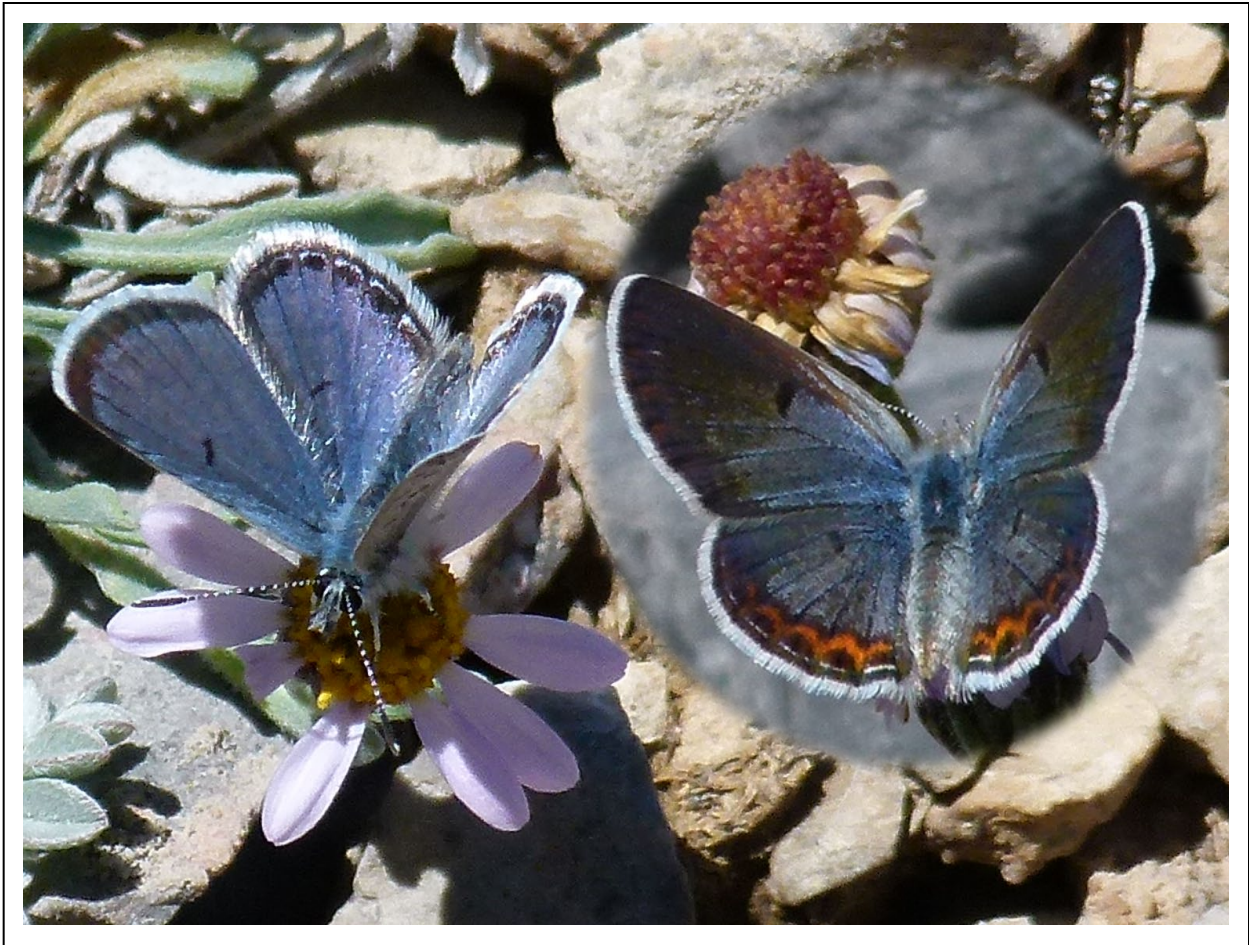


Recovery Implementation Strategy for Mount Charleston Blue Butterfly (*Icaricia shasta charlestonensis*)



Photos of male (left) and female (right) Mount Charleston blue butterflies courtesy of Corey Kallstrom, U.S. Fish and Wildlife Service.

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Introduction

This Recovery Implementation Strategy specifies the activities necessary to fully implement the recovery actions that are specified in the Recovery Plan for Mount Charleston blue butterfly (*Icaricia shasta charlestonensis*) (U.S. Fish and Wildlife Service (USFWS) 2023). Along with the recovery actions, the Recovery Plan contains the recovery strategy, recovery objectives, and recovery criteria for the species. Designed to provide more focused detail than the recovery actions in the Recovery Plan, the recovery activities found herein are prioritized in terms of their importance for recovery. An assessment of the biology, life history, and status of the Mount Charleston blue butterfly is available in the Species Biological Report, which can be found at <https://ecos.fws.gov>. The Species Biological Report and this Recovery Implementation Strategy will be updated on a routine basis as necessary.

Recovery Action and Activity Narrative

The recovery actions and activities identified below are those that, based on the best available science, we believe are necessary to bring about the recovery of the Mount Charleston blue butterfly and ensure its long-term conservation. However, these recovery actions and activities are subject to modification as suggested by new information, changes in species status, and the completion of other recovery actions. Implementation of the recovery actions and activities will require close coordination and cooperation with the Forest Service because the Mount Charleston blue butterfly occurs entirely on land managed by the Forest Service. Each recovery activity has been assigned a priority number (see below) according to our determination of what is most important for the recovery of Mount Charleston blue butterfly based on its status, life history, ecology, and threats.

Key to Terms and Acronyms Used in the Recovery Action and Activity Narrative and Implementation Schedule:

Priority numbers are defined as:

Priority 1: An activity that must be taken to prevent extinction or to prevent a species from declining irreversibly.

Priority 2: An activity that must be taken to prevent a significant decline of the species population/habitat quality, or some other significant negative impact short of extinction.

Priority 3: All other activities necessary to provide for full recovery of the species.

The numeric recovery priority system follows that of all USFWS recovery plans. Because situations change over time, priority numbers must be considered in the context of past and potential future activities at all sites. Therefore, the priority numbers assigned are intended to guide, not to constrain, the allocation of limited conservation resources. Priority numbers are provided in parentheses after activities. Similar and closely related activities are grouped.

1. Management - Protect existing Mount Charleston blue butterfly populations and habitat as appropriate, enhance and manage existing and new habitat, and manage existing and new populations.

1.1. Prepare and implement plans for site-specific treatments to enhance habitat and alleviate threats. (Priority 1)

To recover the Mount Charleston blue butterfly it will be necessary to prepare and implement plans based on the best available science that identify appropriate site-specific treatments to enhance habitat and alleviate threats. Site-specific treatments will vary to affect habitat quantity, quality, and arrangement. Treatments should adapt Climate-Smart (Stein et al. 2014) conservation principles in a Resist-Accept-Direct framework (Schuurman et al. 2020) as feasible. Treatments may result in any combination of protection, enhancement, restoration, and augmentation of habitat. Protection of habitat will maintain those areas where it currently exists. Enhancement of existing habitat will improve the elements of physical and biological features that provide for a species' life history processes and are essential to the conservation of the species. Restoration of habitat will return it to where it once existed. Augmenting habitat will increase the area of habitat by adding to existing or creating new areas of habitat. The properly planned arrangement of protected, enhanced, restored, and augmented habitat will contribute to recovery and conservation of the Mount Charleston blue butterfly by improving habitat and alleviating threats. Locations in Lee Canyon are the highest priority because of known and presumed occupied locations there have the highest exposure to threats and greatest potential for improvements through actions that lead to recovery.

The Mount Charleston blue butterfly and its habitat should be protected from threats impacting them directly or indirectly by planning treatments to physically exclude, inhibit, or divert threats. Threats include impacts from human or animal trampling, unearthing, and excessive erosion. Physical exclusion, inhibition, or diversion of threats could be implemented by manmade fencing, earthen or rock barriers, vegetation, or redirecting threats such as recreation.

To enhance, restore, and augment habitat, management plans should include treatments to address threats caused by succession, climate change, and non-native species. Succession causing changes in forest structure such as higher tree canopy cover and densities, and increases of non-native species of grasses or other invasive species reduce habitat quantity and quality and will require active management to alleviate them. Plans should be prepared and implemented for site-specific treatments that facilitate improvement of the physical and biological features necessary for the conservation of this species and to alleviate threats. Treatments that reduce tree and non-native grass species cover and density, performed in concert with the seeding, planting, and protection (if necessary) of nectar and host plant materials will benefit the Mount Charleston blue butterfly and its habitat.

1.2. Reduce or minimize impacts from feral horses in Lee Canyon. (Priority 2)

Feral horses are a threat to the Mount Charleston blue butterfly populations in Lee Canyon. Efforts to reduce or minimize impacts from horses in Lee Canyon will enhance habitat and reduce effects to Mount Charleston blue butterflies from crushing and disturbance. Management options to protect the Mount Charleston blue butterfly and its habitat from feral horses include fencing habitat, removing horses entirely from areas, and implementing other actions that discourage the presence of horses.

1.3. Protect existing Mount Charleston blue butterfly populations and habitat.

1.3.1. Develop standard measures or conditions for proposed actions and permits and revise as necessary. (Priority 3)

Planning that incorporates standard measures or conditions will facilitate the avoidance and minimization of impacts to the Mount Charleston blue butterfly and its habitat. Standard measures would provide guidance of timing, order, manner, and responsible parties for implementing avoidance and minimization measures.

1.4. Monitor populations and habitat.

1.4.1. Develop population and habitat monitoring protocols and guidelines, and revise as necessary. (Priority 1)

Different monitoring protocols have been used to assess Mount Charleston blue butterflies. The life history, detection difficulty, logistical challenges, and differences among populations require population monitoring methodology to vary between Mount Charleston blue butterfly locations. The development of population and habitat monitoring protocols and guidelines that provide temporal and spatial consistency between monitoring activities will allow comparisons and interpretation with a higher level of confidence. Monitoring protocols and guidelines should be adaptive and provide for assessing progress towards recovery criteria. Monitoring protocols and guidelines should balance logistical issues with collection of data that allows comparisons among years.

The first priority of population monitoring should be to determine occupancy and distribution. Populations of adult Mount Charleston blue butterflies should be monitored annually throughout the flight period to provide baseline information; the efficacy of management programs should be evaluated to allow for adaptive management; and assess population and habitat status and dynamics to inform evaluations of progress towards recovery criteria. Surveys should extend beyond known locations to determine any changes in distribution. Monitoring other butterfly life stages should be evaluated and considered and implemented, if feasible. During population surveys, collect data on habitat and threats to inform assessments of threats as it relates to the recovery and status of the Mount Charleston blue butterfly.

1.4.2. Implement population and habitat monitoring. (Priority 1)

Monitoring has been performed and should continue for the Mount Charleston blue butterfly and its habitat. During and following implementation of actions associated with 1.1, 1.2, and 1.3, monitoring should occur to inform future management decisions. Monitoring of populations and habitat is essential for assessing the status of the Mount Charleston blue butterfly to determine if criteria have been met to downlist or delist the subspecies as well as providing information for understanding the life history and long-term population dynamics.

1.5. Evaluate feasibility of translocation and captive propagation for the Mount Charleston blue butterfly.

1.5.1. Prepare a plan that evaluates alternatives, provides recommendations, and specifies guidelines and protocols for translocation and captive propagation. (Priority 3)

The rate of recovery of the Mount Charleston blue butterfly may be increased by translocation of individuals from known occupied habitat or captive-reared populations to areas with suitable habitat. Development of a plan may become a higher priority if (1) one additional known occupied location is lost; or (2) unoccupied habitat is available which is beyond the assumed dispersal distance of a known occupied location. A plan or report should evaluate the feasibility of translocation and captive propagation and include recommendations, guidelines, and protocols. It also may include a plan for a pilot study with a related subspecies to assist with determining the feasibility of translocation or captive propagation of the Mount Charleston blue butterfly. The North Loop Trail and Griffith Peak locations are among the highest priority for evaluation.

1.5.2. Implement translocation or captive propagation program. (Priority 3)

Implement the translocation or captive propagation program.

2. Research - Perform research to increase ecological knowledge of the Mount Charleston blue butterfly and its interrelationships with habitat to improve recovery efforts.

2.1. Study snow and snowpack as it relates to the life history requirements of the Mount Charleston blue butterfly. Develop and implement relevant management guidelines or recommendations based on findings. (Priority 3)

Snow distribution and compaction affects the environment where butterflies and their habitat occur, and an understanding of the relationships between snow and habitat quality is needed for management to maintain or improve habitat. This would be especially relevant at the Lee Canyon Ski Area and may help with prioritizing areas on which to focus habitat improvement efforts. Snow and snowpack operations at the Lee Canyon Ski Area may provide opportunities for alternative management in response to climate change.

2.2. Study treatments for non-native plant species. Develop and implement relevant management guidelines and recommendations. (Priority 3)

Plants such as grasses are used to stabilize the soil and prevent erosion on ski slopes where the Mount Charleston blue butterfly occurs. In the past, non-native tall grasses and forbs have been introduced which may outcompete plants needed by the Mount Charleston blue butterfly or create an environment unfavorable for activities such as flight. In addition, after fires, grasses or other plants could be used to treat burned areas and could subsequently affect Mount Charleston blue butterfly habitat. Guidelines and management recommendations are needed to address existing non-native species and inform future management treatments to reduce potential threats. Habitat quantity and quality for the Mount Charleston blue butterfly will be enhanced through management that favors host and nectar plants by treating competing plant species in a manner guided by the best science.

2.3. Study treatments that address successional changes. Develop and implement relevant management guidelines and recommendations. (Priority 3)

Treatments to address tree cover successional changes will be needed for long-term forest management. However, more information is needed to design and implement these activities in a manner that reduces impacts to the Mount Charleston blue butterfly while improving habitat conditions. Apply information obtained from 2.3 to 1.1 as it becomes available.

2.4. Study host and nectar plants for improving habitat. Develop and implement relevant management guidelines and recommendations. (Priority 3)

Improving habitat for the Mount Charleston blue butterfly will require techniques and materials to establish host and nectar plants. Studying host and nectar plants and ways to increase them will aid with implementing successful habitat improvement projects. Studies of host and nectar plants will inform development of management guidelines, recommendations, and protocols for treatments, production, handling, and establishment of host and nectar plants. Apply information obtained from 2.4 to 1.1 as it becomes available.

2.5. Study populations and life history of the Mount Charleston blue butterfly. (Priority 3)

The small population sizes, low detection probability, short adult lifespan, and small size of the Mount Charleston blue butterfly make it difficult to study to obtain basic life history and population information. Studies should be performed to obtain information about diapause, movements, disease or predation, and population dynamics to guide recovery decisions. Studies of related Shasta blue butterfly populations, and use of genetic molecular techniques, should be considered. Studies using genetic methods should identify techniques to obtain genetic material that are least harmful to individuals and populations (e.g. environmental DNA, wing scales) and employ common surrogate species if necessary. Genetic studies may permit an indirect means to estimate basic

information about population connectivity related to movements, dispersal, and population sizes. This information will inform other management alternatives such as habitat creation, translocation, and captive breeding.

3. Develop and implement public education and outreach programs.

Increase public understanding of the needs of and threats to the Mount Charleston blue butterfly.

3.1. Prepare programs and distribute outreach materials. (Priority 3)

Public information and outreach efforts play a key role in obtaining support for conservation efforts and facilitating compliance with protective measures. Programs and materials should target land management staff, and the general public that work and recreate in close proximity to Mount Charleston blue butterfly habitat. Increase public awareness that facilitates land uses compatible with Mount Charleston blue butterfly conservation to prevent and alleviate threats. Examples of programs and materials may include one or more combinations of using citizen science opportunities and volunteer efforts; distributing bookmarks, brochures, pamphlets, guides, posters, videos, and news releases; installing kiosks and displays; and delivering presentations.

4. Annually review and monitor recovery implementation and progress to apply adaptive management as needed. (Priority 3)

Review the implementation of the recovery plan to determine if and when adjustment to actions is necessary. Coordinate with the Forest Service, Lee Canyon Ski Area, interested communities, and other partners as appropriate to implement adaptive management. Adaptive management will permit the most efficient use of resources to expedite recovery of the Mount Charleston blue butterfly.

Implementation Schedule

The following implementation schedule outlines the activities and estimated costs necessary to achieve recovery of the Mount Charleston blue butterfly. This schedule prioritizes activities, provides an estimated timetable for completion of activities, indicates the responsible parties, and estimates costs of performing activities. Total cost estimates are provided for the entire recovery period (estimated to be 25 years) along with annual costs for the first 5 years of the recovery period.

Key to additional terms and acronyms used in the Implementation Schedule:

Definition of activity durations and costs:

Number: The predicted duration of the activity in years or the cost of the action.

Ongoing: An activity that is currently being implemented and will continue throughout the recovery period.

Continual: An activity that is not currently being implemented but will be implemented continuously throughout the recovery period.

Unknown: Either activity duration or associated costs are not known at this time.

Responsible Parties:

Responsible parties are those agencies who may voluntarily participate in any aspect of implementation of particular tasks listed within this recovery plan. Responsible parties may willingly participate in project planning, funding, staff time, or any other means of implementation.

ALL	All entities
BLM	Bureau of Land Management
FS	Forest Service
USFWS	Fish and Wildlife Service
NUR	Organization for Plant Material
PVT	Private contractor
UNIV	University

Activity number	Description	Priority	Responsible Parties	Duration (years)	Total Cost ¹	FY24 ² Cost	FY25 ² Cost	FY26 ² Cost	FY27 ² Cost	FY28 ² Cost	Comments
1.1	Prepare and implement plans for site-specific treatments to enhance habitat and alleviate threats	1	USFWS, FS	Ongoing	1,250	50	50	50	50	50	
1.4.1	Develop population and habitat monitoring protocols and guidelines, and revise as necessary.	1	USFWS	Ongoing	10	5	0	0	0	0	
1.4.2	Implement population and habitat monitoring.	1	FS, USFWS, PVT, UNIV	25	875	35	35	35	35	35	Cost estimate does not include monitoring for activities under 1.1, 1.2, and 1.3.
1.2	Reduce or minimize impacts from feral horses in Lee Canyon.	2	FS, BLM	Ongoing	TBD						Depends upon FS and BLM planning processes and funding.
1.3.1	Develop standard measures or conditions for proposed actions and permits and revise as necessary.	3	FS, USFWS	Ongoing	4	2	0	0	0	0	

Activity number	Description	Priority	Responsible Parties	Duration (years)	Total Cost ¹	FY24 ² Cost	FY25 ² Cost	FY26 ² Cost	FY27 ² Cost	FY28 ² Cost	Comments
1.5.1	Prepare a plan that evaluates alternatives, provides recommendations, and specifies guidelines and protocols for translocation and captive propagation.	3	FS, USFWS, UNIV, PVT, NUR	3	50	20	20	10	0	0	
1.5.2	Implement translocation or captive propagation program.	3	PVT, UNIV	Unknown	TBD	0	0	0	0	0	Requires evaluation under 1.5.1
2.1	Study snow and snowpack as it relates to the life history requirements of the Mount Charleston blue butterfly. Develop and implement relevant management guidelines or recommendations based on findings.	3	FS, USFWS, UNIV	5	200	50	50	35	35	30	
2.2	Study treatments for non-native plant species. Develop and implement relevant management guidelines and recommendations.	3	UNIV	5	200	50	50	35	35	30	

Activity number	Description	Priority	Responsible Parties	Duration (years)	Total Cost ¹	FY24 ² Cost	FY25 ² Cost	FY26 ² Cost	FY27 ² Cost	FY28 ² Cost	Comments
2.3	Study treatments that address successional changes. Develop and implement relevant management guidelines and recommendations.	3	UNIV	5	200	50	50	35	35	30	
2.4	Study host and nectar plants for improving habitat. Develop and implement relevant management guidelines and recommendations.	3	UNIV	5	200	50	50	35	35	30	
2.5	Study populations and life history of the Mount Charleston blue butterfly.	3	UNIV	5	200	50	50	35	35	30	
3.1	Prepare programs and distribute outreach materials.	3	FS, USFWS	Ongoing	7	1	0	0	0	0	
4	Annually review and monitor recovery implementation and progress to apply adaptive management as needed.	3	USFWS	25	25	1	1	1	1	1	
Estimated Total Cost of Recovery = \$3,221,000											

Activity number	Description	Priority	Responsible Parties	Duration (years)	Total Cost ¹	FY24 ² Cost	FY25 ² Cost	FY26 ² Cost	FY27 ² Cost	FY28 ² Cost	Comments
<p>¹ Total estimated cost of action through 25-year recovery period in thousands of U.S. dollars. ² Estimated cost per fiscal year in thousands of U.S. dollars.</p>											

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