

Wildlife Assessment of San Luis Valley Proposed Solar Energy Zones:

Gunnison's Prairie Dogs
Raptors

Burrowing Owls
Herpetofauna

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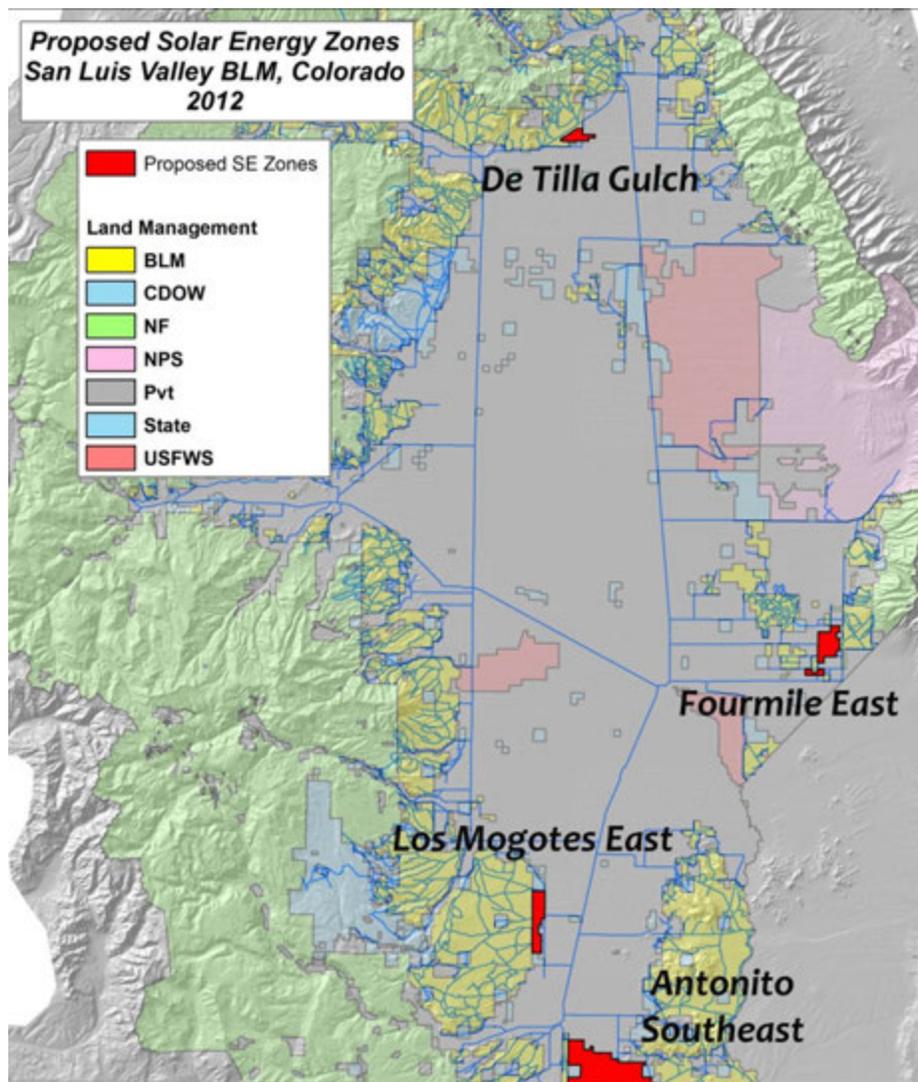


Introduction

This report represents the second year of wildlife assessment on four designated Solar Energy Zones (SEZ) on San Luis Valley BLM lands (Figure 1). These sites are located in Saguache, Alamosa, and Conejos counties in arid, scrub/shortgrass habitat dominated by plants such as blue gramma, prickly gilia, winterfat, and various rabbitbrush species. These areas serve as habitat for a suite of fauna that are adapted to arid, open terrain and are often linked with Gunnison's prairie dog (GuPD) colony activity. This includes several Species of Concern in Colorado such as the Ferruginous Hawk, Mountain Plover, Swift fox, and the Burrowing Owl (a Colorado threatened species).

The wildlife assessment of these four proposed solar energy sites occurred during the summer of 2012, and focused documenting GuPD activity as well as the distribution of amphibians and reptiles (herpetofauna), and noting the presence of other species of concern that may utilize the area. These surveys were conducted by Loree' A. Harvey, Casey Day, and Tayler Rocha.

Figure 1. Locations of Proposed Solar Energy Zones within the San Luis Valley.



Survey Protocols

Gunnison's Prairie Dog Colony Perimeters and Transects

Each SEZ site was ground-truthed for GuPD activity using a combination of road observations and foot travel along established transects, glassing all areas with binoculars and visually inspecting burrows. An area was considered to have GuPD activity if prairie dogs were observed; scat, tracks, or recent signs of digging were observed; or burrow mounds with functional holes were present, with or without recent signs of use. Burrows with cobwebs or minor residual vegetation blown in from winds were included in colony maps as long as they were structurally functional. If burrows were partially or completely collapsed with no signs of GuPD use (footprints, scat, or signs of digging), they were not considered to represent recent GuPD activity, and were not included in the colony perimeter. In addition to quantifying the use of each area by GuPD, the areas were monitored for use by other species of concern, including ferruginous hawks, mountain plovers, and burrowing owls, as well as other non-threatened vertebrate species.

Areas that were identified as having GuPD activity were monitored using established transects which were generally oriented in a north/south direction and spaced at 200 m intervals within the mapped polygon. The purpose of transects was to create a systematic and reproducible method of gauging the current level of GuPD activity within the polygon, with the intent of monitoring them annually in the summer. The focus of the information collected during a transect walk was the number of burrows that show signs of current activity (fresh scat, prints, digging, or a visual of a prairie dog) versus the number of burrows that are inactive (lacking the above signs, or having cobwebs or residual vegetation blocking the burrow). Technicians conducting the transect walk counted burrows of either type that were within 2 meters of either side of the transect line.

Since GuPD are frequently targeted by sport hunters, animals will often seek cover in their burrows when approached by humans. This can make accurate counts of individuals difficult. To negate this affect, the number of GuPDs was noted with binoculars at a safe distance from the transect, as well as upon approach in a vehicle or on foot during the transect walk. Other details of the colony were also noted, such as the presence of ground squirrel activity, and whether GuPD alarm calls were heard while walking the transects.

Herpetofauna Transects

Within each SEZ, several transects were established and monitored for the presence of amphibian or reptile species inhabiting the area (List 1). The entire acreage of each SEZ was potential reptile habitat, therefore transects were set every 800 meters in order to efficiently cover the large amount of area and habitat variation within each SEZ. Transects were oriented in either an east-west or north-south direction to aid technicians in staying on course, as most of the SEZ's are relatively flat and lack obvious visual landmarks. Technicians generally walked transects between 7am and 12:30pm before the

daytime heat forced the resident herpetofauna into cover and rendering counts inaccurate. Technicians followed specific easting or northing coordinate lines aligned with their particular transect and adjusted their course as needed, based on real-time readings of handheld GPS units as they walked. Any amphibian or reptile species found within a meter-wide swath along the center of the transect line were identified, measured by snout-vent length (PHHE only), sexed, photographed in most cases, and released. General habitat observations and animal behavior were also noted. Waypoints for all herpetofauna found were collected regardless if they were located on or off transect (i.e., animals encountered when traveling between transects). Estimates of population densities were calculated by adding the number of each species found on transect within the total area covered by the transect swath and extrapolating that to the entire acreage of the SEZ. Population density estimates represent conservative values since many species of reptile are cryptic and visual detection along the transect is rarely 100% even with trained personnel.

List 1. Species Codes for common SLV floor herpetofauna species as follows:

PHHE = Short Horned Lizards (<i>Phrynosoma hernandesii</i>)	SCUN = Plateau Lizards (<i>Sceloporus undulatus</i>)
EUGA = Variable Skink (<i>Eumeces gaigeae</i>)	PICA = Bullsnake (<i>Pituophis catenifer</i>)
THEL = W. Terrestrial Garter Snake (<i>Thamnophis elegans</i>)	CRVI = Western Rattlesnake (<i>Crotalus viridis</i>)
BUCO = Great Plains Toad (<i>Bufo cognatus</i>)	BUWO = Woodhouse's Toad (<i>Bufo woodhousii</i>)
SPBO = Plains Spadefoot (<i>Spea bombifrons</i>)	RACA = Bullfrog (<i>Rana catesbeiana</i>)
PSTR = W. Chorus Frog (<i>Pseudacris triseriata</i>)	RAPI = N. Leopard Frog (<i>Rana pipiens</i>)
AMTI = Tiger Salamander (<i>Ambystoma tigrinum</i>)	

Raptors

There are several species of raptor that are common in the San Luis Valley and would utilize habitat within the SEZ areas at various times of the year. Rough-legged Hawks (*Buteo lagopus*) and Bald Eagles (*Haliaeetus leucocephalus*) are winter migrants to the SLV and may be seen on or near SEZ habitat typically from October to March, either loafing or hunting. In the summer, species such as Turkey Vultures (*Cathartes aura*), Swainson's Hawks (*Buteo swainsoni*), Prairie Falcons (*Falco mexicanus*), Red-tailed Hawks (*Buteo jamaicensis*), and American Kestrels (*Falco sparverius*) are common visitors to SEZ habitat. More rarely seen are Golden Eagles (*Aquila chrysaetos*), Peregrine Falcons (*Falco peregrinus*), and Ferruginous Hawks (*Buteo regalis*), which are known to hunt, perch, or nest near SEZ habitat. Maps of raptor distribution within this report represent documented sightings by the author from 2004 to 2012, on visits to the area during the summer field season. Species of concern such as Ferruginous Hawks, Prairie and Peregrine Falcon, and Golden Eagles are usually tracked and plotted more intensely than very common species such as Turkey Vultures, American Kestrels, Swainson's Hawks, and Red-tailed Hawks, therefore common raptor species are under-represented compared to species of concern on the distribution maps of this report.

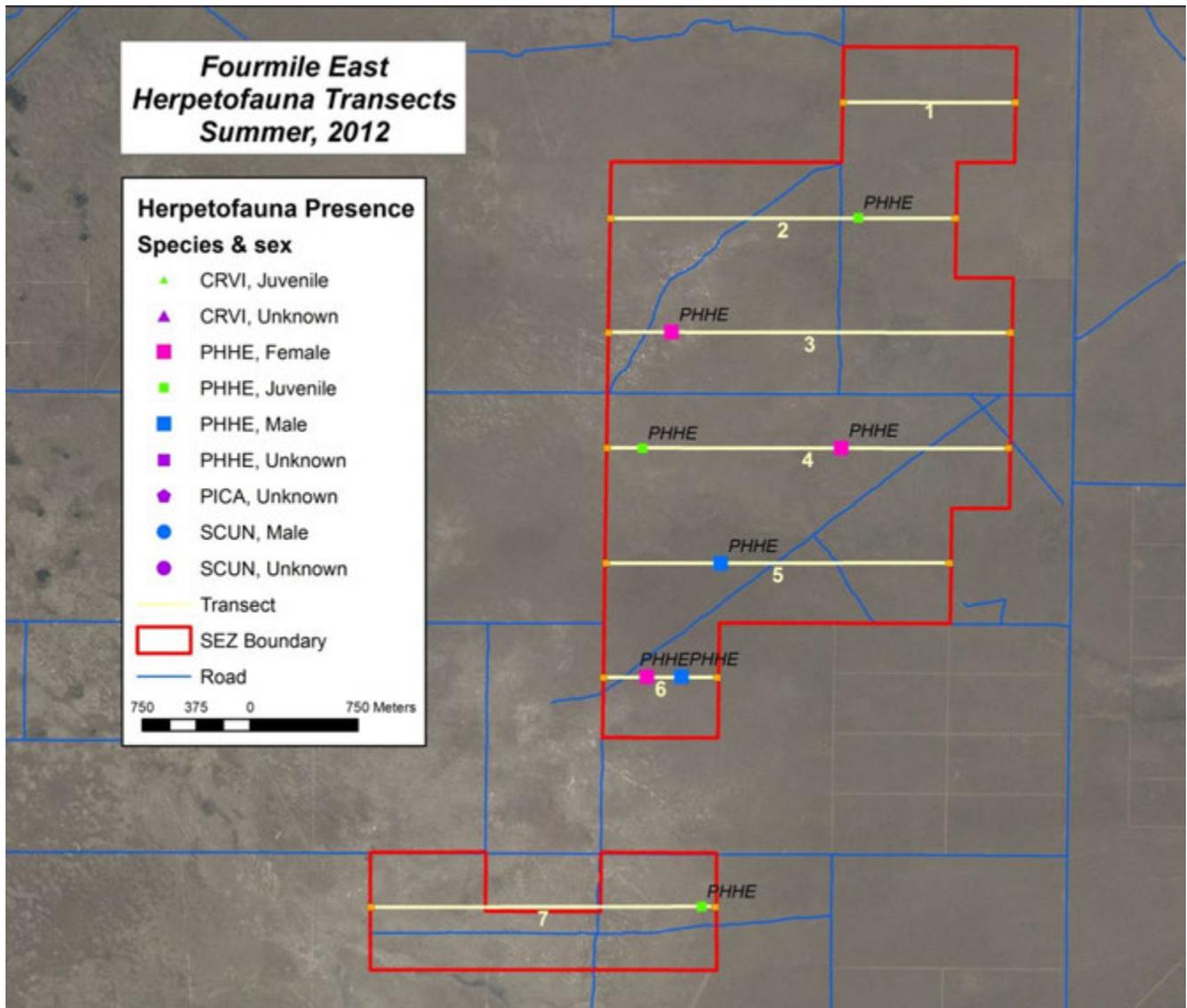
Burrowing Owls and other Species of Note

The presence, location, and number of burrowing owls and additional significant species were documented in and/or near each SEZ, and are discussed in each specific SEZ section.

Fourmile East

The Fourmile East solar field site (Figure 2) was assessed on 6/19, 6/20, and 6/27 for a combined time of approximately 10 hours. The primary focus was locating herpetofauna, but technicians were alert for significant raptors, burrowing owls, Gunnison prairie dogs, and any other species of note while walking transects.

Figure 2. Presence of herpetofauna within the Fourmile East Solar Energy Zone, summer of 2012.



Fourmile East, cont.

Gunnison's Prairie Dog Use:

No Gunnison's prairie dog activity was noted in any portion of the Fourmile East SEZ.

Herpetofauna Transects:

Seven transects were established that run from east to west, having a total length of 14,866 meters (9.25 mi, Figure 2). A one meter-wide transect of this length represents a sampled area of 3.68 acres for this SEZ. Fourmile East has a total acreage of 2883.2 Ac, therefore the sampled area represents 0.128% of available habitat. A summary of Fourmile East herpetofauna can be found in Table 1. A total of eight Short-horned lizards (*Phrynosoma hernandesii*) were found on transect, giving a total population estimate of ~2 per acre, or ~6268 individuals for the entire acreage. No Short-horned lizards were found off transect, and no other reptile species or amphibians were found in the Fourmile East SEZ.

Table 1. Summary of herpetofauna observed on Fourmile East transects, 6/19, 6/20, and 6/27/12. Population estimates rounded to the nearest whole number.

<i>Species</i>	<i>Total # Adults</i>	<i>Total # Juveniles</i>	<i>Grand Total on Transect</i>	<i>Estimated Population for Total SEZ Acreage</i>	<i>Estimated Number of Individuals per Acre</i>
Short Horned Lizard	5	3	8	~6268	~2

Burrowing Owl Use:

Burrowing owls were not seen in the vicinity of the Fourmile East solar field site during the assessments on 6/19, 6/20, and 6/27/12. However, a small group of 3-5 owls was found (appx. location N4164392 E438847) in mid-September by Lisa Rawinski at a nest site near the Closed Basin Canal by the South San Luis Lakes experimental flood basins. This area is about 7.5 miles NW of the Fourmile East SEZ. As these birds disperse from this nest site, it is possible that they would forage in the northern portions of the Fourmile East area.

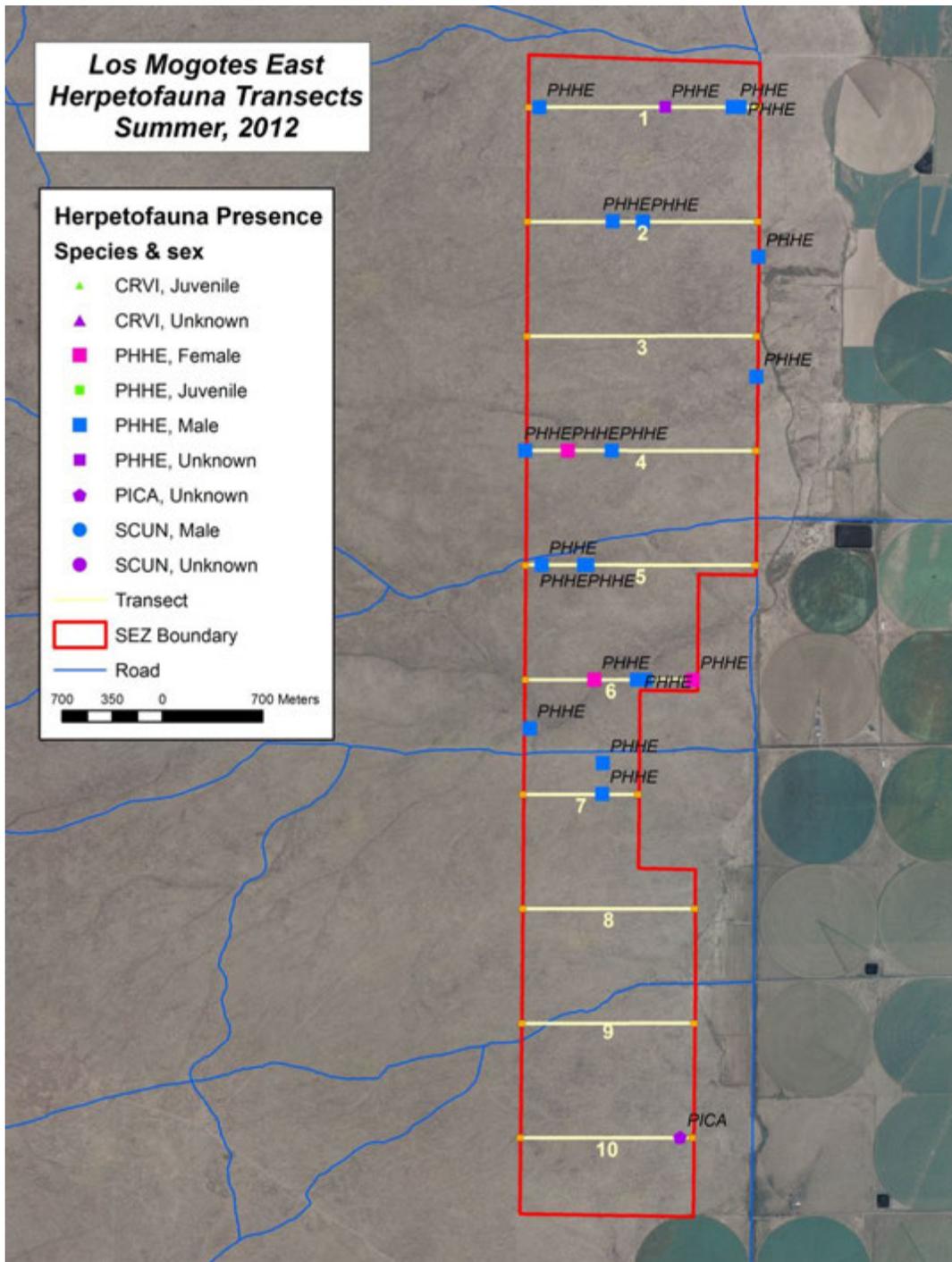
Raptor Use:

No species of concern (Golden Eagles, Ferruginous Hawks, or falcon species) were observed while walking transects or traveling around the Fourmile area. However, this SEZ is only 3.5 miles southeast of the Blanca Wetlands complex, which is known to support several species of raptor including Northern Harriers (*Circus cyaneus*), Red-tailed Hawks, American Kestrels, and Swainson's Hawks. It's quite reasonable to expect that raptors from Blanca Wetlands utilize at least a portion of the Fourmile SEZ for foraging, loafing, and dispersal at various times of the year.

Los Mogotes East

The Los Mogotes East solar field site (Figure 3) was assessed on 7/11 and 7/16 for a combined time of approximately 8 hours. The primary focus was locating herpetofauna, but technicians were alert for significant raptors, Burrowing Owls, Gunnison’s prairie dogs, and any other species of note while walking transects.

Figure 3. Presence of herpetofauna within the Los Mogotes East Solar Energy Zone, summer of 2012.



Los Mogotes East, cont.

Gunnison's Prairie Dog Use:

No GuPD activity was noted in any portion of the Los Mogotes East SEZ. However, there are two significant GuPD populations that are known to support Burrowing Owls, Ferruginous Hawks and other wildlife, located ~3.5 miles to the west and ~2 miles to the north of the SEZ (Figure 4).

Herpetofauna Transects:

Ten transects were established that run from east to west, having a total length of 13,679 meters (8.5 mi, Figure 3). A one meter-wide transect of this length represents a sampled area of 3.38 acres for this SEZ. Los Mogotes East has a total acreage of 2650 Ac, therefore the sampled area represents 0.128% of available habitat. A summary of Los Mogotes East herpetofauna can be found in Table 2. A total of 17 Short-horned lizards (*Phrynosoma hernandesii*) and one Bullsnake (*Pituophis catenifer*) were found on transect, and four Short-horned lizards were found off transect. Population estimates of Short-horned lizards were ~5 per acre, or ~13,328 individuals for the entire acreage. Estimates for Bullsnares were ~784 for the entire acreage, which is less than one per acre (~0.3). No other reptile species or amphibians were found in the Los Mogotes East SEZ.

Table 2. Summary of herpetofauna observed on Los Mogotes East transects, 7/11 and 7/16/12. Population estimates rounded to the nearest whole number.

Species	Total # Adults	Total # Juveniles	Grand Total on Transect	Estimated Population for Total SEZ Acreage	Estimated Number of Individuals per Acre
Short-horned Lizard	17	0	17	~13,328	~5
Bullsnake	1	0	1	~784	>1

Burrowing Owl Use:

Burrowing owls were not seen in the immediate vicinity of the Los Mogotes East solar field site during the assessments on 7/11 and 7/16. However, at least two separate nest sites are located within 3.5 miles to the north and west of this SEZ (Figure 4). Both of these sites support nesting owls that use the area consistently from year to year.

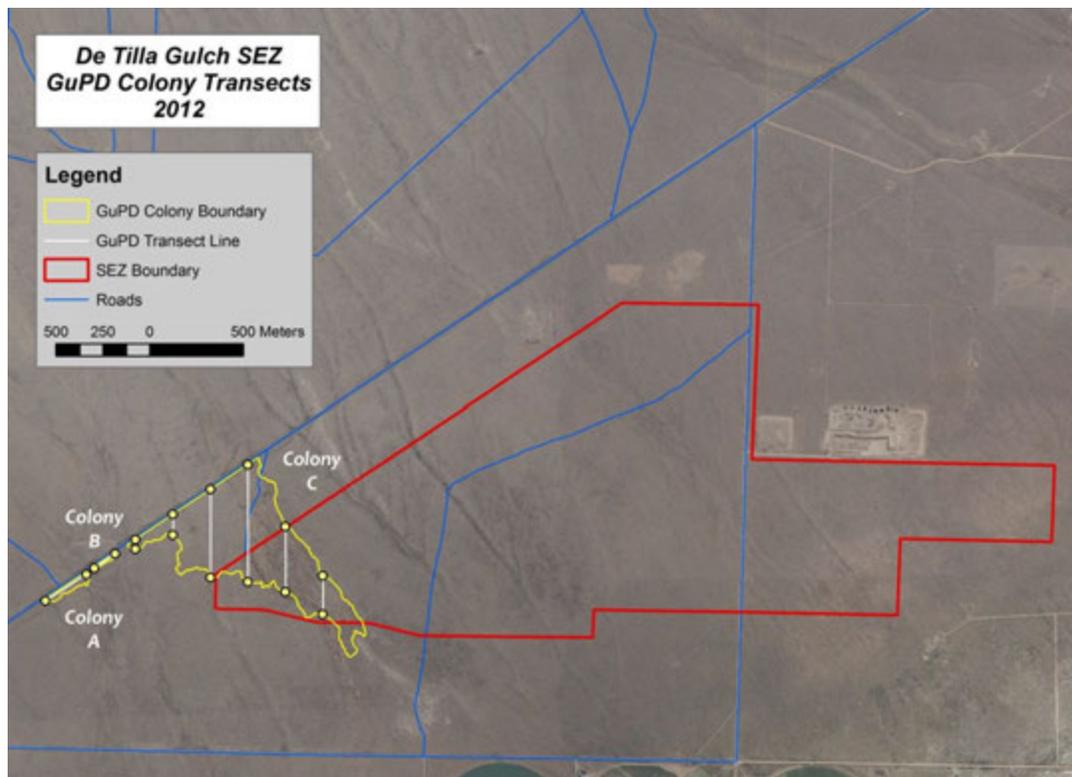
De Tilla Gulch

The De Tilla Gulch solar field site (Figures 5 & 6) was assessed for GuPD activity on 6/13 & 6/14, and for herpetofauna presence on 7/2/12, representing a combined survey time of approximately 5 hours. The primary focus was locating herpetofauna and monitoring the established GuPD transects, but technicians were alert for significant raptors, Burrowing Owls, and any other species of note while walking transects.

Gunnison's Prairie Dog Use:

No GuPD activity was noted in any portion of the De Tilla Gulch SEZ in 2012. In prior years there has been GuPD activity associated with the road embankment of Highway 285 which runs along the north side of the SEZ, but no GuPD were seen along the highway after multiple visits to the site. Three colony sites had been outlined (Colony's A, B, and C, Figure 5) and transects established within these polygons which were monitored in both 2011 and 2012. Numbers of active versus inactive GuPD holes were counted on 6/13 and 6/14/12, and no signs of GuPD were seen during these counts (Table 3). Some GuPD holes had evidence of use (tracks & disturbance) from burrowing mammals and were marked as "active", but it is likely the activity was from Wyoming or Thirteen-lined ground squirrels (*Urocitellus elegans* and *Ictidomys tridecemlineatus*, respectively). It is probable that this colony has recently suffered the effects of sylvatic plague, and has experienced a severe reduction in inhabitants.

Figure 5. Monitored GuPD Colony Sites and Transects at De Tilla Gulch SEZ, 2012.



De Tilla Gulch, cont.

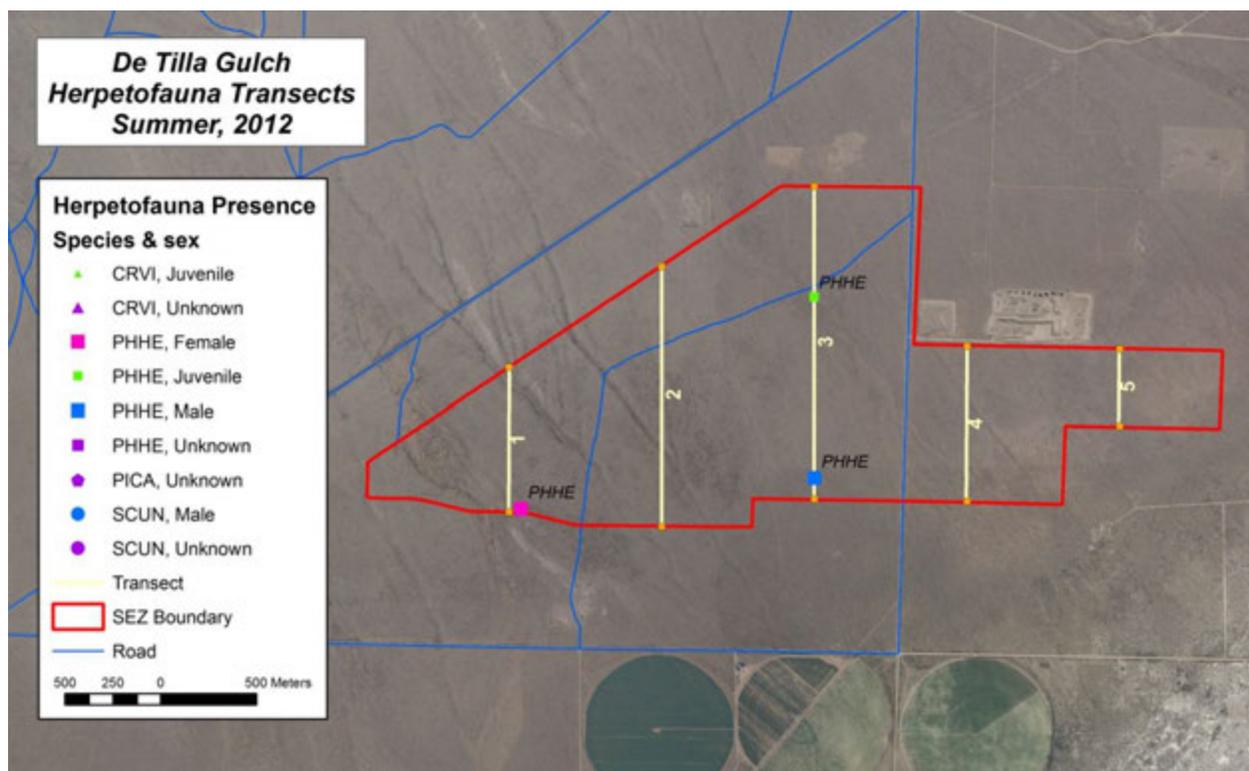
Table 3. Summary of active versus inactive burrows along transect lines, and number of GuPD seen (on approach and during transects) in De Tilla Gulch SEZ GuPD Colonies, 6/13 & 6/14/12.

Name of Colony	Acres	Number of Transects	Combined Transect Length (m)	Inactive Burrows	Active Burrows	Total Burrows	% Active	Number of GuPD Seen
De Tilla Gulch A	2.5	1	260 m	5	0	5	0 %	0
De Tilla Gulch B	0.6	1	140 m	0	0	0	0 %	0
De Tilla Gulch C	101.2	6	1866 m	39	11	50	22%	0

Herpetofauna Transects:

Five transects were established that run from north to south, having a total length of 4925 meters (3.1 mi, Figure 6). A one meter-wide transect of this length represents a sampled area of 1.22 acres for this SEZ. De Tilla Gulch has a total acreage of 1064 Ac, therefore the sampled area represents 0.115% of available habitat. A summary of De Tilla Gulch herpetofauna can be found in Table 4. A total of two Short-horned lizards (*Phrynosoma hernandesii*) were found during transect searches, in addition to one that was found off transect. Population estimates of Short-horned lizards were ~2 per acre, or ~2,596 individuals for the entire acreage. No other reptile species or amphibians were found in the De Tilla Gulch SEZ.

Figure 6. Presence of herpetofauna within the De Tilla Gulch Solar Energy Zone, summer of 2012.



De Tilla Gulch, cont.

Table 4. Summary of herpetofauna observed on De Tilla Gulch transects, 7/2/12. Population estimates rounded to the nearest whole number.

<i>Species</i>	<i>Total # Adults</i>	<i>Total # Juveniles</i>	<i>Grand Total on Transect</i>	<i>Estimated Population for Total SEZ Acreage</i>	<i>Estimated Number of Individuals per Acre</i>
Short-horned Lizard	1	1	2	~2596	~2

Burrowing Owl Use:

Burrowing owls were not seen in the vicinity of the De Tilla Gulch solar field site during the assessments on 6/13, 6/14, and 7/2/12.

Raptor Use:

No species of concern (Golden Eagles, Ferruginous Hawks, or falcon species) were observed while walking transects or traveling around the De Tilla Gulch SEZ. However, this does not rule out the use of the area by raptors for foraging or loafing, as there are several available perch sites near the area (high power transmission lines to the south).

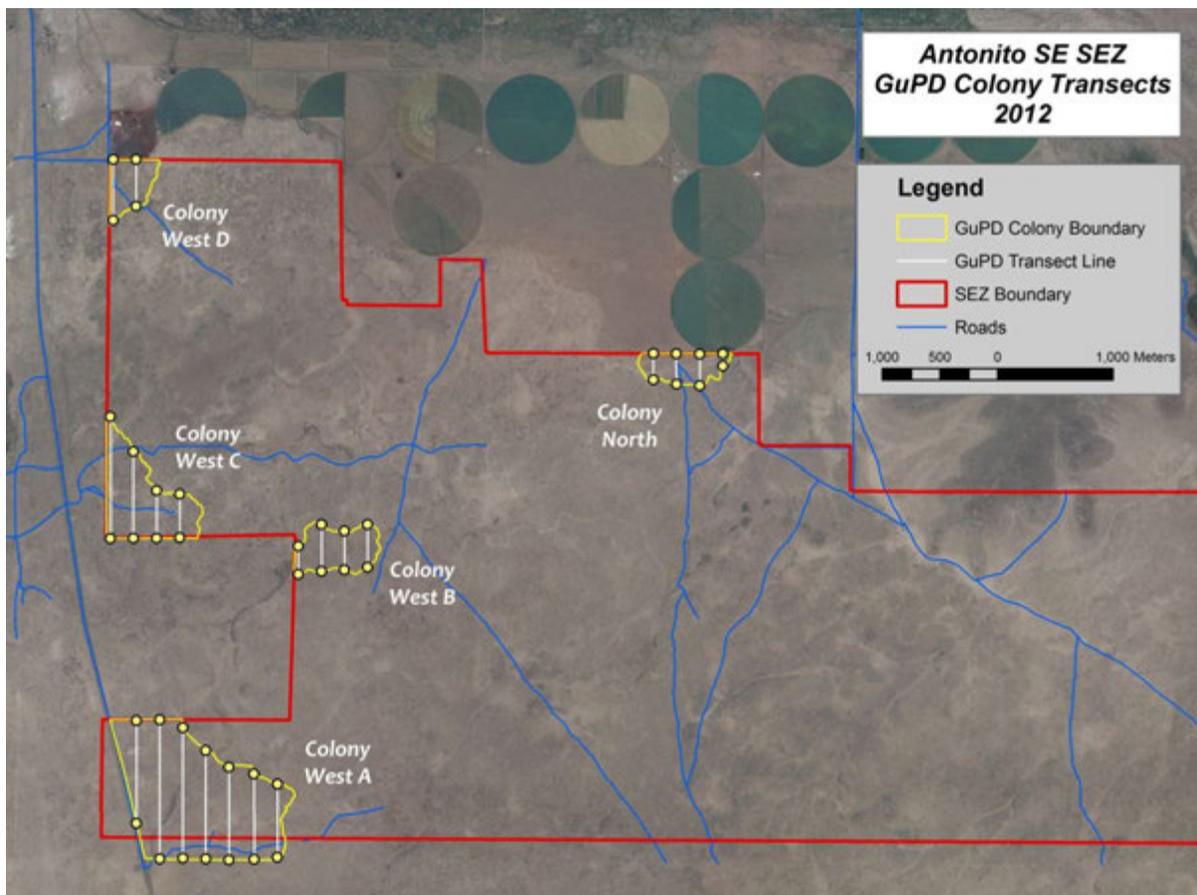
Antonito SE East

The Antonito SE solar field site (Figures 7-10) was assessed for GuPD activity on 7/3, 7/12, and 7/17/12, and for herpetofauna presence on 6/28, 7/3, 7/10, 7/12, 7/17, 7/19, 7/23, 8/1, 8/18, and 8/24/12, representing a combined survey time of approximately 46 hours. The primary focus was locating herpetofauna and monitoring the established GuPD transects, but technicians were alert for significant raptors, Burrowing Owls, and any other species of note while walking transects.

Gunnison's Prairie Dog Use:

GuPD activity was noted in southwestern, northern, and far southeast portions of the Antonito Southeast solar field site in the summer of 2012 (Table 5, and Figures 7 and 10). Five colony areas that had been mapped in 2011 were assessed using established transects, and numbers of inactive versus active GuPD holes were identified. Antonito Southeast polygons West A through D are associated with a large colony that borders the solar field along its western flank, following the roadbed of US Highway 285. Polygon North appears to be a remnant of a larger colony connected to the foothills of Saritas Peak in the South Pinion Hills. There was notable increase in GuPD numbers in colony North, West D, and West B, and little change in West A and West C.

Figure 7. Monitored GuPD Colony Sites and Transects at Antonito SE SEZ, 2012.



Antonito SE East, cont.

Table 5. Summary of active versus inactive burrows along transect lines, and number of GuPD seen (on approach and during transects) in Antonito SE SEZ, July 2012.

Name of Colony	Acres	Number of Transects	Combined Transect Length (m)	Inactive Burrows	Active Burrows	Total Burrows	% Active	Number of GuPD Seen
Antonito SE North	43.3	4	873 m	21	20	41	49%	~75
Antonito SE West A	327.7	7	6351 m	38	15	53	28%	0
Antonito SE West B	62.4	4	1360 m	6	4	10	40%	2
Antonito SE West C	118.3	4	2582 m	14	2	16	13%	1
Antonito SE West D	40.7	2	935 m	7	1	8	13%	5

Herpetofauna Transects:

Fourteen transects were established that run from north to south, having a total length of 49,117 meters (30.5 mi, Figures 8 & 9). A one meter-wide transect of this length represents a sampled area of 12.14 acres for this SEZ. Antonito SE has a total acreage of 9729 Ac, therefore the sampled area represents 0.125% of available habitat. A summary of Antonito SE herpetofauna can be found in Table 6. A total of 24 Short-horned lizards (*Phrynosoma hernandesii*) were found on transect, in addition to 22 that were found off transect. Population estimates of Short-horned lizards were ~2 per acre, or ~19,234 individuals for the entire acreage.

Estimates for Western rattlesnakes (*Crotalus viridis*) were ~1603 for the entire acreage, which is less than one per acre (~0.2). Populations of Plateau lizards (*Sceloporus undulatus*) were calculated with separate transect width (2 m) and habitat acreage values since they inhabit terrain dominated by fractured and extensive rock outcrops, which is only found on the northeast portion of Antonito SE SEZ acreage. Available habitat acreage is estimated to be ~200 Ac, with ~800 meters (0.5 miles, or 0.4 Ac) of transect length within it. Nine Plateau lizards were found on transect (eight were found off transect), yielding a population density of ~4500 for the entire 200 Ac, and ~23 per acre. No other reptile species or amphibians were found in the Antonito SE SEZ.

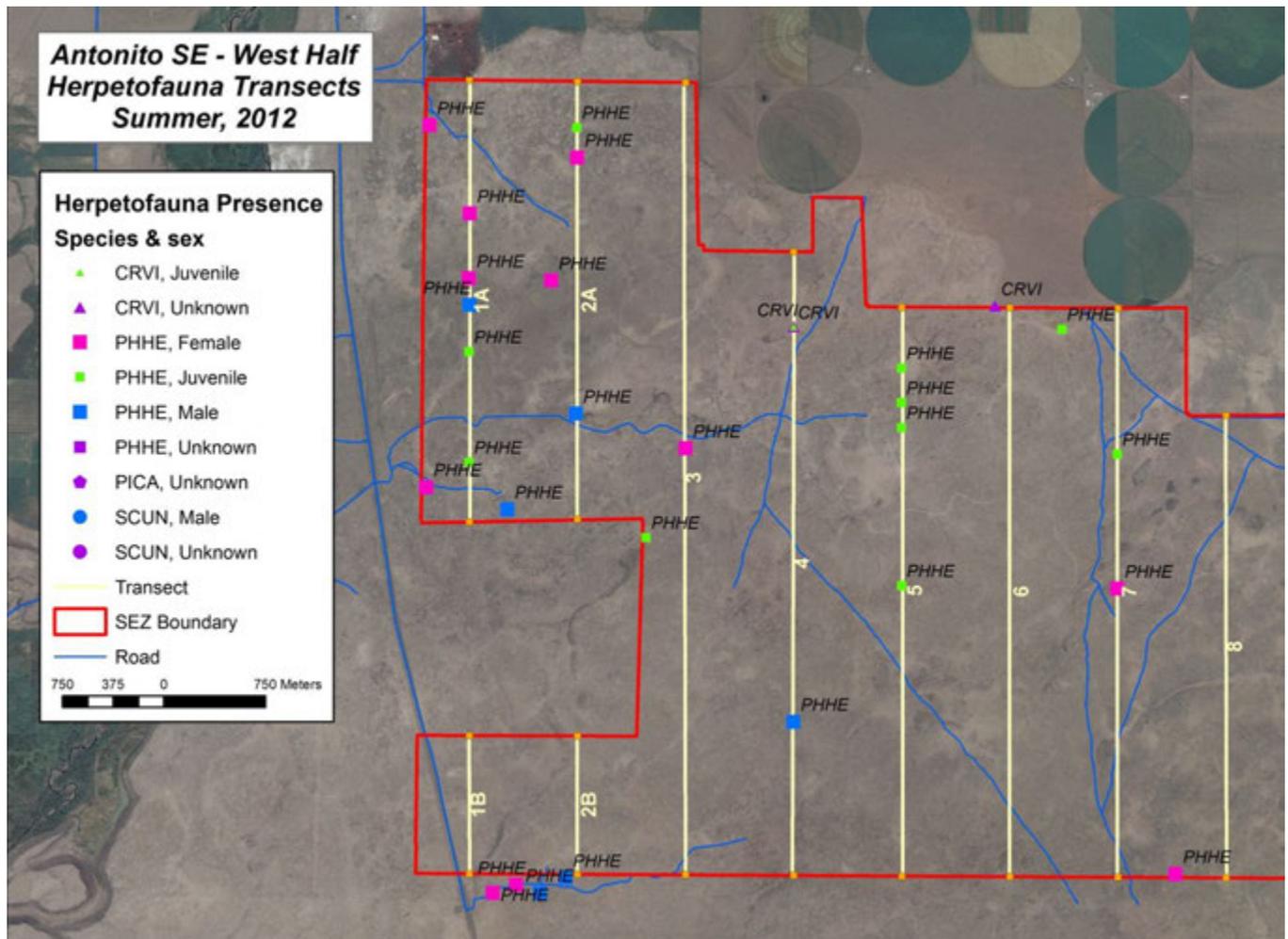
Antonito SE East, cont.

Table 6. Summary of herpetofauna observed on Antonito SE transects, July & August 2012. Population estimates rounded to the nearest whole number.

Species	Total # Adults	Total # Juveniles	Grand Total on Transect	Estimated Population for Total SEZ Acreage	Estimated Number of Individuals per Acre
Short-horned Lizard	11	13	24	~19,234	~2
Western Rattlesnake	2	-	2	~1603	>1
**Plateau Lizard	9	-	9	~4500	~23

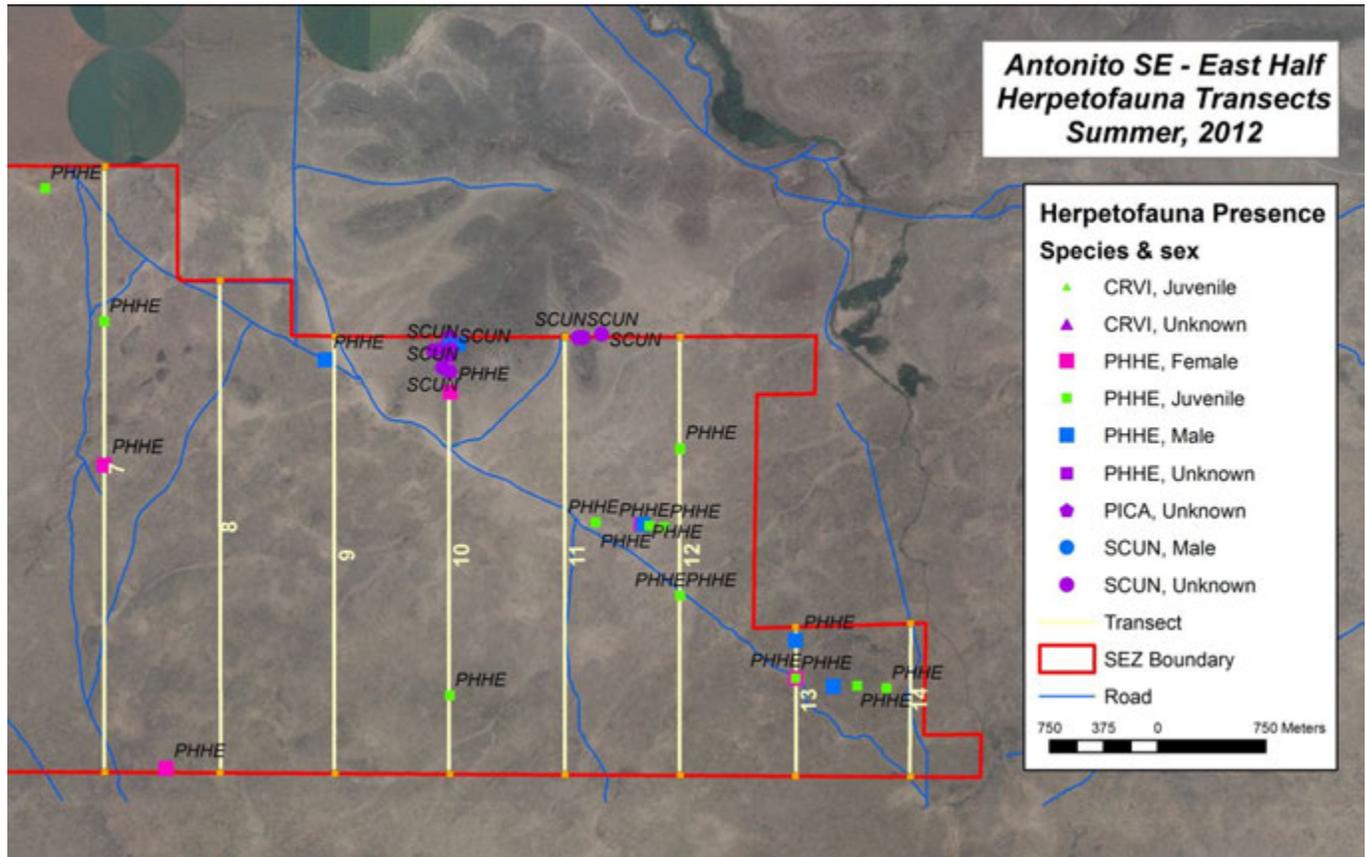
**See narrative for calculation of Plateau Lizard densities

Figure 8. Presence of herpetofauna within the Antonito SE SEZ (West Half), summer of 2012.



Antonito SE East, cont.

Figure 9. Presence of herpetofauna within the Antonito SE SEZ (East Half), summer of 2012.



Burrowing Owl Use:

Burrowing owls were found to occupy three separate areas in or near the Antonito SE SEZ, which is a marked increase from last year's assessment (Figure 10). Three den sites were confirmed at N4099166 E417413; N4099144 E416094; and N4094646 E421984, with a total (adults and juveniles) of 9, 6, and 8 birds respectively.

Raptor Use:

No species of concern (Golden Eagles, Ferruginous Hawks, or falcon species) were observed while walking transects or traveling around the Antonito SEZ (Figure 10). However, there is nesting activity for Golden Eagles and Prairie Falcons along the basalt rock outcrops bordering the Rio Grande river approximately 8 miles to the east. Antonito SE likely serves as habitat for foraging and dispersal for these raptors.

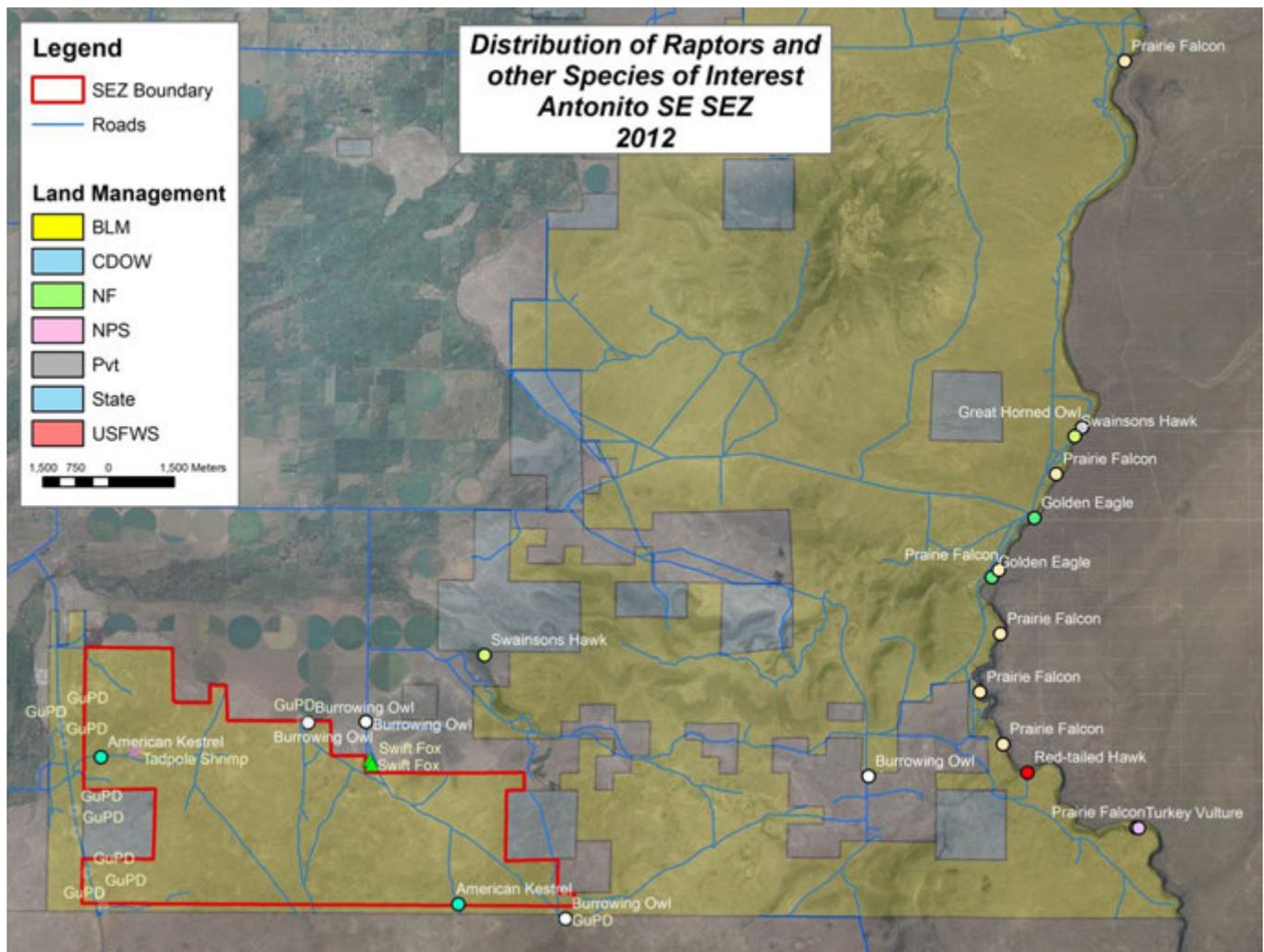
Antonito SE East, cont.

Other species of Note:

On July 17th, one adult and two juvenile Swift Foxes (*Vulpes velox*) were found lounging near dens ~125 meters to the northeast of the northern edge of the SEZ. The habitat they occupy is contiguous with Antonito SE SEZ habitat, and it's reasonable to assume that they utilize the northern portion of the SEZ. These are a Species of Concern within the state of Colorado, and up to this point have never been confirmed as residing in or breeding within the San Luis Valley.

In addition, Alta Lake (a playa basin on the western side of Antonito SE SEZ) was found to harbor a relic shrimp species, *Triops sp.*, also known as Tadpole shrimp. These are playa specialists, and persist in conditions with frequent wet/dry cycles similar to fairy shrimp. They are considered "living fossils" and haven't changed their morphology substantially since the Triassic.

Figure 10. Presence of Raptors and other species of note in the vicinity of the Antonito SE Solar Energy Zone, 2004 to 2012.



Conclusion

From a wildlife perspective, two of the four proposed Solar Energy Zones outlined in this report would be poor candidates for solar energy development due to the type and distribution of wildlife currently utilizing them. Antonito Southeast and Los Mogotes East harbor, or are in close proximity to, several species of concern including Ferruginous Hawks, Prairie Falcons, Burrowing Owls, Gunnison's Prairie Dogs, and Swift Foxes. The other two sites, Fourmile East and De Tilla Gulch, seem to harbor far fewer species of concern at least during the summer months. Winter assessments would be needed to declare with certainty that they are used minimally by all species of concern, threatened, and endangered species.

Photos



Typical habitat – Fourmile East Solar Field Site



Short-horned Lizard – Fourmile East Solar Field Site



Typical Habitat – Antonito SE Solar Field Site



Typical Habitat – Los Mogotes East Solar Field Site



Short-horned lizard from Los Mogotes East.



Thirteen-lined ground squirrel from Antonito SE



Tadpole Shrimp from Alta Lake – Antonito SE



Burrowing Owls from Antonito SE SEZ



Swift fox pups – Antonito SE SEZ



Gunnison's prairie dog on Antonito SE SEZ



Plateau lizard on Antonito SE SEZ



Wyoming ground squirrel near De Tilla Gulch SEZ