BEFORE THE SECRETARY OF INTERIOR

PETITION TO LIST THE SAND MOUNTAIN BLUE BUTTERFLY (*Euphilotes pallescens arenamontana*) AS A THREATENED OR ENDANGERED SPECIES UNDER THE U.S. ENDANGERED SPECIES ACT

Submitted by,
Center for Biological Diversity
Xerces Society
Public Employees for Environmental Responsibility
Nevada Outdoor Recreation Association

April 23, 2004

Ms. Gale Norton
Secretary of the Interior
Office of the Secretary
Department of the Interior
18th and C Street N.W.
Washington D.C., 20240

Dear Ms. Norton:

The Center for Biological Diversity, Xerces Society, Public Employees for Environmental Responsibility and the Nevada Outdoor Recreation Association hereby formally petition to list the Sand Mountain blue butterfly (*Euphilotes pallescens arenamontana*) as a threatened or endangered species pursuant to the Endangered Species Act (hereafter referred to as ESA), 16 U.S.C. 1531 et seq. This petition is filed under 5 U.S.C. 553(e) and 50 CFR 424.14 (1990), which grants interested parties the right to petition for issue of a rule from the Secretary of the Interior.

Petitioners also request that critical habitat be designated for the Sand Mountain blue butterfly concurrent with the listing, pursuant to 50 CFR 424.12, and pursuant to the Administrative Procedures Act (5 U.S.C. 553).

The entire known geographic range of the Sand Mountain blue butterfly is restricted to the Sand Mountain Recreation Area in Nevada. Habitat for this species has suffered destruction and modification by extensive off-road vehicle (hereafter referred to as ORV) use over the past three decades. Current and proposed management of the species' habitat by the Bureau of Land Management (hereafter referred to as BLM) allows ORV use in the overwhelming majority of the areas known to harbor the species. Without the designation of as an Endangered Species, the Sand Mountain Blue butterfly faces an imminent threat to its continued existence in the wild.

The Sand Mountain Blue meets three criteria under the Endangered Species Act for consideration as an endangered species: 16 U.S.C. § 1533 (a)(1)(A,B,E) (Section 4).

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.

(B) The inadequacy of existing regulatory mechanisms.

(E) Other natural or manmade factors affecting its continued existence.

Factors A), B), and E) play a significant role in endangering the continued existence of the Sand Mountain blue butterfly. The most immediate threat to this butterfly is the continued destruction of its hostplant, the Kearney Buckwheat by ORV use. Due to the threat of extinction and because of the Sand Mountain blue has a small population size, limited distribution, isolation, and the numerous factors threatening the species and its

remaining habitat, it is in immediate need of protection under the Endangered Species Act.

Because the Sand Mountain blue butterfly's habitat, and consequently the Sand Mountain blue itself, are confronted with an immediate and significant threat, we request an emergency listing and emergency critical habitat designation pursuant to 16 U.S.C. § 1533(b)(7) and 50 CFR 424.20.
Sincerely,

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The Center for Biological Diversity is a private non-profit public interest organization, whose mission is to protect and restore natural ecosystems and imperiled species in the western United States through science, policy, and law.

Nevada Outdoor Recreation Association (NORA) is dedicated to the preservation and management of our BLM Public Lands and unappropriated government lands worldwide. It is the nation's oldest BLM Public Lands environmental and commons ecology advocacy.

Public Employees for Environmental Responsibility (PEER) is a national non-profit alliance of local, state and federal scientists, law enforcement officers, land managers and other professionals dedicated to upholding environmental laws and values.

The Xerces Society is an international non-profit organization dedicated to protecting biological diversity through invertebrate conservation. The Society works with scientists, land managers, and citizens to protect invertebrates and their habitats by producing information materials, presenting educational activities, implementing conservation projects, and advocacy.

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I. EXECUTIVE SUMMARY

The Sand Mountain Blue butterfly (*Euphilotes pallescens arenamontana*) is a highly geographically restricted subspecies that only lives in Sand Mountain Recreation Area in the Great Basin of Nevada. Habitat for this species has suffered destruction and modification by extensive off-road vehicle (ORV) use over the past three decades. Current and proposed management of the species' habitat by the Bureau of Land Management allows ORV use in the overwhelming majority of the areas known to harbor the species. Off-road vehicles are an immediate threat to these butterflies and there are no regulatory mechanisms to protect them or their habitat. Without the designation as an Endangered Species, the Sand Mountain Blue butterfly faces an imminent threat to its continued existence in the wild.

II. INTRODUCTION

Sand Mountain is located in the 40-mile desert region of the Great Basin near Fallon, Nevada (Figure 1). It is one of approximately 45 isolated sand dune complexes in the Great Basin and Mojave Deserts. In the 1960's this dune was assumed to have only historic importance, being next to the Overland Stage and Pony Express Routes. However because the surrounding terrain prevents genetic interchange the dune actually resembles a habitat island, and harbors a great variety of species including the Sand Mountain blue butterfly (*Euphillotes pallescens arenamontana*) (Giuliani, 1977) According to Charles S. Watson, director of the Nevada Outdoor Recreation Association, the Sand Mountain dunes have generally remained undisturbed (i.e. relatively free from the influences of agriculture, mining, cattle, introduced weeds) by humans throughout our history. Thus, they still carry a diverse biota that has evolved on the mountain.

However, during the past three decades all this has changed. Sand Mountain's size, lack of adequate restrictions, and relative proximity to cities in both Nevada and California now make it a mecca for ORV enthusiasts (Giuliani, 1977). From 1993-2003 the Carson City Field Office has seen a 25% increase in visitor use at the recreation area, and BLM expects use to continue rising (BLM, 2003). This escalation in visitor ORV use has directly contributed to the decline of the Sand Mountain blue.

Figure 1: Sand Mountain, Great Basin Desert, Nevada. The only known habitat for the Sand Mountain Blue. *Photo: Daniel R. Patterson*

III. TAXONOMY

The Sand Mountain blue butterfly (*Euphilotes pallescens arenamontana*) is in the family *Lycaeninae*, the family that includes the blue, copper, gossamer-winged, hairstreak, and harvester butterflies, within the order *Lepidoptera* of the Kingdom *Animalia* and the Class *Insecta* (Austin, 2002). The taxon is named after its type locality and the only known place of its occurrence; *arenamontana* is derived from the Spanish words for Sand Mountain (arena= sand, montaña=mountain).

Order- Lepidoptera
Suborder- Macrolepidoptera
Superfamily- *Papilionoidea*
Family- Lycaenidae
Genus- Euphilotes
Species- pallescens
Subspecies- *arenamontana*

IV. SPECIES DESCRIPTION

A. Adult

The adult Sand Mountain blue butterfly is small, with a wingspan of slightly less than one inch across when fully spread (Figure 2). Males of the species average 11.1 mm (10.0 - 11.8); females are slightly smaller at 10.9 mm (10.0 - 11.9). *E. p. arenamontana* is the palest sub-species of the *Euphilotes* genus. The distally whitish dorsum and pinkish aurora are also distinct traits in the subspecies. *E. p. arenamontana* differs from *E. p. pallescens* by the non-contrasting wing bases at the distal areas. The ventral surfaces of the two subspecies are said to be similar but the black macules on *E. p. arenamontana* are usually smaller (Austin, 1998).

B. Male

The males' have a pale bluish violet dorsum that is nearly whitish towards the distal edges. The outer margin of the wing is narrow (0.5 mm) and black, sometimes no more than a terminal line on the forewing and a series of black dots on the hindwing. The fringes are white with gray checkering behind the vein tips on both wings. The ventral surface is chalky white; the macules are small, and nearly obsolete on the hindwing. The moderately wide aurora on the hindwing is pale orange (Austin, 1998).

C. Female

The females' dorsum is brown to tan and only similar to the males' bluish coloring at the bases on both wings. The forewing possesses a brown cell-end bar, and the apex is typically whitish. The hindwing has black dots along the margin, and the aurora on the hindwing is pale orange to pale pink, usually becoming nearly white distally and not strongly contrasting. The fringes and the ventral surface are the same as found on the males of the subspecies (Austin, 1998).

D. Immature

The larvae of the Sand Mountain blue butterfly are fat and grub-like, with lateral setae. Like other blue butterflies, the Sand Mountain blue larvae are very colorful (Funari, personal communication).

Figure 2: Sand Mountain Blue butterfly on Kearney buckwheat

V. LIFE HISTORY

A. Habitat

Sand Mountain blue butterflies are closely linked to their larval host plant, Kearney buckwheat, also known as Money Buckwheat, (*Eriogonum nummulare* M.E. Jones), throughout their life (Austin, 1998). In this area of Nevada this plant grows primarily near the southern dunes on Sand Mountain. This plant is the sole food source for the larvae and an important nectar source for adults during their flight period (Opler, 1999). The plant also provides cover and a layer of litter on the ground where pupae mature. Emergence generally coincides with the peak flowering of the host plant and occurs between mid-July and mid-September. The Sand Mountain blue butterfly only lives about one week as an adult and the overall population of adults is active for only a few weeks.

The Sand Mountain blue is only known to exist at Sand Mountain. Its absence in other dunes nearby, such as Blow Sand Mountain, suggest that this butterfly requires a large area of the Buckwheat.

B. Life Cycle

The subspecies produces one brood a year and the maturation of larvae is timed in accordance with the peak blooming of its host plant, Kearney buckwheat (Austin, 1998). The female butterfly lays single eggs into buckwheat flower heads within 24 hours of mating. In about a week the egg hatches and becomes a larva. The larvae feed on petals and fruit in the flower head.

The larvae are also known to produce a secretion of sugar from the abdominal glands that provides food for their attendant ant species, the desert carpenter ants. In return, the

larvae are thought to derive some protection from predation or parasitism from the ants, but this remains uncertain (Funari, personal communication). The larvae mature through several larval stages called instars in three to four weeks before becoming a pupa. The pupa eventually falls into leaf litter and topsoil beneath the plant. Pupae diapause for the winter (Austin, 1998).

This species is non-migratory and movement has been observed to be restricted to within 200 feet of the host plant (Opler, 1995).

C. Host plant

Kearney buckwheat is a long-lived perennial shrub with an extensive branching caudex deriving from a woody taproot (Figure 3). The caudex adjusts to the shifting dune sand and the flexible aboveground branches can occasionally be found downslope from the taproot (Reveal, 2002). Kearney buckwheat has deep roots and an ability to survive sand movement. These plants often form hummocks, mounds of sand held in place by roots and stems, which are important stabilizers of blowing sand (Bury and Luckenbach, 1983). Leaves are formed in the spring and early summer and when exposed, the caudex also becomes photosynthetic. Flowering begins in early summer and continues until a killing frost; fruit production is likewise continuous. Kearney buckwheat is widespread in Nevada, occurring along the western third of the Great Basin desert and in a total of eight Nevada counties, from 3700-6100 ft. in elevation (Reveal, 2002). It is not considered threatened, rare, or at risk in Nevada (NNHP, 2003). Kearney buckwheat also occurs in Utah, Arizona, and California (USDA, 2003). Natural causes of mortality include foraging chipmunks and droughts; however the mature Kearney has such an extensive root system that drought will only have a considerable impact on germinating plants. The most destructive unnatural cause of mortality in the San Mountain area comes from ORV impact.

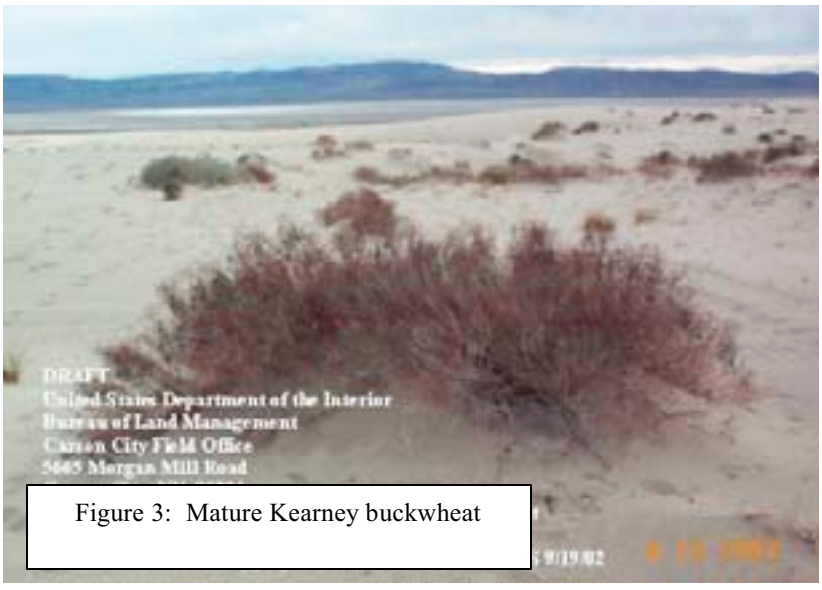


Figure 3: Mature Kearney buckwheat

VI. Sand Mountain Recreation Area

Sand Mountain Recreation Area (SMRA) consists of 4,795 acres. The dunes are about one mile wide and 3.5 miles long. About 10,000 years ago, glaciers filled many of the valleys in the Sierra Nevada Mountains to the west. The cool, wet climate and runoff from these glaciers had created an immense inland lake that covered much of what is now western Nevada. However, as the climate grew warmer the glaciers retreated and the lake slowly started to dry up until eventually the lake level dropped below where Sand Mountain now stands. Meanwhile quartz particles, which the glaciers had ground away from the hard Sierra granite, were washed down the Walker River and deposited in the river's delta. As the wind blew across the delta this sand was picked up and carried high into the air. More than thirty miles to the northeast, a large basin on the southwest flank of the Stillwater Range slowed the wind. With its force broken by the mountain, the wind's burden of sand would fall into this natural trap (BLM, 2004). Over the centuries Sand Mountain grew to its present height; its highest point rises approximately 600 feet above the valley floor, making it the largest single dune in the Great Basin area. The primary reason people go to the SMRA is to ride their ORVs on the dunes; however there is also the historic Sand Springs Pony Express Station and Desert Study Area to visit.

The less active, smaller dunes on the periphery of the main dune system are particularly important habitat for the Kearney Buckwheat and likewise the Sand Mountain Blue butterfly (The Nature Conservancy of Nevada, 2002). This area is typical of the Great Basin cold desert with an average rainfall of 13cm/year. The summers (May-September) are hot and dry with an average temperature of 18.8 C, and the winters (October-April) are cold and dry with an average temperature of 5.3 C.

Sixteen species endemic to Sand Mountain have been identified and others provide important habitat for these species. Important species on Sand Mountain include the mottled milkvetch (*Astragalus lentiginosus var. kennedyi*), Kearney buckwheat (*Eriogonum nummulare*), desert sunflower (*Helianthus deserticola*), sand cholla (*Opuntia pulchella*), Nevada oryctes (*Oryctes nevadensis*), Sand Mountain blue butterfly (*Euphilotes pallescens arenamontana*), Hardy's aegialian beetle (*Aegialia hardyi*), Sand Mountain aphodius scarab beetle (*Aphodius sp.*), click beetle (*Cardiophorus sp.*), Sand Mountain pygmy beetle (*Coenonycha pygmaea*), sand-obligate beetle (*Eusattus muricatus*), Sand Mountain serican scarab beetle (*Serica psammobunus*), dune honey ant (*Myrmecocystus arenarius*). Numerous species of rare and endemic bees are also found at Sand Mountain: *Anthidium rodecki*, *Anthophora affabilis*, *Calliopsis phaceliae*, *Colletes stepheni*, *C. tectiventris*, *Hespereapis sp., Perdita aridella, P. chloris, P. cleomellae, P. eucnides eucnides, P. haigi, P. hirticeps apicata, and P. vesca* (The Nature Conservancy of Nevada, 2003).

VII. POPULATION DISTRIBUTION OF THE SAND MOUNTAIN BLUE

The only known habitat for the Sand Mountain blue butterfly is on the Sand Mountain dunes within the Sand Mountain Recreation Area, Bureau of Land Management,

Churchill County, Nevada. All type specimens were collected from this locality (U.S. highway 50, Sand Mountain, 1310 m, T17N R32E S28 on USGS Fourmile Flat, Nev. 7.5' quadrangle) (Austin, 1998).

VIII. POPULATION STATUS OF THE SAND MOUNTAIN BLUE

The Sand Mountain blue butterfly (*euphilotes pallescens arenamontana*) is a BLM sensitive species that is endemic to Sand Mountain. The Sand Mountain blue was previously listed as G4T1; however it has recently been classified as G3G4T1. The G3G4 rank indicates that the species as a whole is vulnerable. The T1 distinction denotes that it is a critically imperiled subspecies at great risk of extinction (The Nature Conservancy of Nevada, 2003).

Given their restricted geographic ranges, endemic species are generally considered more prone to extinction than widespread species, particularly short-lived species that can decline rapidly if their reproductive cycle is disrupted (Rabinowitz, 1981). According to Dean Tonenna this endemic invertebrate species is dependent on the 1000 acres of Kearney buckwheat habitat. Within the San Mountain Recreation Area this plant was once pervasive in the vicinity of the dunes but in the past five years most plants on the southeast side have been destroyed by ORV activity (personal communication). With its small population and limited range and with habitat destruction from ORVs, the future of this subspecies is precarious.

A. Distribution of the Kearney Buckwheat

The Kearney buckwheat (*eriogonum mummulare*) is the only larval host species for the Sand Mountain blue butterfly. The Kearney Buckwheat occurs at the southeast and northern boundaries of the Sand Mountain dune (University of Nevada Biological Resources Research Center, 2000) (Figure 4).

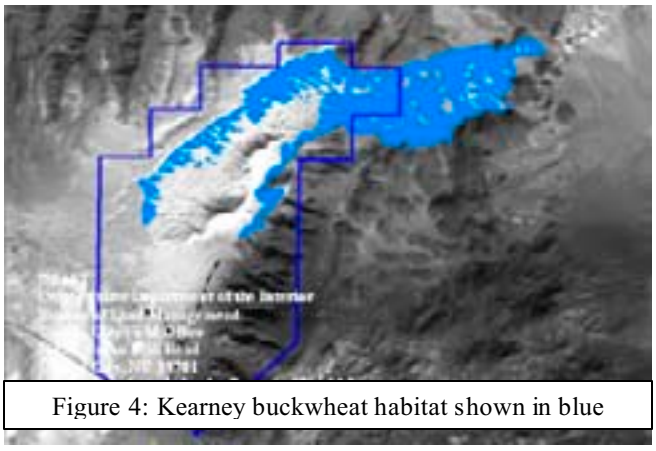


Figure 4: Kearney buckwheat habitat shown in blue

Extensive reconnaissance trips have been conducted by the BLM in order to find if a large enough population of Kearney buckwheat exists outside of Sand Mountain to support a population of the Sand Mountain Blue butterfly (SMBB). On January 27, 2003, Claudia Funari (BLM wildlife biologist), Dean Tonenna (BLM Plant Ecologist),

Jody Fraser (USFWS Botanist), Marcie Hayworth (USFWS Wildlife Biologist), Rochanne Downs (Fallon Paiute-Shoshone Tribe representative), and Tansey Smith (FPST Environmental Specialist) conducted a reconnaissance trip to determine if within a 100-kilometer radius of Sand Mountain, there existed a population of Kearney Buckwheat that would be able to sustain a population of Sand Mountain Blue butterflies. The group surveyed six sites along a long linear stretch of sand dunes found west of the Stillwater Range. Kearney buckwheat was not observed at any of the six sites surveyed and the group concluded that the plant was probably not present within the dune complex. They concluded if it was present the population is so small as to be unsuitable habitat for sustaining the SMBB (Funari, personal communication).

On August 17, 2003, Funari, Tonenna, Fraser, and Hayworth along with Gary Ryan (BLM Navy Liason), Dr. Dennis Murphy (Professor at University of Nevada), Dr. George Austin (Nevada State Museum Zoologist), Sue Wainscott (Nature Conservancy), Jan Nachlinger (Nature Conservancy), two U.S. Navy Biologists, and four U.S. Navy personnel conducted a reconnaissance trip to Blow Sand Mountain. Blow Sand Mountain is a small, dry range south of Carson Lake, with most of the southern portion of the range dominated by large sand dunes. Kearney buckwheat was not observed, and it was concluded by the group that if any Kearney buckwheat was present and missed within the area surveyed, that it would not be a large enough population to sustain the SMBB. These reconnaissance expeditions confirm that there is not a large enough population of Kearney buckwheat close enough to Sand Mountain to support a viable Sand Mountain Blue butterfly population. Based on this survey information it can be safely assumed that there is no other habitat within the flight range of Sand Mountain Blue except what is found at Sand Mountain (Funari, personal communication).

IX. CRITERIA UNDER THE ESA FOR CONSIDERATION AS AN ENDANGERED SPECIES

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Sand Mountain is sacred to the Fallon Paiute-Shonshone Tribe and has been used for centuries by the spiritual people of Great Basin Tribes. However since the invention of off-road vehicles, Sand Mountain has seen a drastic change in the number of visitors and their recreational use of the land (BLM, 1985). Motorized recreation today accounts for over 90% of the total visits to the area. From 1993-2003 the Carson City Field Office has seen a 25% increase in visitor use at the recreation area, and BLM expects use to continue rising (BLM, 2003). Visitor use at SMRA has increased dramatically over the past five years with approximately 5,000 people present during the Memorial Day holiday in 2003 (BLM, 2003). The increase in yearly visitors to the area has contributed to an increase in the number of ORV trails through the Sand Mountain Blue habitat (Figures 5, 6, 7, 8 and 9). ORVs at the Sand Mountain Dunes include dune buggies, sand rails, and off-road motorcycles, whose tires can cut deeply into the sand even when accelerating on level ground (Stebbins, 1995).

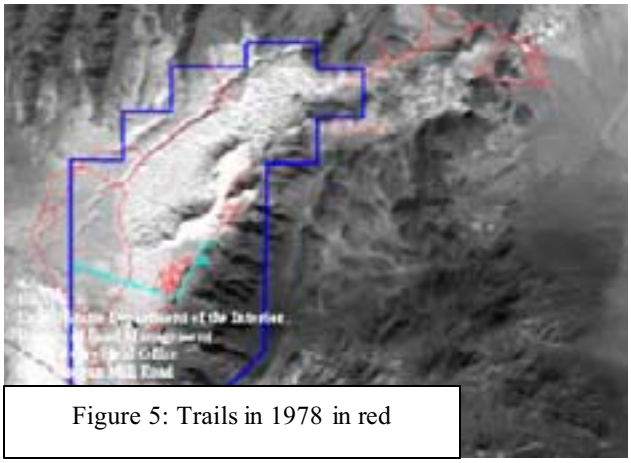


Figure 5: Trails in 1978 in red

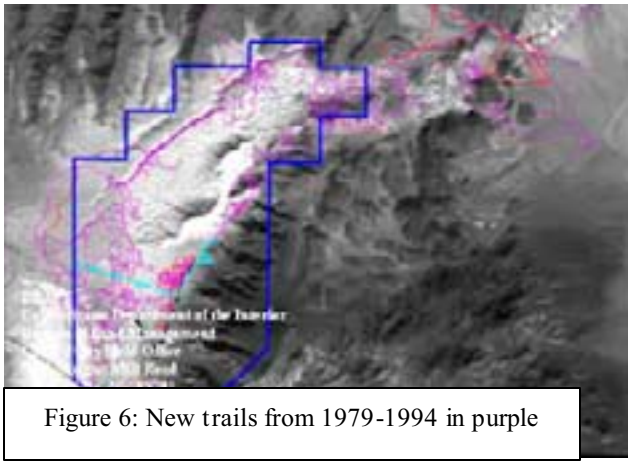


Figure 6: New trails from 1979-1994 in purple

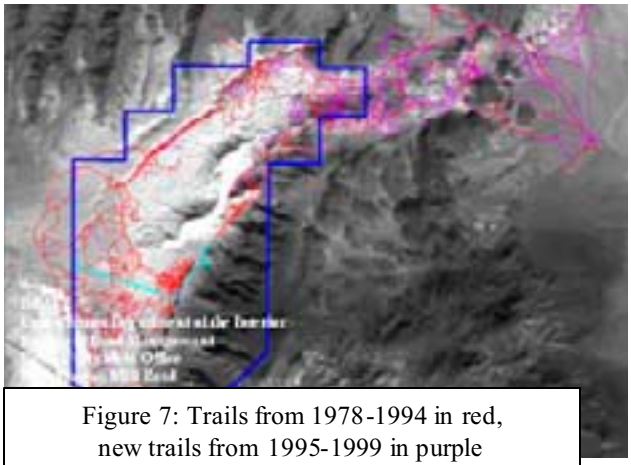


Figure 7: Trails from 1978-1994 in red, new trails from 1995-1999 in purple

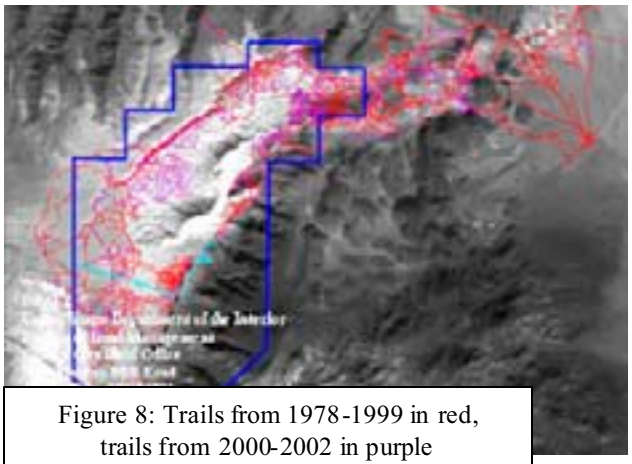


Figure 8: Trails from 1978-1999 in red, trails from 2000-2002 in purple

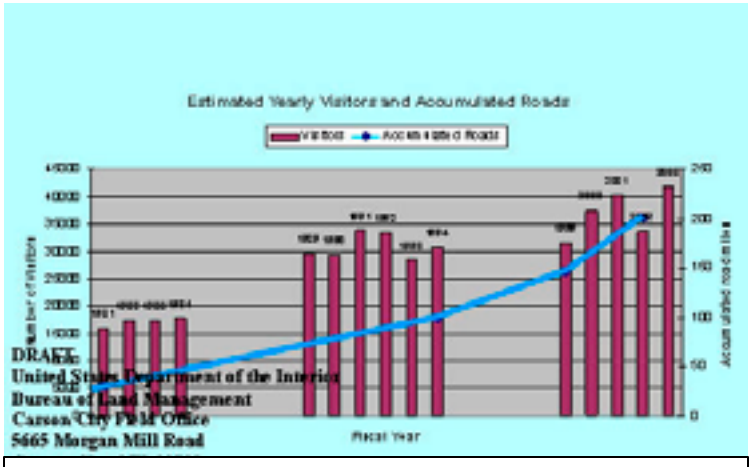


Figure 9: Estimated yearly visitors & accumulated roads.

During a visit to Sand Mountain in 1977, Derham Giuliani, an expert in the field of invertebrates of the Great Basin, discovered that along the edge of the main rise of the dune for a distance of 1000 ft. the plant life had been wiped out to at least 150 ft. from the dune, and only low humps of dead roots and stems remain. Not a single insect track was

present for at least 100 ft. David L. Harlow, former USFWS State Supervisor of Ecological Services in Reno, found that of the 58 individual Kearney buckwheat plants he inspected on the south side of the mountain up to one-half had been disturbed (crushed and broken off at the ground surface) and were either dead or in the process of resprouting from the root stocks. He also noted that this was a fifty to seventy-five percent increase from five years ago (1994). In 1996 Dr. Peter Brussard, Head of UNR Dept. of Biology and co-chair of NV Biodiversity Initiative, emphasized that if the food plant for the Sand Mountain blue, the Kearney Buckwheat, continues to decline in the overall dune area, the butterfly's continued existence will fall into question. As of 2000, the Kearney Buckwheat had been nearly eliminated on the lower, southeast footing of the dune near the vehicle staging area (University of Nevada Biological Resources Research Center, 2000) (Figure 10).

Figure 10: Intensive ORV use in the SMRA causes complete vegetation loss and habitat destruction. *DRP photo.*

The Nature Conservancy of Nevada conducted a conservation assessment of Sand Mountain in 2002 with input from published literature, interviews with experts in sand dune ecology and management, local public land managers, and scientists. The assessment gave Sand Mountain a fair condition rank because they determined that the condition of the dunes was heavily impaired due to loss of vegetative cover from recreational use and abuse. They found that in particular, the practice of running vehicles over large perennial plants at high speeds is a significant source of stress to the Sand Mountain dune system (The Nature Conservancy of Nevada, 2002). Abuses by ORVs include off-trail incursions into previously undisturbed vegetated areas and destruction of vegetation. ORV abuse also artificially increases dune activity and soil erosion by destroying the natural vegetation cover and biological soil crusts. Photo documentation captures the extent of the habitat destruction (Figures 11-14). The conservation assessment concluded that the critical threat to viability of Sand Mountain and its unique suite of plants and invertebrates is degradation of the vegetated dunes from ORVs (The Nature Conservancy of Nevada, 2003).

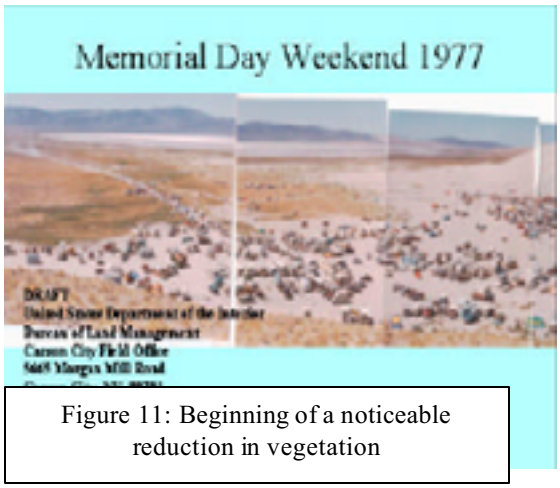


Figure 11: Beginning of a noticeable reduction in vegetation

Figure 12: Left side of the road closed to vehicles, loss of vegetation evident on right side

Figure 13: Continued damage to vegetation

Figure 14: Vegetation has been entirely destroyed over a period of only 26 years

The Kearney buckwheat shrubs collect sand and in time form small mounds. ORV enthusiasts use the shrub mounds as "jumps". With repeated use as a "jump" the shrub dies and the sand-stabilizing properties of the plant are lost. (Figures 15, 16)

Figure 15: Example of ORV using a shrub mound as a "jump"

Figure 16: Example of a dead shrub from repeated use as a "jump"

ORVs also alter ecosystem function by changing the hydrology of the dunes. Plants are dependent on the thin layer of topsoil; when the surface is disturbed, the underlying soil

can blow or wash away. The result is a barren area that is unable to support plants until new soil develops, which can take thousands of years (Kockelman, 1983). In addition, clay layers found below the sand act as impermeable barriers to downward percolation of precipitation. This likely has the effect of keeping soil moisture closer to the roots of the plants. Without the soil stabilizing properties of the vegetation, the wind transports the sand, revealing the clay layer. With further vehicle impacts the clay layer is broken and punctured, resulting in precipitation percolating down to deeper depths. This may create a difficult situation for plants trying to reestablish these sites when the soil moisture is now deeper in the sand (Tonenna, personal communication). Not only are plants damaged, but also the interspaces between the shrubs are constantly disrupted making it exceedingly difficult, if not impossible, for seedlings to germinate in unoccupied open spaces between the shrubs. This could be the primary reason that Kearney buckwheat populations are skewed toward older-aged classes (Figure 17). Tonenna emphasizes that without adequate younger shrubs, there is the real threat of invertebrate population crashes/extinctions when the majority of the older plants die naturally or die from vehicle impacts (personal communication).

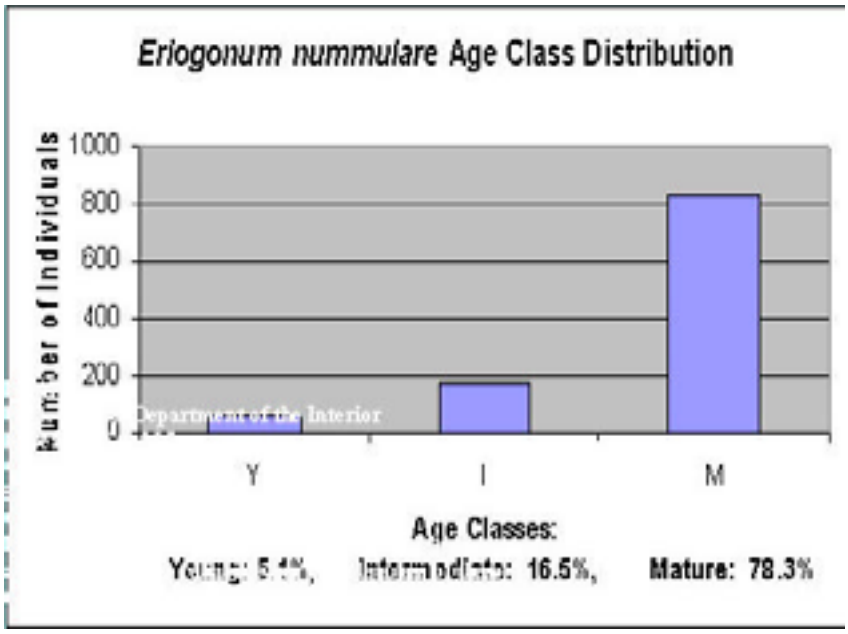


Figure 17: The host plant population is skewed towards older-aged classes, illustrating low survival of young plants essential for future habitat.

Several published studies have documented the deleterious effects of ORVs on insects and vegetation. For example, vehicles have crushed the larval burrows of the tiger beetle, *Cicindela dorsalis,* along beaches to such an extent that this once widespread, abundant species has been eliminated throughout most of its range (Black and Vaughan 2003). Bury and Luckenbach studied the affects of ORV use in the Algodones Dunes in California. They compared areas that were not impacted by ORVs to those that had been affected by ORV activity, and found that ORVs significantly reduced the biota. The areas not impacted by ORVs had 2.5 times the number of plant species, 10 times the

density, 10 times the cover, and 4 times the number of shrubby perennials, as did the ORV affected plots. It was found that in those areas where ORV users congregate, shrub biomass was reduced by about 95% as compared to undisturbed areas. They conclude that ORVs have had an obvious, harmful affect on dune plant communities (1983).

Vegetation recovery has also been quantitatively measured in sevral land sites. Lathrop found that only 35% of the vegetative cover returned on vehicle trails after 38 years and only 18% of the vegetation recovered on heavily used roads (1983). Rowlands studied the effects of controlled ORV use in three areas in the Mojave Desert and concluded that "recovery from compaction is long term" and "several centuries may be too conservative for recovery time" (Webb and Wilshire, 1983).

Due to mild weather conditions year-round at Sand Mountain, the dunes receive significant ORV throughout the year. Therefore there is not a considerable 'rest' period from ORV use in the SMRA, even during the summer when the butterfly is active. In addition to the crushing of foliage, root systems and germinating seeds are damaged during compaction of the soil; the superstructure of the vehicles also damages the plants, over the entire area of the vehicle and not just the track width (Lathrop and Rowlands, 1983). The data indicate that perennial vegetation and ORV use are incompatible, and so we must choose to have either one or the other (Lathrop, 1983). As you can see in the photos below, large rocks are often the only reason that some habitat is not degraded (Figures 18, 19 and 20).

Figure 18: Large rocks are avoided by ORVs and therefore protect the Kearney from being trampled; note loss of habitat outside of the rocks. *DRP photo.*

Figure 19: Rocks keep ORVs off left.

Figure 20: Same site showing the extent of the trails on the right slope

B. The Inadequacy Of Existing Regulatory Mechanisms

e e e c e tl o fe e l st te o loc l e l t o s t t p otect t e o t l e tte fl o ts t t.

O e t e p st e s t e s f le to p otect t s e f o e cess e ORV se. t e s e o e t l ssess e t eco st te t t co t e ORV ct t o l co t te to t e l e ete o te e et t o . st t e e pl s t t t e se of t e e off o e cles s c se e et t o to e e o e o c se s ft f o pe e l ss s spec es to l pl ts spec es. et esp te t ese f s t e o t Rec e t o e e t l oes ot e tel t ke to cco t olo c l co s e t o s .

eo e st oolo st t t e e t te se fo e t o t es t t t e o t l e tte fl s t e te e st ce of ts ost pl t f o t pl e cles e e l Re ste . O e es of t e e t te Off ce t e t e e t l e t e o t e e t te se p t c p te o s te s t t o t e e . t t t t e s f s of t e p t c p ts k e t e tte fl o l ee fo o e e t c e p tc of e e ck e t e t e p k e . e o p c e to co se s s t t t e o t l e s t t s ll co t e to e se o sl e e less e s es e t ke to p otect t e o t l e co cl e t t t e e e e see ette c se fo e e e e c l st . O st of t t e to l e e ck e t t t t t e o t l e tte fl s loc te t e R . e ec e t t t e e e o lo e e l t e e e c st to ec e to p t pl ce o to pl o e to o s l st to t e f t e . s R kk s et te e p to p t e e e s st to s ot p oto po ts . o e e R kk left t e pos t o s ot e c es o e t e o to p o ect t l s o se took t p fo t tel t ese t ee e s t e e e ck e t t t s ffe e se e e e oc le e f o ORVs. s s st ot e e ple of f l to follo t o o co se t o e s es o e pe so l co c t o .

esp te e st o s e cles le e t e o s t t o t e se s t e spec es t t e . lt o t e ese t t e s s te fo p ss e ec e t o ORVs lle ll e te t e l te close e o co t e s s .

e oo off o e s o e s s e close e s e t . o e of t e l e s t t s o close to ORVs.

t e sp of st ff eco e e clos off so e e s t o t to off o e s to p otect t e o t l e tte fl t e e ck e t se e l ot e e e e c spec es. co e e s o p of st ff . . s l l fe e ce e e fte st ff co se t o sts off o e s ep ese t t e of t e llo te os o e e to sc ss t e eco e t o . p opose co p o se t t foc se o p otect o of t e c e t t e lo t e o t s e e le keep t e o e pop l off o e s o t e es ope esp te se e e e o e t l e t e e. o e e off o st o ps e e ll to co s e clos e e t e e t e R e ope to te s e off o . o lt o e e s of s ppo te t e clos e t e s cc e to p ess e f o t e ORV st ee ot to close t t t t e e pe se of se e l spec es. les . tso ecto of t e so t se e O t oo Rec e t o ssoc t o sse ts t t s s ef ll llo e o t to e t ke o e est ct e off o o t e ke pol t c l ec s o to o psett t e st t t ll llo co t e to e e c spec es c lt l s tes pe so l co c t o .

l t e cl e t t t e e e t k e e e c ct o to p otect esto e t e s e ecos ste t R le llo ORV ct t to co t e ll t t e s . e pl l te s ct o s el te to ORV se se et o e of t ese st te es e e te to p otect t e o t l e ts t t.

o t e to e t e R e t e e st off o e cle es t o s. e co t es to llo est cte te s e ORV se c oss t e e t e R c s c s f t e t t est ct o .

e elop p o s p ct ces t t e co e ORV se s to p e e t st ce of e e ck e t t t t o ts e t e R .

s s p el ol t pp o c c s ot o ke t e p st s ot o k o . t cl es post s s s c s st o t e s f o e et t o . o e e s s ote e l e ORV e s se t e e e o s s ps so o l p efe to st o t e e et t o . Ot e s s e e sk t e ORV e to t e l tl e ff c lt t to o o l . oto e cle. e efo e ste of p tt pl ce e fo ce le e s es to p ese e t e e e e t t t e t o ce ol t e s est t e e fo ce le *do not protect the Sand Mountain Blue butterfly from ORVs.* e l ec t e O e s R s sect o s . pol c el e es l e s to close e s to off o e cles e e cle e to t l eso ces s occ s t s t o t . t oes ot llo e s to o ee e clos es t ol t pp o c es s e c c of l c plo ees fo o e t l Respo s l t . e ske co l ot e t f e e e e ol t off o e cle est ct o s e o ke to co se e o esto e t t pe so l co c t o .

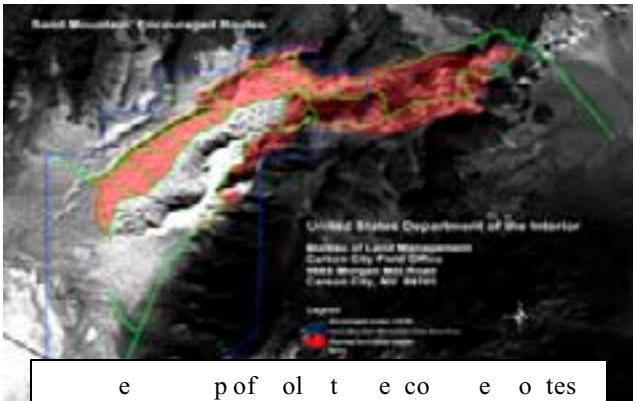
t s po t t to ote t t e co s e et e o ot to l st spec es t e s l l fe e ce s ot to co s e p o se o f t e e e t ct o s t ste o l t e c e t e e t st t s of t e spec es. e o s c ses t e s l l fe e ce s ee fo ce c l ct o to e e se ec s o s ot to l st spec es ec se t e ele o p o se e e t ct o s cl ec s o s o e t e to p s s l e Q ee lotte os k le e c pel o olf co o s l o . s s ot e el le l st c tec c l t . e e s oo e so fo co s e o l c e t e e t st t s. t tes e e l e c es p te te ests c e s l p o se to p otect eco e spec es o e to o o el l st t t t e co s e pote t ll co t o e s l t t e e s o of k o et e t e ll follo t o o t e p o ses o et e t e ct o s ll es lt eco e . o p otect spec es f o o o est ct o o f c to o c t l e t of t t o e l st e t e s e e le e e t ct o s e e teste . f t t s o t p o se e e t ct o s es lt s st t l eco e t e t t t po t t e c e co po te to eco e pl fo t e spec es. le l t e o t l e tte fl s e pe e c o o t t est ct o t o o t t e R t t s plc t e of e t ct o t s e es p otect o e less of teste p o se e e t ct o s.

e effo ts to esto e e l t te st e e e ck e t t t t o ts e t e R .

Resto e l t t t e e e ck e t s l le o l ll e po t t t e lo te s l of t s tte fl . t s oo step t t oes ot p o e e l to p otect o fo t e tte fl . s e fo ce le pl s e l cks et l o e e e o t t esto t o o l e tte pte . t e o e f co t es to llo ORV se t t e s esto t o tte pts e l kel to e s ccessf l.

e t f e st st e t el o tes t o t e e e ck e t t t to co ect ORV se e s t o ts e t e R . sco e ORV se t e t t o ts e t ese t el o tes.

e o l of t s s to s c f ce e s to se ORV t ff c t t e o l of p otect ot e e s e . e f t e e s e o t t e fo t s to o k t e s ot p tt pl ce e fo ce le e s es t t c p otect t e e lt e e f o e. s ll p o e o e l to p otect o fo t e tte fl .



e p of ol t e co e o tes pl e e t t s o e e co e o tess o ee . s ol t pl s ot o k .

o t e sc e t f c est t o s to t e o t ecos ste cl st es of t e t l sto of t e pl ts ls esto t o tec es o to tec olo .

s s e po t t ecess step t e lo te s l of t e o t l e tte fl . o e e t o e l t o s p otect t t fo t e tte fl es sc e t f c st es ll o l ttle oo .

t te e se e e t pl fo t e o t l sc pe to p te t e c e t Rec e t o e e e t l eflect t e c e s o t et of ses e s of t e e .

e e t pl t t solel el es o ol t e fo ce le e s es ll ot e le to p o e s st t l p otect o to t e o t l e tte fl .

e s ee co ct eekl o to of t e o tes to ete e o ell ol t co pl ce s o k e co e to co se s s t t t s ot p otect t e e e ck e t. s e of t c l o e t l o ce p opos l s e o e sse ts

ese tl eeks of t e ee co p le . e es lts s o t t o co pl ce s occ t o o t t e e . ll o tes t o t e t t co t e to e se t t e e test co ce t t o of se t e s st est of t e e. p cts to t e s e et t o co t e t lt ple e cles t o t e e et t o esp te e e st o tes. c t o l effo ts c e se s e e o t el o e s e cles le e t e o tes ofte o e t e poste s s. le t e e oes see to e so e le el of co pl ce s es lt of t e e e t c es t e e s st ll s f c t o co pl ce t t ll l kel co t e t e t e of e et t o loss p e e t t e e l t t o of t e e pe so l co c t o .

e efo e t e ple e t t o of p o s s ol t e s es s ee fo t e ost p t f t le. s s o s t t t e ORV e s t o t e e t e st ll e t t t e est cte e s t e e tte fl close to e t ct o o else t e st o t c e. et e t e t e e st e s es e ot e l to o te l effect e less o e s ccessf l e l to p oce es e p t pl ce s c s l st s t e te e o e e e t e o t l e tte fl s t t ll e co pletel est o e .

O p l s ost p l c eet llo V to sc ss ss es t t ll e co s e e t e c ll o t pl . O e te o t e e s co s e t o of o e s p opos l to c e te t o t . et e e f s es te e t e c ll o t pl t t t t e *any prescriptive measures can not be implemented until the SMRA plan goes into effect next October at the earliest*. s pe so l co c t o . o e e f co t es to o e p ess e f o t e ORV st t e ll ot e plo ct o s t t o l est ct ORV se t e R .

s s o o e t e e e o e st e l t o s p otect t s e t e t t fo t e s o t l e tte fl .

C. Over-utilization for commercial, recreational, scientific, or educational purposes

e e l ec se of t e fec t of l sects t e collect o of sects poses l ttle t e ts to t e pop l t o s collect o oes ot c e tl ppe to e ss e fo t e o t l e tte fl . o e e t e c se of so e e e e spec es t t e s ll pop l t o s l te eo p c e s collect o co l s f c tl e ce p o ct o of offsp . ec se t s tte fl s so e collect o o e e lo s lep opte sts s pote t l t e t. l st s t e te e o e e e ll e s e t t t s oes ot eco e ss e t e f t e.

D. Disease and predation

e e e e of pote t l t e ts to t e o t l e fo c l ttle fo t o s l le. se ses ffect l l ost pl ts tte fl es p e t o t e t o ce l l fe e e sel ffecte ot e tte fl spec es t s ll pop l t o s es t o fo t o o t e pote t l p cts to t e o t l e s l le.

E. Other natural or manmade factors affecting its continued existence

op l t o cs t ct e

f ot ost sect pop l t o s o ll e pe e ce l e fl ct t o s s e l c c lt . e t e p e t o se se c se l c es tte fl e s of o e of t e o o e. o l pop l t o fl ct t o s co ple t t t lte t o o loss so et es see l o t t lte t o s c es lt pop l t o e t p t o s sk *et al.,* . ec se of ts e t e el l te eo p c e t s tte fl s e t e el l e le to e t ct o .

s e spec es

s e pl ts e co o ss e t t p cts pe le tte fl es. cco to o e s pe so l o se t o t e R ss t stle pop l t o t e R s c e s . s e spec es s c s t e R ss t stle e p o e to f e o e e t e e e ck e t pop l t o s ot pte to es st f e f f e e e to e k o t t co l k ll o se o sl e pl ts . lt o f es e e e e t e o t l e tte fl s t t c e se R ss t stle s ectl el te to c e se sk t t f e e k o t o e pe so l co c t o .

X. CONCLUSION

e o t l e ee s to e e e e e c p otect o e t e fe e l e e pec es ct. Off o e cles e e te t e t to t ese tte fl es t e e e o e l to ec s s to p otect t e o t e t t e .

e to t e t e t of e t ct o ec se of t e o t l e s s ll pop l t o s e l te st t o sol t o t e e o s f cto s t e te t e spec es ts e t t t e e te fo olo c l e s t e e ces oc et l c plo ees fo o e t l Respo s l t t e e O t oo Rec e t o ssoc t o fo ll pet t o fo e e e c l st s e e e spec es. t e o e pet t o e s st o l e est t e e ce to se t e t o t t o est l s t c l t t se o t e f cts p ese te to p e e t f t e ecl e of t s l e le tte fl spec es.

s o e el e es t t st ces c e te oto e ec e t o l e cles c e tes co st t s f c t p ct c e co e t t e t l cs of t e e e o e t o e el t e flo f to t e po t e e e e f ce t se o s c lle es p e e t e t ct o s of t ese e e e c spec es pe so l co c t o . p e o ect e of t e s to p otect p ese e t l pl t l co tes t e e s s o t e o t . e o ps l ke e Re o eele s e e o ce f o of e s fe c of e s c co t e e e e o t e te e spec es e . cco to eo e st t e oolo st o fo ll esc e t e o t l e t e ke to p ese t s tte fl s to e s e t e co t e e ste ce of ts ost pl t l e e o e s to t le pop l t o of t e sect st . f t e e et t o of t e es s lost t e t opo s ssoc te t t ll lso e lost R st . s t e c t c l t e t to t e l t of o t ts e s te of pl ts e te tes espec ll t e o t l e s t e e t o of t e e et te es f o ec e t o l e cle se se o l l st c p otect eco e t e spec es. e o t l e tte fl cle l ts l st o e e e c s s e t e o se c of e .

e ecos ste s fo t o o t t e o l e t e s es of olo c l e s t . e c s co t o s fo t t e e ecos ste p o ce e es l e t flo f le to t st t e s c e o e t. e o t es e t l t e s e fo c t e e lect se of t e p st s o lo e ccept le.

e ple of lost t t t o t e to e o
te s e ORV se. *DRP photo.*

XI. References

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t op . . . e ffect of Ve cle se o ese t Ve et t o . es
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p e Ve l e o k .

t op . . Ro l s . . . l t colo ese ts O e e . es
R. . e . . ls e e to s. o e t l ffects of Off
Ro Ve cles. p e Ve l e o k .

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o k.

Re e l es . e s t of l . e so l o c t o l
t e o e ep. .

R st R. . . o t lo o t t opo e l
Repo t. tte to . so t st ct.

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e s t of s to e ttle. p es.

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e R. . ls e . . e to s. . o e t l ffects of Off Ro
Ve cles. p e Ve l e o k .