

Interim Core Map Documentation for Casey's June Beetle

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Developed by US Environmental Protection Agency, Office of Pesticide Programs with technical input from Corteva Agriscience, Compliance Services International, Syngenta, and Center for Biological Diversity

Species Summary

Casey's June Beetle (*Dinacoma caseyi*; Entity ID #8503) is an endangered terrestrial invertebrate. This species prefers alluvial (not too rocky or compacted) soil habitat to successfully burrow, and it can occur in intermediately disturbed developed vacant lots. It requires native desert vegetation in Riverside County, California and is not found on cultivated land. Additional information is provided in **Appendix 1**.

Description of Core Map

The core map for Casey's June Beetle is the range, which was last updated in June 2022. The range encompasses both the critical habitat and current distribution identified by FWS. Known location data compiled by Fish and Wildlife Service (FWS) aligns with data compiled by iNaturalist, NatureServe and Global Biodiversity Information Facility (GBIF). **Figure 1** depicts the interim core map for Casey's June Beetle. The core map represents approximately 6,471 acres. Given that (1) the species is endemic with limited distribution and a refined range map (less than 10,000 acres), (2) critical habitat alone does not account for male dispersal, and (3) occurrence data are consistent with the range, additional mapping refinements based on habitat or landcover were not pursued.

Landcover categories within the core map area are included in **Table 1**.

The core map developed for Casey's June Beetle is considered interim. This core map will be used to develop pesticide use limitation areas (PULAs) that include Casey's June Beetle. The core map has a best professional judgment level of 1 because it consists of the species range with no additions or subtractions. This core map incorporates information developed by FWS and made available to the public; however, the core map has not yet been formally reviewed by FWS. This interim core map may be revised in the future to incorporate expert feedback from FWS. This core map does not replace or revise any range or designated critical habitat developed by FWS for this species.

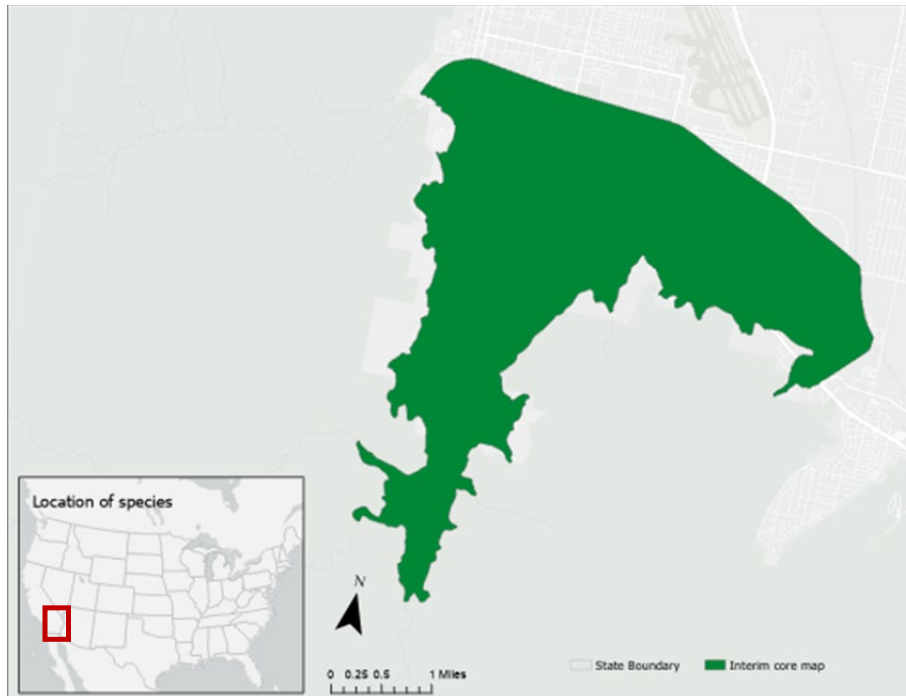


Figure 1. Interim core map for Casey's June Beetle (green).

Table 1. Percentage of Interim Core Map Represented by NLCD¹ Land Covers and Associated Example Pesticide Use Sites/Types.

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover	% of core map represented by example pesticide use
Forestry	Deciduous Forest (41)	15%	19%
	Evergreen Forest (42)	3%	
	Mixed Forest (43)	1%	
Agriculture	Pasture/Hay (81)	0%	0%
	Cultivated Crops (82)	0%	
Mosquito adulticide, residential	Open space, developed (21)	11%	77%
	Developed, Low intensity (22)	18%	
	Developed, Medium intensity (23)	40%	
	Developed, High intensity (24)	8%	

¹ Dewitz, J., 2023, National Land Cover Database (NLCD) 2021 Products: U.S. Geological Survey data release, <https://doi.org/10.5066/P9JZ7AO3>

Example pesticide use sites/types	NLCD Landcover (Value)	% of core map represented by landcover	% of core map represented by example pesticide use
Invasive species control	Woody Wetlands (90)	0%	5%
	Emergent Herbaceous Wetlands (95)	0%	
	Open water (11)	0%	
	Grassland/herbaceous (71)	0%	
	Scrub/shrub (52)	0%	
	Barren land (rock/sand/clay; 31)	5%	
Total Acres	Interim Core Map Acres	~6,471	

Evaluation of Known Location Information

There are five datasets with known location information:

- Occurrences provided in FWS documentation;
- Occurrences provided in iNaturalist;
- Occurrences provided in GBIF; and
- Occurrences provided in NatureServe.

EPA evaluated these sets of data in developing the core map. The range map provided by FWS captures the available known locations in the FWS literature, iNaturalist (4 research-grade observations), GBIF (9 mappable observations), and NatureServe (2 publicly available records). Therefore, the known location information supports using range as the core map. **Appendix 1** includes more information on the available known location information.

Approach Used to Create Core Map

The interim core map was developed using the Process EPA Uses to Develop Core Maps for Draft Pesticide Use Limitation Areas for Species Listed by the U.S. Fish & Wildlife Service (FWS) and their Designated Critical Habitats² (referred to as “the process”). This core map was developed using the 4 steps described in the process document:

1. Compile available information for a species;
2. Identify core map type;
3. Develop the core map for the species; and
4. Document the core map (reflected in this document).

For step 1, EPA compiled available information for Casey’s June Beetle from FWS as well as observation information available from various publicly available sources (including iNaturalist, NatureServe, and GBIF). The information compiled for Casey’s June Beetle is included in **Appendix 1**. Influential information that impacted the development of the core map includes:

² Dated 2024, available online at: <https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-draft-pesticide-use-limitation-areas>

- The species' range is refined (less than 10,000 acres)
- The available occurrence data from iNaturalist, NatureServe, and GBIF are consistent with the core map;
- Males have been observed outside of suitable critical habitat and known distribution areas by up to 750 feet and the male dispersal distance is suspected to be much farther.

For step 2, EPA used the compiled information to identify the core map type. EPA compared the range data to the known location data and found that they were consistent with one another. The critical habitat does not include all parts of the range where this species occurs.

For step 3, EPA used the best available data sources to generate the core map. For this core map, EPA used the Environmental Conservation Online System (ECOS) range map (ARCGIS, ECOS Entity ID #8503).

Discussion of Approaches and Data that were Considered but not Included in Core Map

EPA considered whether the habitat of this species could be used to refine the core map (*i.e.*, a biological information core map), especially considering soil habitat requirements (the species uses top soils classified as Coachella fine sand series, Myoma fine sands, entirely Carsitas series, and Riverwash soils). Further investigation into this using the USDA Soil Survey Geographic Database (SSURGO) showed that suitable soils exist throughout the species range (the range is ~60% Riverwash, ~30% Coachella, and the remaining ~10% other suitable soils). Attempts to use suitable soil requirements would not refine the core map to any meaningful extent. Slope data was assessed as well, and suitable slopes existed throughout the range and would not refine the core map to any meaningful extent. Therefore, very few, if any, landcovers would be removed from the core map using a refinement process that removed unsuitable habitat.

EPA considered if cultivated lands should be removed from the core map, but the core map already does not coincide with agriculture as shown by Table 1.

EPA considered if instead of the 2022 FWS range, it should use the more narrowly defined current distribution summarized in the most recent FWS 5-year review (2021), but ultimately did not due to consideration for male dispersal capabilities as well as the availability of suitable habitat outside of the 2021 current distribution area.

Appendix 1. Information compiled for species during Step 1

1. Recent FWS Documents

- 76 FR 58954. 2011. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Casey's June Beetle and Designation of Critical Habitat. Federal Register 76(184):58954-58998. <https://www.govinfo.gov/content/pkg/FR-2011-09-22/pdf/2011-24047.pdf#page=1>
- US FWS. 2013. Recovery Outline for Casey's June Beetle (*Dinacoma caseyi*). US Fish and Wildlife Service, Pacific Southwest Region, Carlsbad, CA. https://ecos.fws.gov/docs/recovery_plan/CJB_Recovery_Outline_FINAL.pdf
- US FWS. 2021. Casey's June Beetle (*Dinacoma caseyi*) 5-Year Review: Summary and Evaluation. US Fish and Wildlife Service. https://ecos.fws.gov/docs/tess/species_nonpublish/3369.pdf

2. Background Information

- Status: Federally listed as **endangered** in 2011
- Resiliency, redundancy, and representation (the 3Rs)
 - All three R's are low, based on the recovery vision statement articulated in the FWS Recovery Outline (2013).
 - According to the Recovery Outline, "As identified in the final rule (76 FR 58954, September 22, 2011), the primary threats to Casey's June beetle are: destruction, modification, and fragmentation of habitat; increased intensity and frequency of catastrophic flood events; environmental effects resulting from changing climatic patterns; loss of individuals due to soil disturbing activities; and loss of individuals due to attraction to light sources."
- Habitat, Life History, and Ecology
 - Life History:
 - "...both male and female Casey's June beetles emerge from underground burrows between late March and early June, with abundance peaks generally occurring in April and May (Duff 1990, p. 3; Barrows 1998, p. 1)." (US FWS, 2013; pg 3)
 - "Females are flightless (Duff 1990, p. 4; Hovore and Associates 1995, p. 7; Hovore 2003, p. 3), emerging only briefly at dusk to mate and then re-entering the ground, presumably to deposit eggs. Males flying in the area are attracted to females by pheromones (Cornett 2004, p. 5), sometimes even prior to complete emergence of the female (Duff 1990, p. 3; Anderson 2012, p. 1)." "...reported observations of females are limited to presence, and emergence to mate followed by re-entering the soil within minutes of mating (for example, Anderson 2012, p. 1)." (US FWS, 2013; pgs 3-4)

- “Outside of the breeding season (approximately June to February), the beetle is in the larval growth stage. Preliminary field investigations suggest that larvae are deeper in the soil and may be less susceptible to soil disturbance at this time (Ronan 2020, pers. comm.; Osborne 2020, pers. comm.)” (USFWS, 2021; pg 5)
- “The observation of a male Casey’s June Beetle at a street light in a suburban neighborhood approximately 750 ft (230 m) from the nearest suitable habitat (Hovore 2003, p. 6; Google Earth Historical Imagery 1996 and 2002) indicates that movement of males among occupied areas occurs over at least that distance, and it is likely much farther. The maximum male dispersal distance recorded for male Mount Hermon June Beetles, a related species that also has flightless females, is 923 ft (281 m) (Arnold, Entomological Consulting Services, Ltd., pers. comm. 2011). Arnold (pers. comm. 2011) noted this datum was from a mark-release-recapture study limited to his study site, and therefore it is “entirely possible” adult male June beetles are capable of making longer distance movements.” (76 FR No 184. 2011, pg 58955)
- Habitat: desert alluvial fans and bajadas (compound alluvial fans); soil types: are Coachella fine sand series (CpA), and Myoma fine sands (MaB), entirely Carsitas series, of a CdC type, Riverwash (RA) soils.
 - “...native Sonoran (Coloradan) desert vegetation located on desert alluvial fans and bajadas (compound alluvial fans) at the base of the Santa Rosa Mountains in the Coachella Valley, Riverside County, California. Sonoran desert habitat is characterized as scattered assemblages of broad-leaved microphyll shrubs with an open canopy (Mayer and Laudenslayer 1988, p. 114).” (76 FR 58954. 2011, pg 58965)
 - Note: Santa Rosa mountains was updated to San Jacinto Mountains in the USFWS recovery plan (2013, pg 4)
 - “These areas include sandy dry washes with ephemeral flow, and dry upland areas associated with soil deposition from extreme flood events.” (USFWS, 2013; pg 4)
 - “Casey’s June beetle is adapted to specialized habitat and soil types found in the Palm Canyon Wash area of Palm Springs, California.” (76 FR 58954. 2011, pg 58956)
 - Soil type observations: “Hawks’ comprehensive survey...habitat remnants identified throughout the City of Palm Springs, including many vacant lots within the developed areas of the cities of Palm Springs and Cathedral City Hawks (pers. comm. 2010) documented numerous female emergence holes and observed many female beetles during his surveys, confirming occupancy of Coachella fine sand series (CpA), and Myoma fine sands (MaB) soil types. Hawks

(pers. comm. 2010) stated he never found emergence holes in the Carsitas cobbly sand series (ChC) soil type.” (76 FR 58954. 2011, pg 58954)

- “...most commonly associated with Carsitas series soil (CdC), described by the U.S. Department of Agriculture (USDA) (USDA on-line GIS database, 2000) as gravelly sand on 0 to 9 percent slopes. This soil series is associated with alluvial fans, rather than areas of aeolian or windblown sand deposits. Hovore (2003, p. 2) described soils where Casey’s June beetle occurs or occurred historically as, “...almost entirely Carsitas series, of a CdC type, typically gravelly sand, single grain, slightly effervescent, moderately alkaline (pH 8.4), loose, non-sticky, non-plastic, deposited on 0 to 9 percent slopes. On alluvial terraces and where they occur within washes, these soils show light braiding and some organic deposition, but [most years] do not receive scouring surface flows.” Casey’s June beetle has primarily been found on CdC and Riverwash (RA) soils, and also some Carsitas cobbly sand (ChC) soils (Anderson and Love 2007, p. 1). Its burrowing habit would suggest the Casey’s June beetle needs soils that are not too rocky or compacted and difficult to burrow in.” (US FWS, 2013; pg 7).
- See Figure A1-1 below: Another potential area for Casey’s June beetle is the Prescott Preserve, owned by the Oswitt Land Trust (<https://oswitlandtrust.org/prescott-preserve-the-restoration-plan>). The soils are the CdC and Fluvents mapunits, which aligns with the habitat information above (US FWS 2018, Formal Section 7 Consultation on the Proposed Palm Springs Master Drainage Plan Line 41, Stage 3 Project, City of Palm Springs, Riverside County, California.(9207487 (fws.gov)).



Casey's June Beetle

Casey's June Beetle. Of special interest on the above list is the federally endangered Casey's June beetle (CJB). As the map below illustrates, CJB occupies suitable habitat upstream of and downstream of the Tahquitz Creek reach that runs through Prescott Preserve. According to USFWS staff, "Because the Preserve supports suitable soils and habitat for CJB, and the known occurrences upstream and downstream of the Preserve boundary, we consider that there is a strong likelihood that CJB occurs in the Tahquitz Creek reach on Prescott Preserve."

Historically, CJB was associated with native Sonoran (Coloradan) desert vegetation on desert alluvial fans and alluvial fans at the base of the San Jacinto Mountains,

U.S. Fish & Wildlife Service
Casey's June Beetle (*Dinacoma caseyi*)

CJB Locations

- Pre-listing (1995 - May 25, 2011)
- Post-listing (May 25, 2011 - present)
- Extirpated

Orange oval indicates Casey's June Beetle observations on either end of Prescott Preserve.

downstream of the Preserve boundary, we consider that there is a strong likelihood that CJB occurs in the Tahquitz Creek reach on Prescott Preserve."

Historically, CJB was associated with native Sonoran (Coloradan) desert vegetation on desert alluvial fans and alluvial fans at the base of the San Jacinto Mountains,

Figure A1-1. Prescott Preserve Restoration Plan Map (top) and website text referencing suitable soil types for Casey's June beetle.

- Ecology
 - Diet: Larvae feed on organic materials in soil including plant matter, adults feed on native plants, though plant preferences not fully known.
- Taxonomy: Terrestrial Invertebrate, see Figure A1-2.
 - “Casey's June beetle belongs to the scarab family (Scarabidae). The genus *Dinacoma* includes two described species, *D. caseyi* and *D. marginata*. A researcher and taxonomic expert experienced with the genus *Dinacoma* stated, “*Dinacoma caseyi* is a distinct species morphologically and comprises its own species group—the caseyi complex—the other [species group] being the marginata complex, which includes the bulk/remainder of the genus.” Casey's June beetle was first collected in Palm Springs, California, in 1916, and was later described based on male specimens” (FWS 2006, p. 44962).

Kingdom	Animalia – Animal, animaux, animals
Subkingdom	Bilateria – triploblasts
Infra kingdom	Protostomia
Superphylum	Ecdysozoa
Phylum	Arthropoda – Artrópode, arthropodes, arthropods
Subphylum	Hexapoda – hexapods
Class	Insecta – insects, hexapoda, insecto, insectes
Subclass	Pterygota – insects ailés, winged insects
Infra class	Neoptera – modern, wing-folding insects
Superorder	Holometabola
Order	Coleoptera Linnaeus, 1758 – beetles, coléoptères, besouro
Suborder	Polyphaga Emery, 1886
Infraorder	Scarabeiformia Crowson, 1960
Superfamily	Scarabaeoidea Latreille, 1802
Family	Scarabaeidae Latreille, 1802 – scarab beetles
Subfamily	Melolonthinae Leach, 1819
Tribe	Melolonthini Leach, 1819
Genus	Dinacoma Casey, 1889
Species	<i>Dinacoma caseyi</i> Blaisdell, 1930 – Casey's June beetle

Figure A1-2. Taxonomy summary of Casey's June Beetle.

- **Relevant Potential Pesticide Use Sites**
 - Cultivated lands are not included in the Casey's June Beetle range. Pesticide impacts would be expected from non-agricultural uses such as turf or ornamentals. “Pesticide” is not present in any listing or recovery documents from FWS.
- **Relevant Recovery Criteria and Actions**
 - “Although this list of actions will likely change during the recovery planning process as we learn more about the species, we recommend the following actions as a more comprehensive list, using all available methods to lead to the conservation of Casey's June beetle. Specific actions that should be undertaken to meet the primary objectives are outlined below” (FWS 2013, pp. 15-16).
 - a. Survey and monitor range-wide to accurately document populations, occupied habitat, and local threats.
 - Develop a range-wide population monitoring or survey protocol that will lead to a better understanding of life history strategies, such as patterns of dispersal, growth, reproduction, and recruitment.

- Conduct range-wide population monitoring of currently occupied watersheds.
 - Conduct range-wide monitoring and assessment of potentially occupied habitat within the historical range.
 - Monitor habitat to identify locations in or adjacent to currently occupied areas where habitat suitability can be improved (for example, by decreasing soil compaction and increasing summer soil moisture levels).
- b. Protect all suitable habitats in Palm Springs within the current estimated population distribution. Ensure persistence of existing population through conservation easements, management in perpetuity, and cooperative planning with landowners, partners, and stakeholders.
 - c. Conduct research designed to inform management actions that would ameliorate or reduce current threats.
 - Develop a better understanding of the species' habitat requirements and environmental tolerances by documenting habitat conditions in currently occupied habitat, such as soil moisture, soil texture/compaction, water table depth, ground cover types, percent root volume per unit volume of soil, spring wind velocities correlated with adult mating activity, and the geographic distribution and frequency of such winds during the beetle's flight season.
 - Monitor the amount and velocity (intensity) of water flow during peak flood events, and the frequency of these events to determine whether flood events result in mortality of subterranean Casey's June beetles in Palm Canyon Wash.
 - Characterize habitat conditions that may provide suitable food resources (i.e., investigating diet through examination of larval gut contents).
 - Investigate the impacts of suburban development on Casey's June beetle occupancy and persistence at Smoke Tree Ranch. Investigative approaches include determination of onsite environmental correlations, follow-up experimentation, and comparison with other occupied sites.
 - Determine whether predation by ravens or crows is a threat to Casey's June beetle. Investigate whether Casey's June beetles are being consumed; and if so, quantify the number of individuals consumed through documentation of foraging by flocks in occupied habitat during the flight season, and examination of bird gut contents.
 - d. Expand the current distribution by restoring and maintaining historically occupied habitat patches in Palm Springs (for example, restore former habitat in the Tahquitz Creek area).
 - Determine whether reintroduction and population augmentation are necessary; and if so, develop a comprehensive plan to facilitate this process.
 - Develop a comprehensive plan for acquiring suitable sites and establishing additional populations.

- Assess and prioritize areas that can be restored and made suitable for reintroduction of Casey’s June beetle.
- Develop habitat restoration and creation techniques.
- Investigate techniques to translocate Casey’s June beetles.

3. **Species Range:** The range for this species is in Figure A1-3 below and totals 6,471 acres. The range is limited to southern portions of the City of Palm Springs, California and is generally associated with Palm Canyon Wash and Tahquitz Creek.



Figure A1-3. Current ECOS range for Casey’s June Beetle (2022).

4. Critical Habitat

- The current designated critical habitat from the US FWS is approximately 587 acres (Figure A1-4).

5. Known Locations

- Known locations identified by FWS (current distribution Figure A1-4).
- Casey’s June Beetle is endemic to Riverside County, California. The only known occurrences of Casey’s June beetle are within the City of Palm Springs, California.



Figure 1. Casey's June beetle current distribution and critical habitat.

Figure A1-4. Current FWS distribution as of the 2021 5-year Review (yellow), compared to the designated critical habitat (orange). This is Figure 1 in the 2021 5-year Review.

- iNaturalist: [Link for research grade observations](#). Since 2017, there have been 4 research grade observations, consistent with the species range considering data resolution (Figure A1-5).

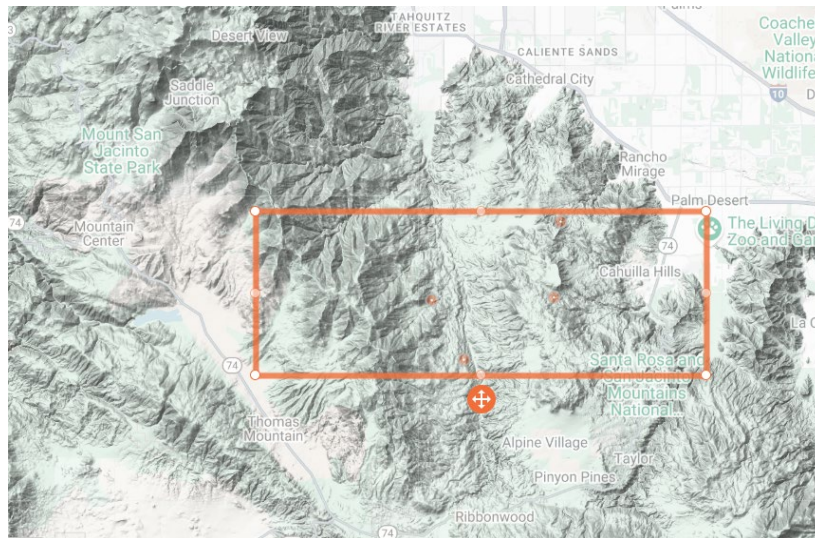


Figure A1-5. iNaturalist occurrences for Casey's June Beetle.

- Global Biodiversity Information Facility (GBIF):
<https://www.gbif.org/species/1054051>. GBIF includes nine point occurrences with coordinates, consistent with the species range given the data resolution (**Figure A1-6**).



Figure A1-6. GBIF Occurrences for Casey's June Beetle.

- NatureServe Explorer Pro³:
https://explorer.natureserve.org/pro/Map?taxonUniqueId=ELEMENT_GLOBAL.2.770508
 - Available public occurrence information (2 public) from NatureServe Explorer Pro generally aligns with the information from iNaturalist and GBIF and does not identify any additional areas outside of the range.

³ <https://explorer.natureserve.org/pro/Welcome>