

**PETITION TO LIST
SIX SAND DUNE BEETLES
UNDER THE U.S. ENDANGERED SPECIES ACT**



Giuliani's Big Dune Scarab Beetle Large



Aegialian Scarab Beetle

Photos: Richard Rust

**Petition Submitted to the U.S. Secretary of Interior
Acting through the U.S. Fish and Wildlife Service**

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I. Summary

The creator must have an inordinate fondness for beetles.

J. B. S. Haldane, FRS

The many, varied habitats in the Great Basin of the western United States are home to a vast diversity of flora and fauna, including some fascinating, endemic, invertebrate species that specialize in sand dunes. Certain butterflies, weevils, bees, ants and scarab beetles have evolved to use these hot, dry, sandy environments and the limited vegetation that grows there.

Many of these species are of conservation concern, including six rare beetles that each occur at one or two sand dunes in the region. The Bureau of Land Management (BLM) administers most, if not all, of the dunes used by the beetles. Over the years, BLM's mismanagement of the sand dunes has allowed off-road vehicle (ORV) use to fragment and destroy these fragile habitats.

WildEarth Guardians petitions the U.S. Fish and Wildlife Service (Service) to list six sand dune beetles under the Endangered Species Act (ESA). Each of these beetles specializes in or is restricted to limited habitats that are threatened by ORV use and other factors. Listing them as "endangered" or "threatened" under the ESA would help conserve these species and protect their habitat.

II. The Great Basin

The Great Basin is one of the most rugged and beautiful regions in the United States. It is a semi-arid closed basin that includes most of the state of Nevada, and parts of California, Oregon, Idaho and Utah (Chambers et al. 2008). Much of the region is basin and range country, where long, steep ridges of volcanic uplift and fault-block mountains flank broad valleys.

The Great Basin's huge size, varied topography, extreme climate, and remarkable geology create a multitude of habitat types. The region features mountainous forests, rolling hills of sagebrush and aspen, rocky outcroppings, lakes, rivers, streams, springs and wetlands, hot springs, playas, dunes, and alkali flats. The many and varied habitat types support significant species diversity and endemism. Nevada, which contains most of the Great Basin, enjoys incredible biodiversity. Only ten states reportedly have greater biodiversity than Nevada, and even fewer have so many endemic species (NNHP 2006).

Unfortunately, the Great Basin has been ravaged in the last 150 years and the region is now considered one of the most imperiled landscapes in the United States (Chambers et al. 2008). Myriad land uses and related effects have destroyed, degraded and fragmented Great Basin habitats, reducing connectivity, blocking corridors and isolating sensitive species. Nearly 16 percent of species in Nevada are in danger of extinction and thirteen endemic species in Nevada are known to have already gone extinct (NNHP 2006: 3).¹

¹ Sada and Vinyard (2002: 280) reported that sixteen taxa associated with aquatic ecosystems in the Great Basin have become extinct since the 1800s (12 fishes, 3 mollusks, 1 aquatic insect).

The six beetles petitioned for listing use rare and fragile sand dune habitats in the central and southern parts of the Great Basin (see Map 1), a region that has and will continue to undergo considerable environmental change. Chambers et al. (2008: 1) summarized:

The population is expanding at the highest rate in the nation, and major sociological and ecological changes are occurring across the region. These changes can be attributed to numerous interacting factors including urbanization, changing land use, climate change, limited water resources, altered fire regimes, invasive species, insects, and disease. The consequences have been large-scale vegetation type conversions, loss of watershed function, and degradation of stream, riparian, and aquatic ecosystems.

III. Sand Dunes

Sand dunes comprise ~ 5 percent of the Earth's surface (Van Dam and Van Dam 2008). Sand dunes are unique habitats because they are "rare, small, of recent origin, and spatially dynamic" (Brussard et al. 1998: 515). Sand dunes or sand dune complexes often stand as distinct islands of habitat surrounded by very different habitat types (Luckenbach and Bury 1983).

Sand dunes in the American West support an impressive number of endemic species (Van Dam and Van Dam 2008, Brussard et al. 1998), including the sand dune scarabs petitioned here. Unfortunately, given their uniqueness and sensitivity to disturbance, sand dunes "are an example of an ecosystem that has a very high risk of species-level extinction" (Van Dam and Van Dam: 411, citing Dunn 2005). The high number of endemic species, combined with the high risk of species extinction, are reason to conserve sand dunes (Van Dam and Van Dam 2008).

There are 32 unconsolidated sand dunes in Nevada (Brussard et al. 1998).² More is known about the dynamics, ecology and threats to some dunes in Nevada than others (Brussard et al. 1998). Most dunes in the Great Basin—including the dunes described in this petition—are at least partially on federal public land, administered by the Bureau of Land Management (BLM) (Brussard et al. 1998).

IV. Endangered Species Act and Implementing Regulations

The Endangered Species Act of 1973 (ESA) protects plants and animals that are listed by the federal government as "endangered" or "threatened" (16 U.S.C. § 1531 et seq.). Any interested person may submit a written petition to the Secretary of the Interior requesting him to list a species as "endangered" or "threatened" under the ESA (50 C.F.R. § 424.14(a)). An "endangered species" is "any species that is in danger of extinction throughout all or a significant portion of its range" (16 U.S.C. § 1532(6)). A "threatened species" is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. § 1532(20)). "Species" includes subspecies and distinct population segments of sensitive taxa (16 U.S.C. § 1532(16)).

² There are 45 unconsolidated dune systems in the Great Basin and Nevada (Britten and Rust 1996); sand dunes cover only 0.11 percent of the Great Basin (Nachlinger et al. 2001: 120, Table 25).

The ESA sets forth listing factors under which a species can qualify for protection (16 U.S.C. § 1533(a)(1)):

- A. The present or threatened destruction, modification, or curtailment of habitat or range;
- B. Overutilization for commercial, recreational, scientific, or educational purposes;
- C. Disease or predation;
- D. The inadequacy of existing regulatory mechanisms; or
- E. Other natural or manmade factors affecting its continued existence.

A taxon need only meet one of the listing criteria outlined in the ESA to qualify for federal listing.

V. Imperiled Beetles Petitioned for Listing under the Endangered Species Act

WildEarth Guardians petitions to list six scarab beetles as “threatened” or “endangered” under the Endangered Species Act:

Crescent Dunes aegialian scarab
Aegialia crescenta

Giuliani’s dune scarab
Pseudocotalpa giulianii

Crescent Dunes serican scarab
Serica ammomensico

Large aegialian scarab
Aegialia magnifica

Hardy’s aegialian scarab
Aegialia hardyi

Sand Mountain serican scarab
Serica psammobunus

NatureServe ranks all of the petitioned species globally and/or nationally, and within the state of Nevada, as “critically imperiled” (i.e., G1, N1, S1). NatureServe’s definition of “critically imperiled” is at least equivalent to definitions of “endangered” or “threatened” under the ESA.

Critically Imperiled -- At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

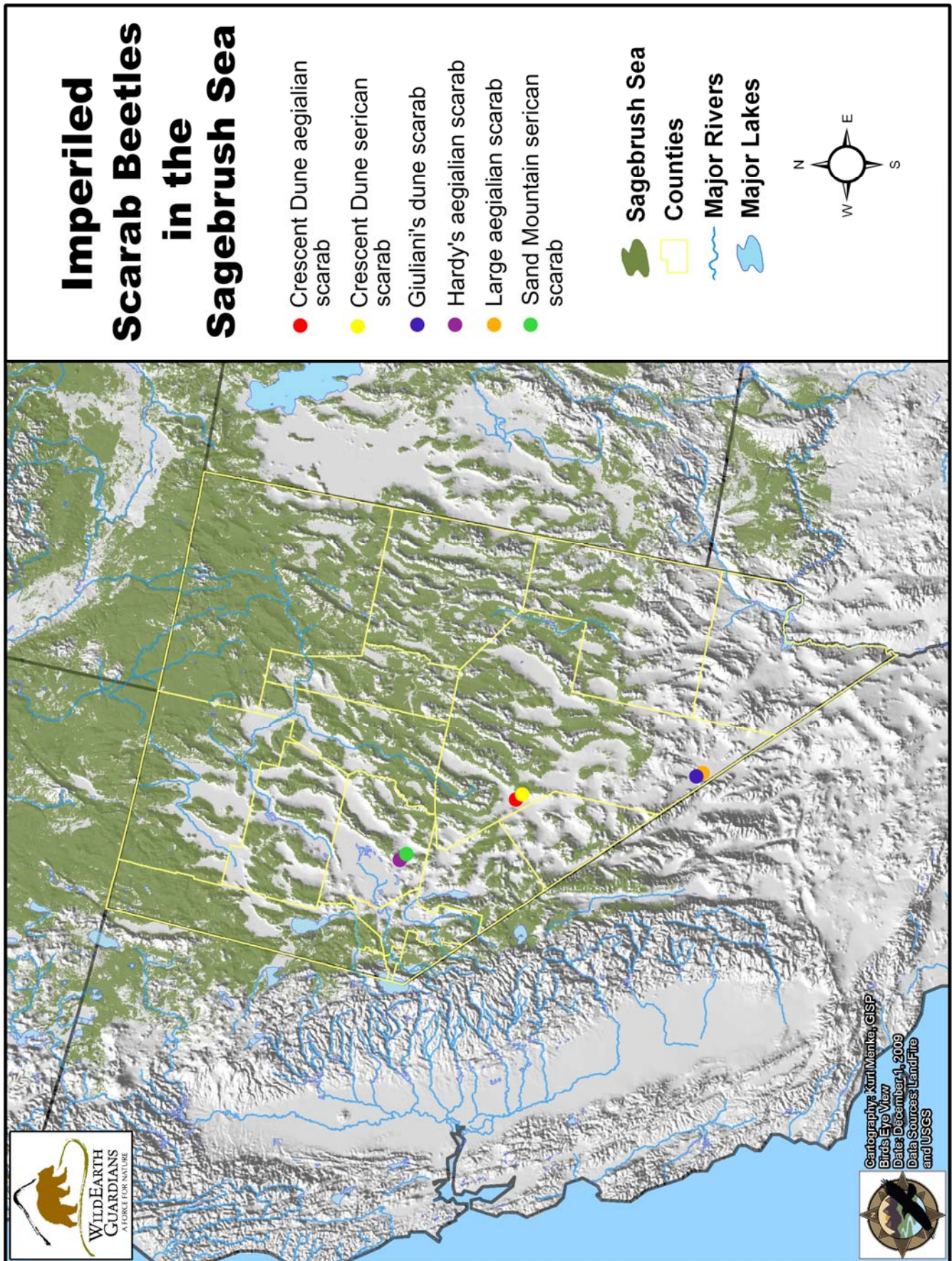
Furthermore, the factors considered by NatureServe in ranking species also overlap with the ESA’s listing factors noted above.

The U.S. Fish and Wildlife Service (Service) currently lists all of the petitioned beetles as “species of concern,” which are “species that are declining” and “might be in need of conservation action,” including possible listing under the ESA. The BLM also lists the beetles as “sensitive species” in Nevada. The designation includes “species that could easily become endangered or extinct in the state.” Two beetles are also listed as “vulnerable” on the Red List maintained by the International Union for the Conservation of Nature.

Table 1. Imperiled Beetles Petitioned for Listing under the Endangered Species Act

Species	NatureServe Global Rank	NatureServe National Rank	NatureServe State Ranks	BLM Sensitive Species	FWS Species of Concern
Crescent Dunes aegialian scarab	1	NR	NV (1)	NV	✓
Crescent Dunes serican scarab	1	1	NV (1)	NV	✓
Hardy's aegialian scarab	1	NR	NV (1)	NV	✓
Sand Mountain serican scarab	1	1	NV (1)	NV	✓
Giuliani's dune scarab	1	NR	NV (1)	NV	✓
Large aegialian scarab	1	NR	NV (1)	NV	✓

Map 1



A. Threats to Sand Dune Beetles

Invertebrates, particularly those dependent on isolated and/or shrinking habitats, are extremely susceptible to habitat modification and perturbations in microclimate (Brussard et al. 1998, citing others). Species that specialize in niche habitats like sand dunes may not be able to adapt to habitat changes, nor disperse to other habitat when conditions require it (WAPT 2006). Further, reestablishing extirpated populations of specially adapted invertebrates becomes less probable on altered or degraded habitat (Brussard et al. 1998). Preserving and restoring current habitat is a more efficient conservation strategy that also offers the greatest chance of protecting and recovering imperiled species.

Many of the petitioned beetles occur in areas threatened by the same land uses, habitat alteration, and other factors. All of them may be vulnerable to effects related to limited range and small population size. These common threats are addressed here, organized by ESA listing factor.

A. Present or threatened destruction, modification, or curtailment of habitat or range.

Of all the threats to sand dune beetles petitioned here, none is more important than off-road vehicle (ORV) use. Approximately half of publicly owned BLM lands are open to unrestricted ORV use, with another 44 percent designated for limited access and only 6 percent of BLM land closed to ORVs (Strittholt et al. 2000, unpublished report: ii). Of 48 million acres of public land managed by BLM in Nevada, almost 37 million acres are open to ORV use, nine million acres are available for limited access, and only two million acres are closed to ORVs (BLM 2005, newsletter: 1). More than 44 million Americans used off-road vehicles in 2007, up from five million in 1972 (Cordell et al 2008, unpublished report: 10; Brown, 06/05/2008). More than 5,400 law enforcement incidents on BLM land in 2005 involved ORV riders (the next highest category of incidents, at 900, involved drug use) (Salt Lake Tribune, 11/02/2007).

Sand dunes in the Great Basin and Mojave Desert are popular for ORV use, often attracting thousands of riders on a single weekend (Brussard et al. 1998; Britten and Rust 1996). ORV users spent 408,703 visitor days on BLM lands in Nevada in 2000 (WAPT 2006, *citing* Newmark et al. 2002). No other anthropogenic use has greater impact on sand dune environments in Nevada (WAPT 2006: 238, “Conditions of sand dune and badland habitats in Nevada are influenced mostly by [ORV] use.”).

ORV use can have “a severe negative impact on Coleoptera [beetles] that inhabit sand dunes” (Van Dam and Van Dam 2008: 411). The beetles petitioned here depend on vegetation around the base of sand dunes for adult or larval forage, mating sites, and protective cover (*e.g.*, Rust 1985, Hardy 1976, Hardy and Andrews 1986). ORV use can destroy dune vegetation (Luckenbach and Bury 1983, WAPT 2006), eliminating and fragmenting beetle habitat and isolating populations; activate sand dune movement (which can destabilize the entire system) (Van Dam and Van Dam 2008, *citing* others); disrupt mating activity (Luckenbach and Bury 1983); and potentially kill individual beetles (Van Dam and Van Dam 2008). ORV use may also facilitate the spread of invasive species into sand dune systems (WAPT 2006).

Populations of Coleoptera were much larger in areas protected from ORV use than in unprotected areas (Van Dam and Van Dam 2008). At the Algodones Dunes in California, it was

“clear that the lack of Coleoptera on the unprotected dunes [was] due to ORV use” (Van Dam and Van Dam 2008: 416). Findings also indicated that Coleoptera species were not dispersing short distances to ORV impacted dunes (Van Dam and Van Dam 2008). The risk of harm to flora and fauna from ORV use continues even where plans are implemented to control it (WAPT 2006).

Most of the beetles petitioned here each occur at one or perhaps two dune complexes. These species are probably restricted to their current range, as the hard soils surrounding dunes are likely a hindrance to larval movement and development (Hardy and Andrews 1987). Further, adult beetles do not fly far (they have short flight periods and fly slowly) and they are likely unable to disperse even short distances to other suitable habitats. Sizeable areas should be protected from ORV use to protect beetle habitat (Van Dam and Van Dam 2008). Suitable habitat must be of sufficient size to promote gene flow and support populations through stochastic events. It may be necessary to ban ORV use altogether on smaller dune systems to protect local or endemic populations of plants and animals (Van Dam and Van Dam 2008).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

While individuals of all of the petitioned beetles have been collected by scientists over the years, it is not known whether collection constitutes a threat to any of these species as a whole.

C. Disease or predation.

Nighthawks were observed preying on Andrew’s dune scarab (*Pseudocotalpa andrewsi*) at Algodones Dunes in southern California (Hardy and Andrews 1986), a dune system very similar to those used by the petitioned beetles. Foxes and coyotes might also prey on sand dune beetles (see Hardy and Andrews 1986: 137). Disease is not known to be a threat to the petitioned beetles.

D. Inadequacy of existing regulatory mechanisms.

There is no federal or state program charged with managing sensitive invertebrates in Nevada or the Great Basin. Nevada state law only protects species that the state Wildlife Commission has specifically determined to be imperiled (Nev. Rev. Stat. 503.584 – 503.589). Protected species may include mollusks and crustaceans, but apparently not other invertebrates (Nev. Rev. Stat. 501.110)—no beetle is protected under the statute.

The Nevada Wildlife Action Plan does not prescribe conservation measures for sensitive invertebrates in the state. Some petitioned beetles may occur at “preliminary focal areas” identified in the Wildlife Action Plan, but it is unclear what regulatory authority, if any, the state has to affect management in these areas.

Some sand dune beetle habitat is designated by BLM as recreation areas or “special recreation management areas.” These administrative designations limit some activities and land use at the dunes, but not those that most directly affect petitioned beetles. For example, restrictions on

ORV use at Sand Mountain Recreation Area were still not deemed sufficient to protect habitat for the imperiled Sand Mountain blue butterfly (*Euphilotes pallescens arenamontana*) and a separate species conservation plan, with even more restrictions, had to be developed to protect the species (*see* 72 FR 24253, 24256-24257)

Some sand dune beetle habitat is within BLM designated “Areas of Critical Environmental Concern” (ACEC), another administrative designation that, despite its higher profile, is not part of the agency’s legislated National Landscape Conservation System. Oliva et al. (2004, unpublished report) noted that the BLM lacks an overarching conservation strategy for ACECs, lacks funding to properly manage and patrol the areas, and routinely allows land uses to damage or destroy the values for which the ACEC was designated.

E. Other natural or manmade factors affecting a species’ continued existence.

All of the beetles petitioned here have limited distribution and apparently small populations, increasing the likelihood of extinction.³ The Service has recognized this threat for other species. For the Langford’s tree snail (*Partula langfordi*), the Service stated:

Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the limited number of known individuals of this species. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Pimm et al. 1988; Center for Conservation Update 1994; Mangel and Tier 1994).

FWS 2009b: 5.

Here, the Service relied on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers even without other known threats. The Service similarly notes for a snail called Sisi (*Ostodes strigatus*), “[e]ven if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations” (FWS 2009a: 4). The Service should similarly consider whether the small populations and limited range of the petitioned beetles threaten them with extinction.

B. Imperiled Beetles at Crescent Dunes

The Crescent Dunes are a small complex of crescent-shaped dunes located in Nye County, a few miles north of Tonopah, Nevada. The highest dune is approximately 5,000 feet in elevation.

³ See, e.g., Service candidate assessment forms for *Doryopteris takeuchii*, *Huperzia stemmermanniae*, *Megalagrion nesiotis*, *Melicope degeneri*, *Melicope hiiakae*, *Myrsine mezii*, *Ostodes strigatus*, *Partula langfordi*, *Peperomia subpetiolata*, *Phyllostegia bracteata*, and *Tryonia circumstriata*, available at www.fws.gov/endangered/wildlife.html (accessed Jan. 11, 2009).

Crescent Dunes are on BLM public land, managed by the Battle Mountain District, Tonopah Resource Area (BLM 1997). The BLM describes the dunes as “easily accessible and well known to the public” (BLM 1994: 3-16). The Crescent Dunes support a suite of eleven sand dune obligate beetles (Nachlinger et al. 2001).

Crescent Dunes aegialian scarab

Aegialia crescenta (Gordon and Cartwright 1977)

Classification and Nomenclature

Common Name. The Nevada Natural Heritage Program calls this species “Crescent Dunes aegialian scarab” (NNHP 2009). It also called “Crescent-Dune aegialian scarab beetle” and “Crescent Dune scarab beetle.”

Taxonomy. The petitioned species is *Aegialia crescenta* Gordon and Cartwright, 1974.

Table 2. Taxonomy of <i>Aegialia crescenta</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Aegialia</i>
Species	<i>Aegialia crescenta</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.itis.gov .	

Description, Life History, Distribution

The Crescent Dunes aegialian scarab is reddish brown, with yellowish brown legs, mouthparts and ventral (anterior) surface (Gordon and Cartwright 1977). The beetle’s head and body are smooth and shiny and textured with tiny puncture marks (Gordon and Cartwright 1977: 44, fig. 2). Measured specimens ranged between 3.75 to 5 mm long and 2.05 to 2.7 mm wide (Gordon and Cartwright 1977).

The Crescent Dunes aegialian scarab is known from the Crescent Dunes (Gordon and Cartwright 1977; NNHP 2006). It may also be present at the San Antonio Dunes in Nye County (Nachlinger et al. 2001) and the Game Range Dunes in Clark County (Gordon and Cartwright 1988: 18). The Nevada Natural Heritage Program noted the species is endemic to Nevada (NNHP 2009).

Conservation Status

NatureServe reviewed Crescent Dunes aegialian scarab in 1995 and globally ranked the species as “critically imperiled” (NatureServe 2009). NatureServe also ranked the species as “critically

imperiled” in Nevada (NatureServe 2009). The International Union for Conservation of Nature assessed the beetle in 1996 and listed it as “vulnerable” (IUCN WCMC 1996a). The Service identifies the Crescent Dunes scarab as a “species of concern” (FWS 2009c) and previously listed it as a “Category 2” candidate for listing under the Endangered Species Act (59 FR 58982). The BLM lists the beetle as a “sensitive species” in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of sensitive flora and fauna in sagebrush steppe. The Nevada Natural Heritage Program lists the beetle as a rare species dependent on dune habitats (NNHP 2004).

Crescent Dunes serican scarab

Serica ammomensico (Hardy and Andrews 1987)

Classification and Nomenclature

Common Name. The Nevada Natural Heritage Program calls this species “Crescent Dunes serican scarab” (NNHP 2009). It is also called “Crescent Dune serican scarab beetle” (NatureServe 2009).

Taxonomy. The petitioned species is *Serica ammomensico* Hardy and Andrews, 1987. NatureServe (2009) and other sources misidentify formal identification of this species as “Hardy 1987.”

Table 3. Taxonomy of <i>Serica ammomensico</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Serica</i>
Species	<i>Serica ammomensico</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.itis.gov .	

Description, Life History, Distribution

The Crescent Dunes serican scarab is dark brown (ranging from pale brown to brownish black) (Hardy and Andrews 1987). Some body parts have scattered, erect, pale-colored hairs (Hardy and Andrews 1987). The average length of measured individuals was 7.2 mm (Hardy and Andrews 1987).

The Crescent Dunes serican scarab is an endemic species known from the Crescent Dunes (Hardy and Andrews 1987; NNHP 2009). The Nevada Natural Heritage Program lists the beetle as a rare species dependent on dune habitats (NNHP 2004).

Conservation Status

NatureServe reviewed Crescent Dune serican scarab in 1995 and globally and nationally ranked the species as “critically imperiled” (NatureServe 2009). NatureServe also ranked the species as “critically imperiled” in Nevada (NatureServe 2009). The Service identifies the Crescent Dune serican scarab as a “species of concern” (FWS 2009c) and previously listed it as a “Category 2” candidate for listing species under the Endangered Species Act (59 FR 58982). The BLM lists the beetle as a “sensitive species” in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of sensitive flora and fauna in sagebrush steppe.

Management of Crescent Dunes

Crescent Dunes were designated by BLM as Crescent Sand Dunes Special Recreation Management Area (SRMA), totaling 3,000 acres (BLM 1997). Some land uses are restricted in the SMRA, such as competitive recreational events and nonenergy mineral leasing, and some management actions must be deemed compatible with goals to conserve the area (i.e., granting rights-of-way through the area) (BLM 1997). Grazing is permitted on or near the Crescent Dunes on the San Antone grazing allotment (BLM 1997).

The SMRA is open to ORV use year-round; no area is reserved for protection of sensitive species, although ORVs are required to stay on roads, trails and unvegetated dunes. Greenwald and Bradley (2008) identified Crescent Dunes as a “hot spot” for imperiled species in Nevada, but found that none of the area offers sufficient protection for these species. Knowledgeable individuals urged BLM to designate the area as an Area of Critical Environmental Concern (ACEC) during the last resource management planning process to protect endemic species (BLM 1994: 5-12), but the agency declined to do so, claiming the area did not meet criteria for protection (BLM 1994: 5-125). The agency indicated that it would prepare a separate management plan for the SMRA (BLM 1994: 5-159), but has not done so.

The Nevada Wildlife Action Plan identified Crescent Dunes as a “preliminary focal area” (WAPT 2006), although it is unclear how the plan enhances protection for sand dunes and sand dune beetles. The plan lacks effective, enforceable measures to protect species and their habitat.

An application to construct a large solar energy facility on BLM land near Crescent Dunes is on a “fast track” for permitting (74 FR 61364). If approved, the increased activity from construction and maintenance of the solar array may disturb beetles and their habitat.

The Crescent Dunes are habitat for at least one other endemic imperiled beetle: the Crescent Dune aphodius scarab beetle (*Aphodius* sp.). NatureServe ranked the Sand Mountain aphodius scarab as “critically imperiled,” while noting that the taxonomy of the species is not yet resolved (NatureServe 2009).

C. Imperiled Beetles at Sand Mountain and Blow Sand Mountain

Sand Mountain and Blow Sand Mountain are located in Churchill County, approximately 30 miles east-southeast of Fallon, Nevada. Sand Mountain is a star dune, ranging from 3,895-4,650

feet in elevation, and occupying approximately 12 sq. miles (32 sq. km) on BLM land (although part of the dune may also be located on state and/or private land) (Bechtel et al. 1983; NNHP 2006).

Blow Sand Mountain (a.k.a. “Blow Sand Mountains,” “Blowing Sand Mountain,” “Blowsand Mountain”) is a complex of star and linear dunes located partially on Fallon Naval Air Station bombing range and BLM land, 15.6 miles (25 km) southwest (across U.S. Highway 50) from Sand Mountain (Bechtel et al. 1983, Nachlinger et al. 2001). Blow Sand Mountain rises to 4,593 feet (1,400 meters) and occupies 3.6 sq. miles (9.2 sq. km) (Bechtel et al. 1983).

The unique habitats at Sand Mountain and Blow Sand Mountain support myriad diverse and sensitive endemic and sand dune-obligate species (NNHP 2004, Bechtel et al. 1983). Sand Mountain is habitat for the Sand Mountain blue butterfly, two endemic sand bees, and a suite of 17 other sand obligate solitary bees (Nachlinger et al. 2001). The Blow Sand Mountains support a suite of 14 sand dune obligate beetles (Nachlinger et al. 2001).

Hardy’s aegialian scarab

Aegialia hardyi (Gordon and Cartwright 1977)

Classification and Nomenclature

Common Name. “Hardy’s aegialian scarab” or “Hardy’s aegialian scarab beetle.”

Taxonomy. The petitioned species is *Aegialia hardyi* Gordon and Cartwright, 1977.

Table 4. Taxonomy of <i>Aegialia hardyi</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Aegialia</i>
Species	<i>Aegialia hardyi</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.itis.gov .	

Description, Life History, Distribution

Hardy’s aegialian scarab is very similar in appearance to Crescent Dunes aegialian scarab: reddish brown, with yellowish brown legs, mouthparts and ventral (anterior) surface (Gordon and Cartwright 1977). The beetle’s head and body are smooth and shiny and textured with tiny puncture marks (Gordon and Cartwright 1977: 44, fig. 3). Measured specimens ranged between 4.33 to 5.10 mm long and 2.25 to 2.6 mm wide (Gordon and Cartwright 1977).

Hardy’s aegialian scarab is known from dunes at Sand Mountain (Gordon and Cartwright 1977). It may also be present at Blow Sand Mountain (Nachlinger et al. 2001). The Nevada Natural Heritage Program noted that the Hardy’s aegialian scarab is endemic to Nevada.

Conservation Status

NatureServe reviewed Hardy’s aegialian scarab in 1995 and globally ranked the species as “critically imperiled” (NatureServe 2009). NatureServe also ranked the species as “critically imperiled” in Nevada (NatureServe 2009). The Service identifies Hardy’s aegialian scarab as a “species of concern” (FWS 2009c) and previously listed it as a “Category 2” candidate for listing under the Endangered Species Act (59 FR 58982). The BLM lists the beetle as a “sensitive species” in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of sensitive flora and fauna in sagebrush steppe. The Nevada Natural Heritage Program lists the beetle as a rare species dependent on deep sand and/or dune habitats (NNHP 2004).

Sand Mountain serican scarab

Serica psammobunus (Hardy and Andrews 1987)

Classification and Nomenclature

Common Name. “Sand Mountain serican scarab” or “Sand Mountain serican scarab beetle.”

Taxonomy. The petitioned species is *Serica psammobunus* Hardy and Andrews, 1987. NatureServe (2009) and other sources misidentify formal identification of this species as “Hardy 1987.”

Table 5. Taxonomy of <i>Serica psammobunus</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Serica</i>
Species	<i>Serica psammobunus</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.its.gov .	

Serica psammobunus is occasionally misspelled *Serica psamnobunus*, including in some government documents.

Description, Life History, Distribution

The Sand Mountain serican scarab is dark colored (black to dark brown) (Hardy and Andrews 1987). Some body parts have scattered, erect, pale-colored hairs (Hardy and Andrews 1987). The average length of measured individuals was 8.05 mm (Hardy and Andrews 1987).

The Sand Mountain serican scarab is known from Sand Mountain and Blow Sand Mountain (Hardy and Andrews 1987). The Nevada Natural Heritage Program noted that the Sand Mountain serican scarab is endemic to Nevada and has recorded two occurrences of the species in the state (NNHP 2009), one of them at Sand Mountain⁴ (NNHP 2006).

Conservation Status

NatureServe reviewed Sand Mountain serican scarab in 1995 and globally and nationally ranked the species as “critically imperiled” (NatureServe 2009). NatureServe also ranked the species as “critically imperiled” in Nevada (NatureServe 2009). The Service identifies the Sand Mountain serican scarab as a “species of concern” (FWS 2009c) and previously listed it as a “Category 2” candidate species for listing under the Endangered Species Act (59 FR 58982). The BLM lists the beetle as a “sensitive species” in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of sensitive flora and fauna in sagebrush steppe. The Nevada Natural Heritage Program lists the beetle as a rare species dependent on deep sand and/or dune habitats (NNHP 2004).

Management of Sand Mountain and Blow Sand Mountain

The Nevada Natural Heritage Program considers Sand Mountain of “highest conservation priority,” ranking the site among the most important in the state for only known or highest quality populations of highly imperiled species (NNHP 2006). The program assigned Sand Mountain its highest ranks for “Site Protection Urgency” and “Site Management Urgency” (NNHP 2006). The rankings indicate the site has a “[g]ood chance of being immediately threatened by severely destructive forces” and that species populations could experience “loss or irretrievable degradation...within 1 year without immediate new, or ongoing annual, management” (NNHP 2006: 14). Greenwald and Bradley (2008) also identified Sand Mountain as a “hot spot” for imperiled species in Nevada, and found that none of the area offers sufficient protection for these species.

The BLM Carson City District, Stillwater Field Office manages Sand Mountain as a 4,795-acre recreation area, where ORV use can be intense at times. The BLM has closed some areas to ORV use (BLM 2001), but some ORV users have ignored these restrictions and ridden into closed areas (anonymous pers. comm., 12/14/2009).

The Nevada Wildlife Action Plan identified Sand Mountain and Blow Sand Mountain as “preliminary focal areas” (WAPT 2006), although it is unclear how the plan enhances protection for sand dunes and sand dune beetles. The plan lacks effective, enforceable measures to protect species and their habitat.

In addition to Hardy's aegialian scarab and Sand Mountain serican scarab, Sand Mountain and Blow Sand Mountain provide habitat for the Sand Mountain aphodius scarab (*Aphodius* sp.) and Sand Mountain pygmy scarab beetle (*Coenonycha pygmaea*) (NatureServe 2009). NatureServe

⁴ It is unknown if the other recorded observation was made at Sand Mountain or Blow Sand Mountain.

ranked both species as “critically imperiled,” while noting that the taxonomy of the aphodius scarab is not yet resolved (NatureServe 2009).

D. Imperiled Beetles at Big Dune and Lava Dune

Big Dune and Lava Dune are west-northwest of Lathrop Wells in southern Nye County, Nevada, near the border with California. The dunes are approximately 4 miles apart, separated by U.S. Highway 95 (Big Dune is located west of the highway, Lava Dune is east).

Big Dune (also commonly called “Amargosa Dunes”) is a 1.5 square mile complex star dune that reaches 2,731 feet above sea level. Lava Dune is sand trapped in a lava flow at the base of a cinder cone; it has an area of approximately 1 square mile and rises to 2,800 feet. Both areas are managed by the BLM. The dunes are located in hot, dry desert and are surrounded by vegetation characteristic of the Mojave Desert. The dunes host a diverse array of flora and fauna, despite these harsh conditions.

Giuliani's dune scarab

Pseudocotalpa giulianii (Hardy 1974)

Classification and Nomenclature

Common Name. “Giuliani’s dune scarab” (NatureServe 2009); also known as “Big Dune beetle” and “Giuliani’s Big Dune scarab.”

Taxonomy. The petitioned species is *Pseudocotalpa giulianii* Hardy, 1974.

Table 6. Taxonomy of <i>Pseudocotalpa giulianii</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Pseudocotalpa</i>
Species	<i>Pseudocotalpa giulianii</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.itis.gov .	

Description, Life History, Distribution, Distribution

Giuliani’s dune scarab is a light tan scarabaeid beetle, with more yellowish pronotum (frontal segment) and head; the legs are darker and the tarsi (“feet”) and claws are reddish brown (Rust 1985). The beetle is between 17 to 25 mm long and 7 to 10 mm wide (Rust 1985, *citing* Hardy 1974). Males are distinguished from females by the size of there tarsal claws: female tarsal claws are of equal size, whereas the outer tarsal claw of the male is twice as large as the inner claw (Rust 1985). Beetles use their legs and claws to burrow into the loose slip-face of dunes to

shelter during periods of inactivity (Rust 1985). Adults have been uncovered from between 4 to 6 inches below the sand surface (occasionally beneath desert shrubs) (Hardy 1976).

Giuliani's dune scarab is known from Big Dune and Lava Dune (Rust 1985). The Nevada Natural Heritage Program likewise noted that Giuliani's dune scarab is endemic to Nevada and has recorded two occurrences of the species at Big/Lava Dune (NNHP 2009, NNHP 2006). (It is unclear if the recorded occurrences were observed one each at Big Dune and Lava Dune, or if both occurrences were observed at one dune or the other.) Other dune systems in the Amargosa Desert have been surveyed for the scarab, but none were found (Rust 1985).

Adults emerge in late April, usually appearing for short periods before sundown (Rust 1985, citing Hardy 1974, 1976). Males and females hover over desert vegetation, including *Petalonyx thurberi* (sandpaper plant), *Larrea tridentata* (creosote bush), *Salsola kali* (prickly saltwort, Russian thistle) and *Argemone corymbosa* (Mojave pricklypoppy) (Rust 1985; Hardy 1976). Mating has been observed on creosote bushes (Hardy 1976) and on the sand surface (Rust 1985; Hardy 1976). Larvae have been recovered from beneath *Petalonyx thurberi*, between 20 cm and 40 cm below the sand surface (Rust 1985). Larvae apparently feed on plant roots (Rust 1985). Larval development appears to take 2 years or more (1985).

Conservation Status

NatureServe reviewed Giuliani's dune scarab in 1995 and globally ranked the species as "critically imperiled" (NatureServe 2009). NatureServe also ranked the species as "critically imperiled" in Nevada, the only state where the species is known to occur (NatureServe 2009). The International Union for Conservation of Nature assessed the beetle in 1996 and listed it as "vulnerable" (IUCN WCMC 1996b). The BLM lists the beetle as a "sensitive species" in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of sensitive flora and fauna in sagebrush steppe. The Nevada Natural Heritage Program lists the beetle as a rare species dependent on deep sand and/or dune habitats (NNHP 2004).

The Service previously proposed to list Giuliani's dune scarab as "threatened" under the Endangered Species Act and recommended that all of Big Dune be designated as critical habitat for the species in 1978 (43 FR 35636). The Service noted the destructive effects of ORV use on the beetle's habitat (43 FR 35636). The agency subsequently withdrew its proposed listing rule—as mandated by Congress—when it failed to finalize the rule within two years after proposing it (45 FR 65137). The Service did not appear to withdraw the rule because threats to the scarab had subsided (as the BLM Southern Nevada District Office recently claimed (BLM 2009a: 5)).

The Service subsequently listed Giuliani's dune scarab as a "Category 2" candidate for listing under the Endangered Species Act (49 FR 21664, 59 FR 58982)) and currently identifies the beetle as a "species of concern" (FWS 2009c). Surveys of the beetle in 1993 and 1994 revealed the presence of fewer than 10 individuals at each survey site (Brussard et al. 1998).

Large aegialian scarab

Aegialia magnifica (Gordon and Cartwright, 1977)

Classification and Nomenclature

Common Name. “Large aegialian scarab” or “large aegialian scarab beetle.”

Taxonomy. The petitioned species is *Aegialia magnifica* Gordon and Cartwright, 1977.

Table 7. Taxonomy of <i>Aegialia magnifica</i>	
Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Scarabaeidae
Genus	<i>Aegialia</i>
Species	<i>Aegialia magnifica</i>
Sources: NatureServe (2009); Integrated Taxonomic Information System, www.itis.gov .	

Description, Life History, Distribution, Distribution

The large aegialian scarab is pale red, with yellowish red mouthparts and ventral (anterior) surface (Gordon and Cartwright 1977). The beetle’s head and body are smooth and shiny and textured with tiny puncture marks (Gordon and Cartwright 1977: 44, fig. 3). Measured specimens ranged between 4.4 to 5.9 mm long and 2.48 to 3.25 mm wide (Gordon and Cartwright 1977).

The large aegialian scarab is known from Big Dune (Gordon and Cartwright 1977; NNHP 2006), where it was reported using dune habitats. The species may also occur at Lava Dune (Gordon and Cartwright 1988: 18). The Nevada Natural Heritage Program noted the large aegialian scarab is endemic to Nevada (NNHP 2009).

Cartwright and Gordon (1977) asserted that *A. magnifica* is the most distinctive of *Aegialia*, based on its red color, large size and smooth appearance. Key characteristics of the species (male genitalia, hind tibiae) are similar to *A. crescenta* and *A. hardyi*, two species also petitioned here.

Conservation Status

NatureServe reviewed large aegialian scarab in 1995 and globally ranked the species as “critically imperiled” (NatureServe 2009). NatureServe also ranked the species as “critically imperiled” in Nevada (NatureServe 2009). The Service identifies large aegialian scarab as a “species of concern” (FWS 2009c) and previously listed it as a “Category 2” candidate for listing under the Endangered Species Act (59 FR 58982). The BLM lists the beetle as a “sensitive species” in Nevada (BLM 2007). Rich (1999) included the species in a comprehensive review of

sensitive flora and fauna in sagebrush steppe. The Nevada Natural Heritage Program lists the beetle as a rare species dependent on deep sand and/or dune habitats (NNHP 2004).

Management of Big Dune and Lava Dune

The Nevada Natural Heritage Program considers Big/Lava Dune of “highest conservation priority,” ranking the dual sites among the most important in the state for only known or highest quality populations of highly imperiled species (NNHP 2006). The program assigned Big/Lava Dune its highest ranks for “Site Protection Urgency” and “Site Management Urgency” (NNHP 2006). The rankings indicate the sites have a “[g]ood chance of being immediately threatened by severely destructive forces” and that species populations could experience “loss or irretrievable degradation...within 1 year without immediate new, or ongoing annual, management” (NNHP 2006: 14).

The BLM has designated a 11,900-acre Big Dune SMRA, and a smaller ACEC at Big Dune, totaling 1,920 acres (BLM 1998). While the agency describes the ACEC as “ecologically critical” (BLM 2009b), only 200 acres were set aside specifically for protection of the petitioned beetles and other species (BLM 1998). This is deficient compared to the Service’s prior proposal that the entire dune be designated as critical habitat to conserve Giuliani’s dune scarab (43 FR 35636). Heavy ORV use occurs over large areas on the rest of the dune and the immediate surrounding landscape.

Greenwald and Bradley (2008) identified Big Dune as a “hot spot” for imperiled species in Nevada and found that only 11 percent of the area is protected. It is unknown if the area is of sufficient size to conserve the two petitioned beetle species. It is possible to use ecological modelling to identify important habitat for an imperiled species (Barrows 1996), and it is advisable to protect enough habitat, in multiple areas, to sustain species through unforeseeable stochastic events and natural habitat dynamics.

The Nevada Wildlife Action Plan identified Big Dune as a “preliminary focal area” (WAPT 2006), although it is unclear how the plan enhances protection for sand dunes and sand dune beetles. The plan lacks effective, enforceable measures to protect species and their habitat.

The BLM is currently reviewing a proposal to develop solar energy on public land near the Big Dune ACEC (74 FR 66146). If approved, the increased activity from construction and maintenance of the solar array may disturb beetles and their habitat.

Big Dune is habitat for at least two other endemic imperiled beetles: Rulien’s miloderes weevil (*Miloderes rulieni*) and Big Dune aphodius scarab beetle (*Aphodius* sp.) (Brussard et al. 1998). NatureServe reviewed Rulien’s miloderes weevil in 1995 and ranked the species as “critically imperiled” globally, nationally and in Nevada (NatureServe 2009). NatureServe also ranked Big Dune aphodius scarab beetle as “critically imperiled,” while noting that the taxonomy of the species is not yet resolved (NatureServe 2009).

E. ESA Listing Factor Analysis for Petitioned Sand Dune Beetles

The ESA sets forth listing factors under which a species can qualify for protection (16 U.S.C. § 1533(a)(1)). A taxon need only meet one of the listing criteria outlined in the ESA to qualify for federal listing. The petitioned beetles each meet one or more of the ESA listing criteria.

Table 8. ESA Listing Factor Analysis for Petitioned Sand Dune Beetles					
Species	Listing Factor A: Habitat Loss and Degradation	Listing Factor B: Over- utilization	Listing Factor C: Disease, Predation	Listing Factor D: Inadequate Regulatory Mechanisms	Listing Factor E: Other Natural or Man-made Factors
Crescent Dunes aegialian scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/S1; IUCN “vulnerable”; 1-3 isolated populations, limited habitat.
Crescent Dunes serican scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/N1/S1; one population, limited habitat.
Hardy’s aegialian scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/S1; 1-2 isolated populations, limited habitat.
Sand Mountain serican scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/N1/S1; two isolated populations, limited habitat.
Giuliani’s dune scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/S1; IUCN “vulnerable”; two isolated populations, limited habitat.
Large aegialian scarab	Habitat loss, degradation and fragmentation from ORV use.			No federal or state regulatory protection.	NatureServe G1/S1; one population, limited habitat.

X. Request for Listing under the Endangered Species Act

WildEarth Guardians petitions the U.S. Fish and Wildlife Service in the U.S. Department of Interior to list Crescent Dunes aegialian scarab (*Aegialia crescenta*), Crescent Dunes serican scarab (*Serica ammomensico*), Hardy’s aegialian scarab (*Aegialia hardyi*), Giuliani’s dune scarab (*Pseudocotalpa giulianii*), Large aegialian scarab (*Aegialia magnifica*), and Sand Mountain serican scarab (*Serica psammobunus*) as “endangered” or “threatened” under the ESA. Protecting these beetles under the Act is warranted, given their small populations, limited range and the threats they face.

XI. Request for Designation of Critical Habitat

Habitat protection is key to protecting sensitive invertebrate species. WildEarth Guardians requests that the Service designate critical habitat for petitioned sand dune beetles concurrent with final ESA listing. Greenwald and Bradley (2008) noted that protecting important habitat in Nevada can effectively conserve entire assemblages of sensitive species.

XII. References

43 Fed. Reg. 35636 (Aug. 10, 1978) (Endangered and Threatened Wildlife and Plants: Proposed Endangered and Threatened Wildlife and Plants).

45 Fed. Reg. 65137 (Oct. 1, 1980) (Withdrawal [sic] of an Expired Proposal for Listing of Eight North American Beetles; Endangered and Threatened Wildlife and Plants).

49 Fed. Reg. 21664 (May 22, 1984) (Endangered and Threatened Wildlife and Plants; Review of Invertebrate Wildlife for Listing as Endangered or Threatened Species).

59 Fed. Reg. 58982 (Nov. 15, 1994) (Animal Candidate Review of Listing as Endangered or Threatened Species).

72 Fed. Reg. 24253 (May 2, 2007) (Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Sand Mountain Blue Butterfly (*Euphilotes pallescens* ssp. *arenamontana*) as Threatened or Endangered with Critical Habitat).

74 Fed. Reg. 66146 (Dec. 14, 2009) (Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Pacific Solar Investments Inc., Amargosa North Solar Project, Nye County, NV).

74 Fed. Reg. 61364 (Nov. 24, 2009) (Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Tonopah Solar Energy, LLC Crescent Dunes Solar Energy Project, Nye County, NV).

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