U.S. Fish & Wildlife Service

Draft Recovery Plan for Casey's June beetle (*Dinacoma caseyi*)

Photo: USFWS

U.S. Fish and Wildlife Service
Pacific Southwest Region
Carlsbad Fish and Wildlife Office
Carlsbad, CA
May 2025

Approved: XXXXXXXXXXXXXXXXXXXX

Regional Director, Pacific Southwest Region, Region 8
U.S. Fish and Wildlife Service

PURPOSE AND DISCLAIMER

This document presents the U.S. Fish and Wildlife Service's (Service) plan for the conservation of Casey's June beetle. 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, Tribes, and others. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies involved in the 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 guidance 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 the completion of recovery actions.

ACKNOWLEDGEMENTS

This recovery plan for the Casey's June beetle was compiled by Julie Simonsen, Noelle Ronan, Bradd Baskerville-Bridges, and Emilie Luciani at the Carlsbad Fish and Wildlife Office (CFWO). The recovery planning process has benefitted from the advice and assistance of many individuals, agencies, and organizations who have provided information through surveys and research, helped manage habitat, and implement recovery actions. We thank our partners who play an active role in Casey's June beetle conservation. Their support over the years has contributed to a better understanding of this species, which has subsequently helped develop this recovery plan. In particular, the Service gratefully acknowledges: the Riverside County Flood Control and Water Conservation District, Agua Caliente Band of Cahuilla Indians, Oswit Land Trust, the Center for Natural Lands Management, the Rivers and Lands Conservancy, and Osborne Consulting, Inc. We appreciate these efforts and look forward to continued collaboration as we refine methodologies and implement actions that support Casey's June beetle recovery.

Recommended Citation:
U.S. Fish and Wildlife Service. 2025. Recovery Plan for Casey's June beetle (*Dinacoma caseyi*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California, USA. 16 pp.

An electronic copy of this Final Recovery Plan will be made available at:
https://ecos.fws.gov/ecp/species/4897

INTRODUCTION

This recovery plan describes criteria for determining when the Casey's June beetle should be considered for delisting, lists site-specific actions that will be necessary to meet those criteria, and estimates the time and cost to achieve recovery. The goal of this recovery plan is to provide guidance on how to control or ameliorate impacts from current threats to the beetle such that the taxon no longer requires protections afforded by the Act. In developing these plan components, we recognize that continued coordination with our partners is needed to ensure long-term protections are afforded to the Casey's June beetle and its habitat.

The SSA Report is summarized below to provide context of the species distribution, needs, and threats impacting the species. Specific on the ground activities necessary for implementing recovery actions are described in the Recovery Implementation Strategy (RIS). These supplemental documents are available at https://ecos.fws.gov/ecp/species/4897. The Species Status Assessment and the Recovery Implementation Strategy are finalized separately from the Recovery Plan and will be updated as necessary.

SUMMARY OF SPECIES STATUS ASSESSMENT REPORT

Casey's June beetle was federally listed as endangered under the Endangered Species Act in 2011 (Service 2011) and critical habitat for the species was also designated at that time. Casey's June beetle is a narrow endemic scarab beetle known only from the alluvial fans of the Coachella Valley in the vicinity of Palm Springs in Riverside County, California. Pronounced sexual dimorphism is evident between the smaller, white-colored males and the larger, brown females that do not fly. The majority of the species' life cycle is spent underground until individuals molt into an adult to breed between late March and June. The species lifespan is thought to be approximately 1 year with adults persisting for approximately 3 days (Harju 2021, p. 15). Adult activity is crepuscular with large numbers of individuals emerging from the ground approximately one hour after sunset (Hovore 2003, p. 3; Ronan et al. 2024, p. 49). Casey's June beetle has egg, larvae, pupae, and adult life stages; and all are subterranean except for breeding and male dispersal. Females are above ground only for minutes to mate and are not known to disperse at the surface. During immature life-stages the beetle feeds on detritus and rootlets supported by the hydrological processes of desert alluvial fan ecosystems.

Casey's June beetle habitat and demographic needs must be met for the core population in the Palm Canyon Wash Floodplain to be resilient. Casey's June beetle habitat is typically associated with broad, gently sloping, alluvial fans that form at the base of the Santa Rosa and San Jacinto Mountains. The species habitat needs are closely tied to the dynamics of the alluvial fan ecosystem including: 1) input of water to support vegetation; 2) deposition of sediment and layering of detritus, an important food resource; 3) maintaining moist, abiotic conditions for immature stages of the beetle to survive and develop; and 4) dispersal of individuals, including the flightless female beetles. To reproduce successfully, Casey's June beetle also needs appropriate climate conditions, habitat connectivity, and sufficient abundance.

The largest threats to the Casey's June beetle are the loss and fragmentation of habitat due to development and altered hydrology and sediment removal associated with flood control structures. Beetle habitat is further degraded by artificial light from urbanized areas that can disrupt reproduction. These threats are exacerbated by increased aridity, prolonged droughts, increased wildfires, and extreme flooding events associated with the effects of climate change, and are increasing the frequency and magnitude of disturbance in the beetle's alluvial fan habitat as well as the ability of the habitat to recover following disturbance. Impacts from soil disturbance from recreational activities and homeless encampments in wash habitat are not as severe; but further evaluation is needed to determine how to ameliorate these threats to recover the species in the future. Predation by native species appears to be inherent to the desert wash ecosystem (Ronan et al. 2024, p. 108, 119) and impacts from predation by nonnative species are unknown, but not anticipated to result in population level effects.

A habitat suitability model was developed in the SSA Report that identified the species current distribution across 1,989 acres (ac; 805 hectares (ha)) based on historical records, new records, and the presence of important habitat parameters (e.g., alluvial soils, appropriate hydrology, and vegetation), of which 889 ac (360 ha) is considered high quality and 995 acre (403 ha) is of moderate quality. The species current distribution is limited to one analysis unit in the Palm Canyon Wash floodplain that has moderate to high population resiliency. Habitat loss due to development and altered hydrology remain moderate-to-high magnitude threats to the beetle and are projected to reduce resiliency under future climate change scenarios, with corresponding reductions in redundancy and representation. Recovery of Casey's June beetle is going to require ongoing cooperation with our partners, as well as conservation of much of the remaining habitat across the species distribution. This would ensure sufficient abundance, ecological and genetic diversity, and connectivity for the species to withstand extreme and more variable abiotic conditions forecasted in the future.

SUMMARY OF CURRENT CONSERVATION EFFORTS

Casey's June beetle's status within the Palm Canyon Wash floodplain has improved since listing due to conservation efforts, partner coordination, and research to address important information gaps. A total of 350 ac (142 hectares; 18 percent) within the species current distribution is preserved in perpetuity or is planned to be conserved by conservation easements or deed restrictions in the immediate future (e.g., Tahquitz Creek Golf Resort) of which 160 ac (65 ha) is high quality habitat and 184.5 ac (75 ha) is moderate quality (Table 1). This total represents modeled suitable habitat, not occupied habitat, and some lands will require habitat restoration to improve suitability for the beetle. Conserved lands, by definition, are not at risk of habitat loss and fragmentation and contribute toward ameliorating the threat of artificial light and soil disturbance, depending on their location. The majority of these lands were conserved through permitted development actions or parcels conserved by our partners directly or indirectly to benefit the beetle.

Table 1. Summary of Conservation Easements within Casey's June beetle's current range.

Property	High quality habitat (ac)	Moderate quality habitat (ac)	Low quality habitat (ac)	Not Suitable (ac)	Subtotal (ac)
Bogert Trail	5.02	0.09	-	-	5.12
Canyon View Residential Mitigation	11.13	3.45	-	0.03	14.61
Tribal Allotment 80E	6.97	31.63	-	-	38.60
CVAG Potential Mitigation	5.65	0.13	-	0.08	5.87
East Palm Canyon Drive	5.13	-	-	-	-
Line 41	32.46	7.64	-	-	40.10
Prescott Preserve	63.70	48.17	4.84	7.89	124.60
Smoke Tree HCP	30.23	93.36		5.30	128.89
Total	160.3	184.48	4.84	13.3	362.92

In addition to conservation easements, the Agua Caliente Band of Cahuilla Indians (ACBCI) and City of Palm Springs zoning designations provide an added 821 ac (332 ha) of conserved land, further reducing the potential for habitat destruction over 41 percent of the species current distribution. The ACBCI Tribal Habitat Conservation Plan (THCP) preserve system includes a Tribal Reserve (412 ac; 167 ha) designated as open space (Helix 2010). In addition, the Indian Canyons Master Plan identifies a Rural Residential designation, with up to 1 unit per 20 ac, that reduces the potential for habitat impacts across an additional 157 ac (64 ha) and is consistent with low-impact development that supports the beetle (Malcolm 2023, pers. comm.; Helix 2010, Figure 6 and 29; ACBCI 2008, entire). These designations, particularly in the southern portion of the species current range, will reduce the potential for habitat loss and degradation; and in combination with open space zoning designations in Palm Canyon Wash and Tahquitz Creek (251 ac; 102 ha), will contribute toward ensuring that hydrological processes remain intact. In total, current conservation and open space designations account for approximately 1,171 ac (474 ha; 60 percent) of the species range.

In addition, Casey June beetle receives some degree of habitat protection and indirect conservation benefits through the ACBCI THCP (Helix 2010, entire). Several of the covered species under the THCP have overlapping ranges and habitat requirements as the beetle; therefore, the regulatory protection and conservation for these species are expected to provide added benefits to Casey's June beetle. Also, wetland and riparian areas provide some protections under the existing tribal conservation programs including management of nonnative vegetation, minimization of trail impacts and erosion, restriction of recreational activities and habitat restoration (Helix 2010, p. 2-8), which is in addition to protections afforded from California Department of Fish and Wildlife streambed alteration agreements and Clean Water Act regulations permitted through the Army Corps of Engineers.

There has also been substantial coordination with the Riverside County Flood Control and Water Conservation District (District) regarding flood control maintenance activities that have the potential to impact the beetle and its habitat. A programmatic biological opinion was issued in 2023 that includes avoidance and minimization measures to reduce the impacts of sediment removal and other flood control maintenance activities on the beetle and its habitat (Service 2023, pp. 4–12). The District also agreed to provide funding when future project impacts warrant additional conservation measures to offset future maintenance activity impacts and promote recovery and conservation efforts of the Casey's June beetle, such as a long-term population monitoring program, population augmentation, habitat enhancement and restoration on conserved lands, land acquisition, and public education.

This recovery plan is also informed by Service-led research that was conducted from 2015 to 2022. The results of this Service research (Dudek 2019, entire; Harju 2021, entire; Harju 2022, entire; Ronan et al. 2024, entire) provided insights on the timing and abiotic conditions associated with adult emergence, adult lifespan, habitat characteristics, and an index of population abundance that served as the basis for the SSA and this recovery plan.

RECOVERY STRATEGY

The recovery strategy provides a concise overview of the envisioned recovered state for the Casey's June beetle, describes the Service's chosen approach to achieve it, and includes the rationale for why the approach was chosen. Specifically, the recovery strategy articulates how the plan's statutory elements (e.g., recovery criteria, recovery actions, and estimates of time and cost) will work together to achieve Casey's June beetle's recovery.

We envision the recovered state of Casey's June beetle to include at least one stable population with moderate to high population resiliency, supported by the hydrological processes of a functioning alluvial fan ecosystem. The species distribution and abundance will be of sufficient size and breadth to withstand stochastic variability in demographic and environmental conditions as well as catastrophic events (e.g. prolonged drought, flooding, and wildfires). Conservation of the majority of occupied habitat will help preserve the remaining ecological and genetic variability within the species range to ensure sufficient adaptive capacity to respond to changing climatic conditions. Habitat conservation in conjunction with increased habitat connectivity will improve the likelihood of successful reproduction, particularly for females that may occur on isolated parcels with limited dispersal ability and encourage gene flow across the species' fragmented distribution. Evaluations, monitoring, and research will be implemented to inform decision making for recovery. To achieve recovery of the Casey's June beetle, our strategy is to implement recovery actions and activities to improve habitat and demographic conditions and ameliorate threats in the Palm Canyon Wash Floodplain to support the functioning of the alluvial fan ecosystem and beetle habitat. Our approach requires increasing species' redundancy by expanding and conserving suitable habitat throughout the species range, with a focus on improving habitat connectivity and maintaining the ecological and hydrological processes of the alluvial fan ecosystem. To expand and conserve the habitat needed for recovery, our strategy also

focuses on restoring unsuitable or unoccupied habitat, such as former golf courses and disturbed habitat within and adjacent to the wash.

Securing a large area of conserved habitat will support the necessary abundance and representation needed for Casey's June beetle recovery. To achieve the abundance recovery criteria necessary to withstand stochastic variability, the core areas of beetle occupancy and abundance must be conserved. The abundance criteria developed are expected to facilitate the recolonization of local extirpations and areas of low abundance. To meet these goals, an augmentation and translocation program needs to be developed and implemented with the potential for a captive propagation and rearing program, should it be deemed feasible and necessary. Maintaining the species' current level of representation is critical to ensure the species has the capacity to adapt to future environmental changes which are projected to be more variable and extreme.

Ameliorating threats throughout occupied habitat is critical to maintaining population resiliency and meeting the acreage and abundance goals established in this recovery plan. While habitat loss and degradation will largely be ameliorated through actions to protect and conserve suitable habitat, our strategy for ameliorating other threats such as altered hydrology, soil disturbance, artificial light and predation would be improved with a better understanding of the species ecology (i.e. dispersal, subterranean habitat requirements, and female distribution) and how these threats are impacting the species and its habitat. Restoration, augmentation, and reintroduction opportunities throughout the species historical range may also help meet the recovery criteria.

We developed this recovery strategy within the context of several data gaps and areas of uncertainty. We do not have a complete understanding of the extent of the species distribution, particularly in the periphery of its range. Additional survey data and genetic analysis could inform future restoration and translocation opportunities. A better understanding of dispersal mechanisms is necessary to develop strategies to improve connectivity and understand the value of isolated habitat areas. Similarly, addressing knowledge gaps regarding the magnitude of impacts associated with flooding events, soil disturbance, and predation will help improve our strategy for ameliorating threats and promoting species recovery.

Our recovery strategy will leverage partnerships with municipal, State, and Federal agencies, land conservancies, Tribes, and other partners. This recovery plan does not assign responsibility of any partner to undertake the recommended actions. However, we recognize that effective conservation of Casey's June beetle will not be achieved without extensive cooperation and coordination with our partners (for example, Smoke Tree Ranch, Inc., District, ACBCI, City of Palm Springs, and Oswit Land Trust, Center for Natural Lands Management, Rivers and Lands Conservancy, Coachella Valley Association of Governments), as well as coordination across the Service, and State and Federal agencies.

MANAGEMENT UNITS

Management units help organize recovery criteria throughout the range of the species and provide a spatial framework for targeting management actions to specific regions. Casey's June beetle management units are geographically defined areas based on watersheds that provide the

natural processes that support a dynamic alluvial fan ecosystem that constitutes beetle habitat. Each management unit has the potential to support an independent and resilient population but may require unique management actions to ameliorate threats or translocations to maintain gene flow. Currently, Casey's June beetle only occupies the Palm Canyon Wash Floodplain as one management unit. Other potential areas that may be suitable for reintroduction of the beetle include Dead Indian Creek, Lower Deep Canyon, and Blaisdell Canyon.

RECOVERY CRITERIA

An endangered species is defined in the Act as a species that is in danger of extinction throughout all or a significant portion of its range. 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 species warrants downlisting or delisting, we consider whether the species meets either of these definitions. A recovered species is one that no longer meets the Act's definitions of threatened or endangered. Determining whether a species should be downlisted or delisted requires consideration of the same five categories of threats, which were considered when the species was listed, and which are specified in section 4(a)(1) of the Act.

Recovery criteria are statutorily required objective, measurable conditions that, when met, are likely to indicate that a species may warrant downlisting or delisting. Thus, recovery criteria are mileposts that measure progress toward recovery. The recovery criteria below pertain to and are organized by the five threat factors identified in the Act and are summarized in Table 2. These recovery criteria are our best assessment at this time of what needs to be completed to downlist or delist the Casey's June beetle. Because we cannot envision the exact course that recovery may take and because our understanding of the vulnerability of a species to threats is very likely to change as more is learned about the species and its threats, it is possible that a future status review may indicate that delisting is warranted before all recovery criteria are met.

Casey's June beetle is classified as an endangered species at this time; thus, the criteria for both downlisting and delisting are outlined below. Downlisting criteria focus on the amelioration of the highest magnitude and most persistent threats, indicating improvements to population resiliency such that the risk to the species is no longer imminent. Delisting criteria are designed to gauge improvements in redundancy and representation such that the species will maintain viability in the future in the absence of the protections afforded by the Act.

DOWNLISTING CRITERIA

The following downlisting criteria, when met collectively, would indicate that Casey's June beetle may be reclassified as a threatened species.

> *1. Relative beetle abundance is stable or increasing over approximately a 10 to 15 year period within the species range to demonstrate sufficient resiliency and redundancy.*

Long-term population monitoring will be based on a scientifically credible monitoring plan that builds on earlier monitoring efforts. The 10-to-15-year timeframe was selected to include at least one period of extended drought to ensure that populations are able to withstand or recover from interannual variability. Stable population trend is defined as within 10 percent of the annual capture average (70 male individuals) across at least 8 trap locations, equally distributed among trap sites with low, moderate, and high relative abundance. The species range includes the Palm Canyon Wash Floodplain as well as any newly established populations necessary to achieve the habitat criteria below.

> *2. One thousand (1,000) ac of modeled moderate to high quality Casey's June beetle habitat is conserved within the species range; and management is in place for at least 20 years to ameliorate the threat of habitat loss and fragmentation and ensure sufficient resiliency, redundancy, and representation.*

The species range includes the Palm Canyon Wash Floodplain as well as any newly established populations necessary to achieve the habitat acreage criteria. This criterion is approximately 50 percent of the current suitable habitat within the Palm Canyon Wash Floodplain and will allow for connectivity and natural hydrological processes to occur throughout the majority of occupied habitat within the historical alluvial fan. The acreage listed above is based on the amount of modeled suitable moderate and high-quality habitat, total acreage currently conserved, and potential for future conservation and restoration. Moderate to high population resiliency is defined by the acres of suitable habitat, stable or increasing population abundance, and habitat connectivity as outlined in the 2025 Species Status Assessment. (Service 2025, p. 69). Parcels included in this calculation include conservation easements, Tribal Reserve, Rural Residential, and zoned open space that are not likely to be developed in the future. This acreage is realistic to achieve based on these existing designations and will be the main piece in obtaining a self-sustaining population. There are also two HCPs that contribute to Casey's June beetle conservation. Smoke Tree Ranch Low-Effect HCP has a 60-year expiration (2047; Terra Nova 2012, p. 7) and the Coachella Valley Link Low-Effect HCP has a 30-year expiration (2048; Service 2018, p. 2). Monitoring and management should be secured throughout the remaining term of these permits, at least 20 years. The 20-year timeframe considers that it may take 15 to 20 years to understand population trends for insect species (Didham et al 2020, p. entire).

DELISTING CRITERIA

The following delisting criteria, when met collectively, may indicate that the Casey's June beetle no longer meets the Act's definitions of either a threatened species or endangered species, and may be able to be the removed from the Federal Lists of Endangered and Threatened Wildlife and Plants:

1. Relative beetle abundance is stable or increasing over approximately a 15-to-20-year period within the species range to demonstrate sufficient resiliency and redundancy.

The species range includes the Palm Canyon Wash Floodplain as well as any newly established populations necessary to achieve the habitat acreage criteria. Long-term population monitoring will be based on a scientifically credible monitoring plan that builds on previous monitoring efforts. The 15-to-20-year timeframe was selected to include 2 to 3 cycles of extended drought to ensure that populations can withstand interannual variability; and 15 to 20 years is a recommended timeframe for assessing population trends in insect populations (Didham et al 2020, entire). Extending the period for population monitoring is necessary to ensure that Casey's June beetle has sufficient redundancy and representation to be considered fully recovered. Stable population trend is defined within 10 percent of the annual capture average (70 male individuals) across at least 8 trap locations, equally distributed among trap sites with low, moderate, and high relative abundance.

2. A total of 1,300 ac of modeled moderate to high quality Casey's June beetle habitat is conserved within the core population in the Palm Canyon Wash Floodplain and/or at another newly established population (i.e. Dead Indian Creek, Lower Deep Canyon, or Blaisdell Canyon) and management is in place for at least 20 years to ensure sufficient resiliency, redundancy, and representation to ameliorate the threat of habitat loss and fragmentation.

This acreage is approximately 65 percent of the species current range and 70 percent of modeled moderate and high-quality habitat; and is likely to preserve sufficient genetic and ecological diversity, and habitat connectivity to ensure adequate representation and redundancy to support long-term species viability. Increasing the amount of habitat conserved is necessary to ensure that Casey's June beetle has sufficient redundancy and representation to be considered fully recovered. The initial focus for habitat protection will be within the Palm Canyon Wash Floodplain, but if there is not sufficient habitat available, areas in adjacent or nearby watersheds can be added to reach the total of 1,300 acres across the range. The timeframe over which conservation and management should be secured is at least 20 years and is based on the time remaining in the existing HCPs within the current range and takes into consideration that it may take 15 to 20 years to understand population trends for insect species (Didham et al 2020, p. entire).

3. On-going threats, including altered hydrology, soil disturbance, flood control maintenance, and other emerging threats, are sufficiently understood, minimized, and/or managed in the Palm Canyon Wash Floodplain and other areas with extant populations through a conservation strategy or similar mechanism that maintains moderate to high population resiliency for a minimum of 20 years following strategy implementation.

This criterion will provide assurances that long-term management will be in place such that threats will be ameliorated into the future, including measures to avoid and minimize impacts associated with periodic sediment removal and other flood control maintenance activities. Moderate to high population resiliency is defined by the acres of suitable habitat, stable or increasing population abundance, and habitat connectivity as outlined in the 2025 Species Status

Assessment. (Service 2025, p. 69). The timeframe over which conservation and management should be secured is at least 20 years and is based on the time remaining in the existing HCPs within the current range and takes into consideration that it may take 15 to 20 years to understand population trends for insect species (Didham et al 2020, p. entire). Future actions and activities will focus on addressing knowledge gaps regarding the mechanisms and magnitude of impact to inform management, and the development of outreach materials to better ameliorate threats.

RECOVERY ACTIONS

Recovery actions are the statutorily required, site-specific management actions that need to be taken to conserve, manage, restore, and enhance the current condition of Casey's June beetle and its habitat to meet the recovery criteria, as described in section 4(f)(1)(B)(i) of the Act. The Service assigns priority numbers (1-3) to rank recovery actions. Priority 1 actions are defined as actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future. 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 Casey's June beetle RIS.

1. Protect and manage existing habitat in the Palm Canyon Wash Floodplain to maintain alluvial dynamics and reduce habitat loss and degradation associated with development, altered hydrology, artificial light, and soil disturbance (Priority 1).
2. Increase population abundance within the Palm Canyon Wash Floodplain using augmentation and reintroduction as recovery tools to increase the species' resiliency, redundancy, and representation (Priority 1).
3. Expand habitat for the beetle in the Palm Canyon Wash Floodplain to improve connectivity, resiliency, and redundancy (Priority 2).
4. Monitor all known populations and ensure that the monitoring protocol informs management of the taxon and allows us to accurately assess population trends (Priority 2).
5. Conduct experimental research to address knowledge gaps in important life history parameters (e.g., dispersal, larval diet, female ecology) to improve our understanding of the mechanism of impact and magnitude of understudied threats (e.g., soil disturbance, altered hydrology, and predation) (Priority 2).
6. Ameliorate the threat of soil disturbance, flood control maintenance activities, and other emerging threats in the Palm Canyon Wash Floodplain (Priority 2).

7. Evaluate, restore, and expand suitable habitat and increase population abundance in suitable habitat areas outside of the Palm Canyon Wash Floodplain (e.g. Dead Indian Creek, Lower Deep Canyon and/or Blaisdell Canyon) (Priority 3).

Table 2. Threat summary table for the Casey's June Beetle.

Listing Factor	Threat Description	Downlisting/ Delisting Criteria	Recovery Actions
Factor A The present or threatened destruction, modification, or curtailment of its habitat or range.	Habitat loss and fragmentation, altered hydrology, and soil disturbance.	• Downlisting: 1, 2 • Delisting: 1, 2, 3	1, 2, 3, 4, 5, 6, 7
Factor C Disease or Predation.	Predation by nonnative species.	• Downlisting: 2, • Delisting: 1, 3	2, 4, 5, 6
Factor E Other natural or manmade factors affecting its continued existence.	More variable and extreme environmental conditions (e.g. prolonged drought, flooding, and wildfire).	• Downlisting: 2 • Delisting: 1, 2, 3	4, 5, 6

ESTIMATED TIME AND COST OF RECOVERY ACTIONS

Estimates of time and cost, as defined in section 4(f)(1)(B)(iii) of the Act, must reflect, to the maximum extent practicable, the total amount of time and costs it will take to achieve the recovery (delisting) of Casey's June beetle. The cost estimates provided do not account for possible future inflation.

Table 3 below summarizes the estimated time and cost to achieve recovery of Casey's June beetle based on the recovery actions described in this plan. We estimate that the cost of completing the recovery actions such that the criteria have been met, and the Casey's June beetle may be considered for delisting, to be approximately $53 million plus additional costs to be determined. We estimate that completion of these actions could be accomplished by 2050, assuming effective coordination and cooperation among necessary partners and stakeholders.

We note that the recovery program may change over time, or the timeframe estimated to implement the recovery actions to achieve recovery of the species may take longer than expected. The recovery of Casey's June beetle will depend largely on the commitment and the ability of the Service and partners to implement the recovery actions necessary to achieve the recovery criteria.

Table 3. Casey's June beetle recovery actions and estimated costs.

Recovery Action No.	Summary of Recovery Action	Estimated Cost	Priority No.
1	Protect and manage existing habitat in the Palm Canyon Wash Floodplain to maintain alluvial dynamics and reduce habitat loss and degradation associated with development, altered hydrology, artificial light, and soil disturbance.	$30,600,000	1
2	Increase population abundance within the Palm Canyon Wash using reintroduction and augmentation as recovery tools to increase the species' resiliency, redundancy, and representation.	$980,000	1
3	Expand habitat for the beetle in the Palm Canyon Wash Floodplain to improve connectivity, resiliency, and redundancy.	$2,500,00	1
4	Monitor all known populations and ensure that the monitoring protocol informs management of the taxon and allows us to accurately assess population trends.	$500,000	2
5	Conduct experimental research to address knowledge gaps in important life history parameters (e.g., dispersal and larval diet) to improve our understanding of the mechanism of impact and magnitude of understudied threats (e.g., soil disturbance, altered hydrology, and predation).	$1,010,000	2
6	Ameliorate the threat of soil disturbance, flood control maintenance activities, and other emerging threats in the Palm Canyon Wash Floodplain.	$50,000 + TBD	2
7	Evaluate, restore, and expand suitable habitat and increase population abundance in suitable habitat areas outside of the Palm Canyon Wash Floodplain (e.g. Dead Indian Creek, Lower Deep Canyon and/or Blaisdell Canyon).	$17,000,000	3
	Total estimated cost	$52,640,000	

Literature Cited

Didham R., Basset, Y., Collins, C.M., Leather, S.R., Littlewood, N.A., Menz H.M., Muller J., Packer, L., Saunders M.E., Schonrogge, K., Steward, A.J.A., Yanoviak, S.P. and Hassall C. 2020. Insect Conservation and Diversity. The Royal Entomological Society. 5pp.

Dudek. 2019. Casey's June Beetle Vegetation Mapping Methodology and Results. Memorandum report dated November 15, 2019. Prepared for the U.S. Fish and Wildlife Service, Palm Springs, California by Dudek, La Quinta, California. 14 pp.

Harju, S. 2021. Casey's June Beetle Population Analyses, Factors affecting emergence and relative abundance. June 2021. Prepared for U.S. Fish and Wildlife Service, Palm Springs, California and Dudek, Encinitas, California. Prepared by Seth Harju, Heron Ecological, LLC, Kingston, Idaho.

Harju, S. 2022. Casey's June Beetle Population Analyses Geographic closure, 2018 rangewide abundance, and hydrological and vegetation factors driving site-level abundance. Supplementary Report. Revised analyses dated April 20, 2022. Prepared for U.S. Fish and Wildlife Service, Palm Springs, California and Dudek, Encinitas, California. Prepared by Seth Harju, Heron Ecological, LLC, Kingston, Idaho.

Helix. 2010. Tribal Habitat Conservation Plan. Prepared for Agua Caliente Band of Cahuilla Indians. Dated August 2010. 606 pages.

Hovore, F. 2003. Report of focused surveys for Casey's June beetle: Smoketree Ranch and vicinity, prepared for Krieger & Stewart, Inc., Riverside, California.

Malcolm, D. 2023. Director of Planning, Agua Caliente Band of Cahuilla Indians. Email communication with Julie Simonsen, Fish and Wildlife Biologist, USFWS, Carlsbad Fish and Wildlife Office. Dated April 6, 2023. Subject: Preliminary tribal review of sections of the Casey's June beetle Species Status Assessment. Clarification on Tribal zoning designations.

Ronan, Noelle A., Osborne, Kendall, H., and Gregory, C.J. 2024. Determining and Measuring Environmental Influences on the Distribution and Abundance of Casey's June beetle (Dinacoma caseyi) 2015-2022. Draft Report. U.S. Fish and Wildlife Service. 152 pages.

[Service] U.S. Fish and Wildlife Service. 2025. Species status assessment report for Casey's June beetle (Dinacoma caseyi), Version 1.0. March 2025. U.S. Fish and Wildlife Service. Pacific Southwest Region. Carlsbad Fish and Wildlife Office. 122 pages.

[Service] U.S. Fish and Wildlife Service. 2023. Biological Opinion for Emergency Authorization for Sediment Removal and Levee Repair in Palm Canyon Wash and Programmatic Consultation for Future Flood Control Facility Maintenance Activities in Palm Canyon Wash, Tahquitz Creek, Whitewater River, and Eagle Canyon Dam, City of Palm Springs

and Cathedral City, Riverside County, California. U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office, Carlsbad, California. Dated December 12, 2023.

[Service] U.S. Fish and Wildlife Service. 2018. Formal Intra-Service Section 7 Consultation on Proposed Issuance of an Incidental Take Permit for Activities Covered under the CV Link Low-Effect Habitat Conservation Plan for Casey's June Beetle, Riverside County, California. Dated April 23, 2018. 38 pp.

[Service] U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Casey's June Beetle and Designation of Critical Habitat; final rule. Federal Register 76:58954–58998.

Terra Nova Planning & Research. 2012. Low-effect Habitat Conservation Plan for the incidental take of Casey's June beetle on 260.27 acres at Smoke Tree Ranch Palm Springs, Riverside County, California. Prepared for Smoke Tree, Inc. 40pp.