis* var. *aestivalis* *(Ranuculus aestivalis*) (autumn buttercup)
https://ecos.fws.gov/docs/recovery_plan/910916.pdf

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DRAFT AMENDMENT

We have identified information that indicates a need to amend the delisting recovery criteria for autumn buttercup (*Ranunculus aestivalis*) which have been in place since the recovery plan was completed. In this proposed modification, we discuss the adequacy of the existing delisting recovery criteria, identify amended delisting recovery criteria, and present the rationale supporting the proposed recovery plan modification. The proposed modification will be included as an appendix that supplements the existing recovery plan, superseding only the delisting recovery criteria in the Executive Summary and Recovery (Part II) section (pages iv, 8, and 15) of the recovery plan (USFWS 1991).

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 A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification.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.

In this recovery plan amendment, we are amending the existing recovery criteria for autumn buttercup and defining what constitutes a population. The 1991 recovery plan (USFWS 1991) does not include delisting recovery criteria that are quantitative, nor does it present the parameters used to define a population. By modifying the existing recovery criteria to be objective and measurable, we will be able to show when the criteria are met.

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

This amendment was prepared by the Utah Ecological Services Field Office. We coordinated with the species' experts in Utah (Weber State University, Flagstaff Arboretum, Bureau of Land Management, Utah Natural Heritage Program, National Park Service, The Nature Conservancy), and we reviewed existing quantifiable recovery criteria for other narrow, endemic species (Revised Recovery Plan for Hawaiian Forest Birds, https://ecos.fws.gov/docs/recovery_plan/060922a.pdf; Revised Recovery Plan for Alala/Hawaiin Crow, https://ecos.fws.gov/docs/recovery_plan/090417.pdf). We also reviewed recommendations for quantifiable demographic and threat-based recovery criteria (Doak *et al.* 2015); the 2013 5-year review for autumn buttercup (USFWS 20213); more recent information on the species; recovery actions that were taken since the development of the original plan; monitoring data provided by Weber State University and the Arboretum at Flagstaff; and the survey extent for the species in Utah.

Our evaluation of the 1991 recovery plan (USFWS 1991), and the original 1989 listing rule (54 FR 30550) indicated that we did not present how we defined a population for autumn buttercup. For this amendment and management of autumn buttercup in the future, we use NatureServe guidelines for delimiting plant populations (NatureServe 2004) based on the proximity of occupied habitat areas to one another. We considered locations within 2 kilometers (km) (1.24 miles (mi)) of each other and suitable habitat in between them to be a single population. Plant locations that are greater than 2 km (1.24 mi) from each other with unsuitable habitat in between them, are considered separate populations (NatureServe 2004). Based on this criterion, there are two populations of autumn buttercup (The Nature Conservancy (TNC) and Junction populations), and the number of populations has increased since the time of our listing decision when there was just one known population. The amended delisting recovery criteria will be peer reviewed in accordance with the Office of Management and Budget (OMB) Peer Review Bulletin following the publication of the Notice of Availability.

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) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

Recovery Criteria

The autumn buttercup recovery objective is to prevent extinction through the protection of existing populations and the introduction of additional populations into suitable habitat, as described on page iv in the 1991 recovery plan. The recovery plan identifies recovery criteria to prevent extinction of autumn buttercup on pages iv and 7 and considers the criteria to be conservation criteria rather than downlisting or delisting criteria. After review, we now consider the current recovery criteria to be downlisting criteria for the species (https://ecos.fws.gov/docs/recovery_plan/910916.pdf)

Current Recovery Criteria
The recovery plan identifies the following recovery criteria to prevent extinction:

1. Increase the current population to a self-sustaining population of 1,000 plants on 10 acres of land at the present known site.

2. Establish at least two artificial populations of the autumn buttercup at suitable, recognized botanical gardens.

3. Establish viable self-sustaining populations in at least 5 additional sites on land managed to protect the species.

4. Establish an overall self-sustaining population of at least 20,000 plants.

Synthesis

Autumn buttercup is a short-lived perennial plant in the buttercup family (*Ranunculaceae*) that occurs in the upper Sevier River valley in Garfield County, Utah. The species produces yellow flowers in late summer that attract a variety of fly (Diptera), butterfly (Lepidoptera), and bee (Hymenoptera) visitors (Spence 1996). Autumn buttercup likely requires insect pollinators to produce seeds (Steinbach and Gottsberger 1993); however, we do not know the primary pollinator(s) for the species.

Autumn buttercup occupies the transition zone between wet, sedge-dominated, spring-fed meadows and dry, upland meadows. Within this transition zone, plants are strongly associated with hummocks, which are drier than the surrounding wet meadow soil. Grazed, wet meadows contain hummocks and low litter cover, two characteristics that appear to be important in maintaining suitable habitat conditions for the species (Skopec *et al.* 2017).

At the time of listing, there was one population of autumn buttercup (TNC population) of 20 plants on private lands. The status of autumn buttercup has improved with the location of a new population (Junction) with approximately 6,000 plants that occurs on private lands (Dale Ranch sub-population) and Federal lands (BLM sub-population). Autumn buttercup introductions have

also been implemented at the TNC population to increase plant abundance and develop successful propagation protocols for the species. The four introduction efforts have established 370 adult plants, but the population is not large enough to maintain the species' presence naturally (Skopec *et al.* 2017; Murray 2018a).

At the time of our last 5-year review, there was a range-wide total population estimate of less than 1,000 individuals (USFWS 2013). We now estimate there are more than 6,000 individuals range-wide. We consider a meaningful measure of population health (resilience) to be the mean number of reproductive individuals over a minimum 5-year period. Since above ground plant abundance fluctuates dramatically from year to year at the TNC population, the measure of reproductive individuals over time will serve as the population estimate for this species (Murray 2018b; Skopec 2018; Spence 2018).

At the time of our last 5-year review (USFWS 2013), not all of the threats identified at the time of listing and the original recovery plan continue to impact autumn buttercup. We no longer consider overutilization, disease, agricultural development, and residential development to be threats to the species. We now consider the primary threats to be over-grazing by livestock and predation (herbivory) by small mammals. Overgrazing by livestock is blamed for the extirpation of the type locality (Orton Ranch population); however, low and moderate levels of grazing are beneficial to maintain suitable habitat conditions for autumn buttercup and reduce small mammal herbivory (USFWS 2013; Skopec *et al.* 2017). Small mammal herbivory at the TNC population was blamed for the loss of the natural population and is the limiting factor in re-establishing this population (Skopec *et al.* 2017; USFWS 2013). TNC is actively managing the two primary threats by caging plants and incorporating low to moderate livestock grazing at the TNC population. We do not have information on the impact of these two threats at the Junction population.

Autumn buttercup appears to be highly sensitive to winter climate conditions (temperature and precipitation) and suffers high mortality rates in the winter months (Spence 1996; Skopec *et al.* 2017). The high mortality rates may reflect high levels of small mammal herbivory in conjunction with climate conditions. Climate change also has potential to impact the species due to its apparent sensitivity to current winter climate conditions (USFWS 2013).

There is a recognized need to improve autumn buttercup's resiliency and redundancy by introducing plants at the TNC population to increase plant abundance, introducing additional populations on Federal lands, and securing habitat protection of the Dale Ranch subpopulation. There is high potential for additional populations to occur on private lands in the Upper Sevier River valley; however, landowner support is low for access, surveys, and conservation efforts. There is some potential to establish new populations in the Otter Creek drainage and along the East Fork of the Sevier River on Federal lands based on expert opinion and a cursory land use evaluation to identify suitable habitat (Rooks 2018). There is also potential to establish new populations in saline, wet meadows in other watersheds such as the Upper Valley near Escalante, Utah (Spence 2018). We will re-evaluate the potential to introduce new autumn buttercup populations on Federal lands after site visits are performed. We want to ensure that recovery efforts support and maintain autumn buttercup's genetic diversity (representation) and recognize that active genetic management of future introduction efforts is needed.

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 autumn buttercup 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 endangered to threatened. 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 that 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 amended delisting criteria for autumn buttercup, which will supersede the recovery criteria included in the autumn buttercup recovery plan, as follows:

Delisting Recovery Criteria

Autumn buttercup will be considered for delisting when the recovery criteria are met. The amended delisting recovery criteria provides a quantifiable approach to determining when autumn buttercup has recovered to the point that it may be delisted:

<u>Amended Delisting Recovery Criteria</u>

Autumn buttercup will be considered for delisting if the following delisting criteria are met:

1. Maintain the TNC population and at least three introduced populations at a level that demonstrates an increasing trend in the 5-year mean (average) adult plant abundance

over a consecutive ten-year period. Adult plant abundance may fluctuate on an annual basis, but the defined populations should have an increasing 5-year mean over the ten-year time period. Maintain the Junction population at a level that demonstrates a stable trend in the 5-year mean (average) adult plant abundance over a consecutive ten-year period. Adult plant abundance may fluctuate on an annual basis, but the defined populations should have a stable 5-year mean over the ten-year time period.

Justification: We expect a period of ten years should be long enough to monitor a minimum of three generations of autumn buttercup, and include variability in above-ground plant abundance that responds to the climatic variation in the species' range. Increasing adult plant abundance in the small populations over this time period should indicate that the five populations are resilient to stochastic events and other stressors. The Junction population is the largest population and a stable population size over this time period should indicate the population is resilient to stochastic events and other stressors.

2. Maintain an estimated range-wide total population size at or greater than 20,000 adult plants over a five year minimum period. This population estimate is based on the mean adult plant abundance measure identified in criterion 1, above.

   Justification: The total population estimate of 20,000 individuals retains the current recovery criterion 4 but specifies the number is needed for the adult life stage. This criterion assumes an adult plant population target of 3,500 for the TNC population and three introduced populations, and the maintenance of 6,000 adult plants at the Junction population. Species-specific demography data in suitable habitat is not available to inform an evaluation of a minimum viable population (MVP) size for autumn buttercup. The information we have on the species indicates that 1,000 individuals mainly comprised of seedlings was not large enough to ensure a self-sustaining population at the TNC preserve (Spence 1996; USFWS 2013). This is based on consideration of clay phacelia's short life-span and high annual variation in above ground abundance, two characteristics that indicate a higher abundance in needed for long-term persistence. The adult plant life stage indicates active regeneration from the seedbank is occurring and is the largest contributor to population growth.

3. The three introduced populations collectively demonstrate 80 percent of the genetic variation of the two natural populations over a minimum of five generations (a consecutive ten-year period). Genetic variation (measured as the number and frequency of unique alleles within a population) is anticipated to vary from year-to-year but we expect this measure will provide a meaningful evaluation of population-level genetic diversity over time.

   Justification: This criterion indicates that introduced populations contain a similar level of genetic health (representation) as natural populations. This criterion should indicate the successful genetic management of introduction efforts to create populations that have the ability to adapt to near and long-term changes in the environment.

4. Long-term habitat protections and habitat management plans are in place for the five populations to protect autumn buttercup habitat and manage for habitat suitability, livestock grazing, small mammal herbivory, and other potential threats. Habitat protection on private and Federal lands can be achieved via fee acquisition, land trades, conservation easement, or long-term management agreements. Habitat management plans should include site-specific measures to address the maintenance of suitable habitat, herbivory, and weed control to improve plant establishment and minimize threats in occupied habitat. Consideration of the water source(s) and hydrologic regime should be included in habitat protections and management plans to the extent practicable. Management plans for spring-fed water sources likely need contingency plans for supplemental water during low-flow periods. The combination of habitat protection, maintenance of suitable habitat, and threat minimization will support increasing trends in adult plant abundance and population resiliency, as we state in criterion 1.

   Justification: Habitat protections, habitat management, and regulatory mechanisms are needed to provide assurances of long-term habitat protections and habitat management (inappropriate livestock grazing practices and small mammal herbivory) to support the continued existence of autumn buttercup and its habitat. This criterion will the support the resiliency, redundancy, and representation of the species.

5. The two natural populations (TNC and Junction) are represented in an *ex-situ* seed collection that is managed according to the Center for Plant Conservation guidelines (Guerrant *et al.* 2004). The *ex-situ* seed collection should contain existing levels of genetic diversity (or representation) of the two populations.

   Justification: Having off-site preservation of the two natural populations will help preserve the breadth of adaptive diversity of the species (representation). This criterion also provides additional redundancy to enable the species to withstand catastrophic events, such as wildfire.

All classification decisions consider the following five factors: (1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; (3) is disease or predation a factor; (4) are there inadequate existing regulatory mechanisms in place outside the ESA (taking into account the efforts by states and other organizations to protect the species or habitat); and (5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the *Federal Register* and seek public comment and peer review. Our final decision is announced in the *Federal Register*.

Rationale for Amended Recovery Criteria

We have amended the recovery criteria for autumn buttercup to include quantitative delisting criteria that incorporate the biodiversity principles of representation, resiliency, and redundancy (Shaffer and Stein 2000) and threats addressed under the five factors in the latest 5-year review

(USFWS 2013). The amended recovery criteria are based on our understanding of the species' needs and requirements. This understanding includes information gathered since the original recovery plan was published, such as more recent information about population status and trends, along with an updated understanding of the threats acting on the species. The amended criteria are based on increasing the population trend and abundance, maintaining genetic diversity, reducing threats to the species, and include a temporal aspect to ensure the species is resilient to expected variation within a reasonable time frame.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

No additional site-specific recovery actions are necessary for this species; therefore, this is not applicable.

COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS

No additional site-specific recovery actions are necessary for this species; therefore, this is not applicable.

LITERATURE CITED

Doak, D.F., G.K. Himes Boor, V.J. Bakker, W.F. Morris, A. Louthan, S.A. Morrison, A. Stanley, and L.B. Crowder. Recommendations for Improving Recovery Criteria under the US Endangered Species Act. Bioscience 65(2): 189 – 199.

Guerrant, E.O., P.L. Fielder, K. Havens, M. Maunder. 2004. Revised genetic sampling guidelines for conservation collections of rare and endangered plants, Appendix 1. In E.O. Guerrant, K. Havens, and M. Maunder (Eds.), Ex Situ Plant Conservation: Supporting Species Survival in the Wild (pp. 419-441). Island Press.

Murray, S. 2018a. "Notes from Autumn Buttercup call" Email to Jennifer Lewinsohn (USFWS) on June 27, 2018. 1 p. + attachment.

Murray, S. 2018b. Status and Recovery Questionnaire Conducted for Autumn buttercup (*Ranunculus aestivalis*). Research Botanist, The Arboretum at Flagstaff, Flagstaff, Arizona. 15 pp.

NatureServe. 2004. A Habitat-Based Strategy for Delimiting Plant Element Occurrences: Guidance from the 2004 Working Group. 15p.

Rooks, D. 2018. Status and Recovery Questionnaire Conducted for Autumn buttercup (*Ranunculus aestivalis*). BLM Botanist, Color Country District, Richfield, Utah. 10 pp.

Skopec, M.M., J. Lewinsohn, T. Sandoval, C. Wirick, S. Murray, V. Pence, and L. Whitham. 2017. Managed grazing is an effective strategy to restore habitat for the endangered autumn buttercup (Ranunculus aestivalis). Restoration Ecology 26(4): 629 – 635.

Skopec, M. 2018. Status and Recovery Questionnaire Conducted for Autumn buttercup (*Ranunculus aestivalis*). Professor of Zoology, Weber State University, Ogden, Utah. 12 pp.

Spence, J. 1996. Demography and Monitoring of the Autumn Buttercup, *Ranunculus aestivalis* (Benson) Van Buren and Harper, South-Central Utah. Pages 19-26, in Maschinski, J., Hammond, H.D., Holter, L, tech eds. 1996. Southwestern Rare and Endangered Plants: Proceedings of the Second Conference; 1995 September 11-14; Flagstaff, Arizona. Gen. Tech. Rep. RM-GTR-283. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 328 pp.

Spence, J. 2018. Status and Recovery Questionnaire Conducted for Autumn buttercup (*Ranunculus aestivalis*). Botanist, National Park Service and California Academy of Sciences. 13 pp.

Steinbach, K. and G. Gottsberger. 1994. Phenology and Pollination Biology of Five Ranunculus Species in Giessen, Central Germany. Phyton 34(2): 203–218.

Traill, L.W., C. J. A. Bradshaw, and B. W. Brook. 2007. Minimum viable population size: A meta-analysis of 30 years of published estimates. Biological Conservation 139:159–166.

U.S. Fish and Wildlife Service (USFWS). 1991. Autumn buttercup, *Ranunculus acriformis* A. Gray var. *aestivalis* L. Benson, Recovery Plan. U.S. Fish and Wildlife Service, Prepared by Frank J. Smith, Kenneth D. Heil, J. Mark Porter, and J. Larry England for Region 6, U.S. Fish and Wildlife Service, Denver, Colorado**.** 20 pp.

U.S. Fish and Wildlife Service (USFWS). 2013. Autumn Buttercup (*Ranunculus acriformis* var. *aestivalis*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Utah Field Office, West Valley City, UT. 48 pp.