Draft Recovery Plan for

Yellow Larkspur

(*Delphinium luteum*)

Photo credit: Debra Cook

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U.S. Fish and Wildlife Service
Pacific Southwest Region 8
Sacramento Fish and Wildlife Office
Sacramento, CA

Purpose and Disclaimer

This document presents the U.S. Fish and Wildlife Service's (Service) plan for the conservation of yellow larkspur. The recovery plan is the second part of the Service's 3-part recovery planning framework and includes the statutorily required elements pursuant to section 4(f) of the Endangered Species Act (Act). This recovery plan is informed by the first part of the framework, a Species Status Assessment (SSA). The SSA report delivers foundational science for informing decisions related to the Act and includes an analysis of the best available scientific and commercial information regarding a species' life history, biology, and current and future conditions that characterizes the species' viability (i.e., ability to sustain populations in the wild over time) and extinction risk. We have also prepared a Recovery Implementation Strategy (RIS), the third part of the framework. The RIS is an easily updateable operational plan that is separate and complimentary to the recovery plan that details the on-the-ground recovery activities needed to complete the recovery actions contained in the recovery plan.

Recovery plans describe the envisioned recovered state for a listed species (when it should no longer meet the Act's definitions of a threatened species or endangered species) and include a recovery strategy, recovery criteria, recovery actions, and the estimates of time and cost needed to achieve it. Plans are published by the Service and are often prepared with the assistance of recovery teams, contractors, State agencies, and others. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies involved in plan formulation, other than the Service. They represent the official position of the Service only after they have been signed by the Regional Director as approved. Recovery plans are guiding and planning documents only; identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Nothing in this plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in any one fiscal year in excess of appropriations made by Congress for that fiscal year in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and completion of recovery actions.

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An electronic copy of this draft recovery plan will be made available at:

https://ecos.fws.gov/ecp/species/3578

1. Introduction

This draft recovery plan describes criteria for determining when yellow larkspur should be considered for downlisting and delisting, lists site-specific actions that will be necessary to meet those criteria, and estimates the time and cost to achieve recovery. The recovery plan is based on the Species Status Assessment (SSA) for yellow larkspur (Service 2024a, entire). The SSA is summarized below. Detailed on-the-ground activities implementing recovery actions can be found in the Recovery Implementation Strategy (RIS; Service 2024b). These supplemental documents are available at https://www.fws.gov/species/yellow-larkspur-delphinium-luteum. The RIS and the SSA are finalized separately from the Recovery Plan and will be updated on a routine basis.

Yellow larkspur is an herbaceous perennial plant in the buttercup family (Ranunculaceae) and was federally listed as endangered in 2000 under the Endangered Species Act of 1973 (Act), as amended (16 U.S.C §1531 *et seq.*; Service 2000, p. 4156). The species has recovery priority number of 8C, indicating a species with a moderate degree of threat, high recovery potential, and conflict with construction, other development projects, or other forms of economic activity. Critical habitat was designated in 2003 for yellow larkspur and Baker's larkspur (*Delphinium bakeri*; Service 2003, p. 12834). At the time of listing, there were 11 known occurrences listed in the California Natural Diversity Database (Diversity Database), only two of which were described in the listing rule; Larkspur Rock and Larkspur Hill, both near Bodega Bay (Service 2000, p. 4156). The historical range includes Marin and Sonoma counties.

Yellow larkspur grows in rocky areas within coastal scrub plant communities, generally near areas showing evidence of some level of ground disturbance in the past. It does not persist where dense native or non-native vegetation outcompetes yellow larkspur for space and sunlight. Hummingbirds are likely needed to facilitate sexual reproduction between genetically distinct individuals. Yellow larkspur populations need suitable habitat, sufficient individuals (i.e., abundance), sexual reproduction and genetic diversity to be resilient. At the species level, yellow larkspur needs multiple resilient populations throughout its historical range, and distributed across the ecological and genetic breadth of the species. Resilient populations throughout its historical range with representation and redundancy within and between the populations will reduce the risk that either stochastic or potential catastrophic events result in the extinction of yellow larkspur.

At the time of listing, habitat destruction and modification due to urbanization, overcollection, and sheep grazing were the most serious threats to the species (Service 2000, p. 4156). Hybridization was added as a threat in the 2003 critical habitat designation, climate change was

added as a potential threat in the 2011 status review, and invasive plant species were added as a threat in the 2019 status review (Service 2003, p. 12836; Service 2011, p. 11; Service 2019, p. 9). All of these threats continue today, although overcollection is likely not having an effect on current populations. Competition with other plants (both native and invasive) is the primary threat to the currently monitored population in Larkspur Rock. Conservation and management actions for yellow larkspur have included land protection in the form of a conservation easement at Larkspur Rock, pulling weeds and trimming poison-oak at Larkspur Rock during annual monitoring visits by UC Botanical Garden at Berkeley staff, propagation, and seed banking.

2. Recovery Strategy

The yellow larkspur recovery strategy is the primary course of action designed to achieve recovery of the species, so that the threats are ameliorated and risk of extinction is lowered to negligible levels. The recovery strategy is to systematically increase the species' resiliency, redundancy, and representation to a self-sustaining state suitable for this narrow endemic. Recovery of the species requires that a sufficient number of populations or occurrences are protected and restored, to the degree necessary for them to be fully self-sustaining and resilient, meaning the population trends are stable or increasing with minimal to low levels of management. Populations should be sufficiently spread throughout the historical range to reduce the chance of a high-intensity wildfire (or other catastrophic event) affecting all occupied yellow larkspur habitat. Annual monitoring data will be used to demonstrate population trends. Research should be conducted to effectively assess viability, population trends, and whether the threats have been sufficiently reduced.

3. Recovery Criteria

According to the definitions provided in the Act, an endangered species is a species that is in danger of extinction throughout all or a significant portion of its range and a threatened species is one that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. When we evaluate whether or not a change in the species status is warranted, such as downlisting or delisting, we consider if the species continues to meet either of these definitions or not. A recovered species is one that no longer meets the definitions of endangered or threatened because the threats to that species have been ameliorated and its viability has been restored to levels expected to be sustainable into the foreseeable future.

Recovery criteria outline the conditions that, when met, indicate that a species warrants downlisting or delisting. Criteria also serve as the performance measures or targets to track the species progress towards achieving recovery. Recovery criteria are our best assessment at this

time of what needs to be completed so that yellow larkspur may be removed from the list of threatened and endangered species. Because we cannot predict the exact course that recovery may take and because our understanding of the species' vulnerability to threats is likely to change as more information becomes available about the species and the threats, it is possible that a status review may indicate that delisting is warranted even though not all of the recovery criteria have been met. Conversely, it is possible that the recovery criteria could all be met, and a status review may indicate that delisting is still not warranted because, for example, a new threat emerged that is not addressed in the current recovery criteria.

Downlisting and Delisting Criteria

Downlisting criteria describe conditions that, when achieved, suggest a reclassification of yellow larkspur from an endangered species to a threatened species may be appropriate. Delisting criteria build from the downlisting criteria. When delisting criteria are met, a removal from the list of threatened and endangered species may be warranted.

Downlisting Criteria

Yellow larkspur may be considered for downlisting when all the following criteria are met:

1a. There are a minimum of six populations in moderate condition as defined in the current SSA. For the purposes of this recovery plan, populations will be considered separate if they are separated by at least 0.25 mile (0.4 kilometer; km).

-or-

1b. There are a minimum of four populations in high condition as defined in the current SSA. For the purposes of this recovery plan, populations will be considered separate if they are separated by at least 0.25 mile (0.4 km)[1].

-and-

2. The populations described in downlisting criteria 1a or 1b are protected and management is shown to be effective by stable or increasing populations based on a minimum of 10 years of data.

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[1] A combination of moderate and high condition populations may also be used to satisfy this criterion if the sum of the population resiliency scores is twelve or higher and there are at least four populations. Population resiliency is scored as follows: low = 1, moderate = 2, high = 3.

Having either six moderately resilient or four highly resilient populations (or a sufficient combination of both) will reduce the risk that either stochastic or potential catastrophic events result in the extinction of yellow larkspur. However, high-intensity wildfire would likely still be a threat to the species, particularly if the populations are not sufficiently spread out. Population protection mechanisms may include sale by willing landowners of conservation easements to a conservation organization, by sale of fee title to the same, through a Memorandum of Understanding with the Service, or other forms of protection. Management may include control of competitive non-native weeds, control of encroaching competitive native vegetation, supplemental watering, monitoring to ensure the management goals are met, and other management activities as they are identified. As ten years of monitoring typically encompasses the full range of wet and dry year variation in coastal California, stable or increasing population trends averaged over 10 consecutive years will demonstrate that populations are healthy and resilient.

Delisting Criteria

Once the downlisting criteria have been met, yellow larkspur may be considered for delisting when all the following criteria are met:

1. A minimum of eight populations, six of which are in high condition as defined in the current SSA, and the remaining of which are at least in moderate condition. For the purposes of this recovery plan, populations will be considered separate if they are separated by at least 0.25 mile (0.4 km). The distance between the furthest two populations is at least 15 miles (24 km) and they are separated by either a manmade (road) or natural (waterway) structure that is likely to serve as a firebreak, decreasing the chance of a catastrophic wildfire affecting all populations[2].
2. The additional sites described in delisting criteria 1 are protected and management is shown to be effective by stable or increasing populations based on a minimum of 20 years of data.

[2] Based on the furthest two population occurrences in the California Natural Diversity Database being 15 miles apart, in addition to historical fire data from Marin and Sonoma Counties, a 15-mile separation distance is used as a reasonable buffer distance to decrease the chance of wildfire extirpating all populations.

3. *Ex situ* recovery seed banks exist and are maintained over time with sufficient seed so that stored seed may be used for recovery efforts while not exhausting the seed supply and decreasing seed bank genetic diversity. Seeds representative of the ecological breadth of the species should be stored at two Center for Plant Conservation-certified facilities, and replenished every 15 years, unless research demonstrates that collection frequency should be more frequent.

Threats to yellow larkspur from climate change, including changes in vegetation, hydrology, and temperature are predicted to be persistent in ways that the species has not experienced in the past, warranting increased redundancy and representation to mitigate extinction risk (Service 2023, pp. 26–27). Having at least two populations located over 20 miles apart will reduce the chance of a high-intensity wildfire burning all occupied yellow larkspur habitat. The longer monitoring period required for delisting (criterion 2) will further reinforce population resiliency in years with precipitation extremes (as predicted with current climate change models).

4. Recovery Actions

Recovery actions are the prioritized, site-specific interventions that need to be taken to conserve, manage, restore, and enhance the current condition of yellow larkspur and its habitat to meet the recovery criteria. Priority 1 actions are defined as those actions that currently available information suggests, must be taken to prevent extinction or to prevent the species from declining irreversibly. Priority 2 actions are those that must be taken to prevent a significant decline in population size or habitat quality or some other significant negative impact short of extinction. Priority 3 actions are all other actions necessary to provide for full recovery of the species. The assignment of priorities does not imply that some recovery actions are of low importance, but instead implies that lower priority items may be deferred while higher priority items are being implemented. The specific operational tasks and activities required to implement the proposed recovery actions outlined within this plan are presented in the yellow larkspur RIS, which is a separate document that can be easily adjusted, therefore maximizing the flexibility of species recovery implementation. Table 1 below crosswalks the identified actions with the criteria, threats, and listing factors.

1. Reintroduce yellow larkspur to additional sites in appropriate habitat within protected areas throughout its historical range (Priority 1).
2. Develop and implement a monitoring program to identify population trajectories and environmental conditions that might be adversely affecting the species throughout its range (Priority 1).

3. Manage habitat that supports the species to reduce or eliminate threats, including control of competitive non-native vegetation, control of encroaching competitive native vegetation, and supplemental seeding or planting throughout its range (Priority 1).
4. Collect seed from populations throughout the species' range and deposit accessions into two permanent conservation seed banks (Priority 2).
5. Conduct needed experimental research projects to enhance and improve management actions throughout the species' range. Examples include those that examine yellow larkspur genetics, assess population viability and habitat requirements, and evaluate planting techniques (Priority 3).

Table 1. Crosswalk of listing factors, threats under those factors, recovery criteria, and recovery action numbers for yellow larkspur. Listing factor D does not apply to the species at this time.

Listing Factor	Threat Description	Downlisting Criteria	Delisting Criteria	Recovery Actions
Factor A *The present or threatened destruction, modification, or curtailment of its habitat or range*	-Development/urbanization	1a/b – Six populations in moderate condition or four populations in high condition 2 – Land protection; stable or increasing population numbers for 10+ years	1 – Eight populations with a minimum of six in high condition 2 – Land protection; stable or increasing population numbers for 20+ years	1 – Reintroductions 2 – Monitoring program 3 – Habitat management
Factor B *Overutilization for commercial, recreational, scientific, or educational purposes*	-Collection for horticultural use	2 – Land protection; stable or increasing population numbers for 10+ years	2 – Land protection; stable or increasing population numbers for 20+ years	1 – Reintroductions 2 – Monitoring program 3 – Habitat management
Listing Factor	**Threat Description**	**Downlisting Criteria**	**Delisting Criteria**	**Recovery Actions**
Factor C *Disease or predation*	-Herbivory	1a/b – Six populations in moderate condition or four populations in high condition 2 – Land protection; stable or increasing population numbers for 10+ years	1 – Eight populations with a minimum of six in high condition 2 – Land protection; stable or increasing population numbers for 20+ years	1 – Reintroductions 2 – Monitoring program 3 – Habitat management
Factor E *Other natural or manmade factors affected its continued existence*	-Competition with native and non-native vegetation -Climate change -Hybridization	1a/b – Six populations in moderate condition or four populations in high condition 2 – Land protection; stable or increasing population numbers for 10+ years population numbers for 10+ years	1 – Eight populations with a minimum of six in high condition 2 – Land protection; stable or increasing population numbers for 20+ years 3 – Seed banking	2 – Monitoring program 3 – Habitat management 4 – Seed banking 5 – Research

5. Estimated Time and Cost of Recovery

Table 2 below summarizes the estimated time and costs to achieve recovery of yellow larkspur based on the recovery actions described in this plan. The costs include financial, volunteer, and in-kind support as well as other conservation endeavors likely to be supported by other cooperating agencies. We assume that implementation of habitat management, habitat protection, and experimental research could occur immediately and that we could see persistence of viable, self-sustaining populations in the following 30 years. Thus, after 30 years of recovery implementation, we expect consideration of the species for delisting to be plausible. However, we acknowledge that the initial steps to secure land protection and outplant yellow larkspur will likely not be instantaneous, thus adding an unknown number of years towards recovery for this species.

Table 2. Yellow larkspur recovery actions and estimated costs.

Recovery Action Number	Recovery Action	Estimated Time to Achieve	Estimated Cost
1	Reintroduce yellow larkspur to additional sites in appropriate habitat within protected areas throughout its historical range.	20 years	$10,000,000
2	Develop and implement a monitoring program to identify population trajectories and environmental conditions that might be adversely affecting the species throughout its range.	30 years	$150,000
3	Manage habitat that supports the species to reduce or eliminate threats, including control of competitive non-native vegetation, control of encroaching competitive native vegetation, and supplemental seeding or planting throughout its range.	30 years	$800,000
4	Collect seed from populations throughout the species' range and deposit accessions into two permanent conservation seed banks.	10 years	$40,000
5	Conduct needed experimental research projects to enhance and improve management actions throughout the species' range.	5–10 years	$200,000
		TOTAL ESTIMATED COSTS	**$11,190,000**

Literature Cited

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