
Observations and Activities of the
Naturalist at the Desert Tortoise Research
Natural Area, Kern County, California:
March 16 through June 5, 2006

by

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ABSTRACT

The Desert Tortoise Preserve Committee staffed a Naturalist at the Desert Tortoise Research Natural Area (DTNA) located northeast of California City in the western Mojave Desert of Kern County, California from March 16, 2006 to June 5, 2006. The Naturalists, Edward Patrovsky and Charles Hemingway, were stationed at the DTNA Interpretive Center for a total of 82 days. During this time, a total of 1427 individual visitors in 418 visitor groups were recorded, an average of 17.4 individuals and 5.1 groups per day. This included 689 males, 444 females, and 294 individuals of unreported gender. Visitors stayed on average of 52 ± 60 minutes. The Naturalist made contact with 89% of the 418 visitor groups comprising 1307 (92%) of individual visitors.

Most (85%) of the 218 visitor groups who made an entry in the Recreation Register, completed the Visitor Survey Form, or reported their place of residence to the Naturalist were from California. There were 20 groups of visitors from thirteen additional states including Alabama, Illinois, Massachusetts, Michigan, Minnesota, New York, North Carolina, Ohio, Oregon, South Dakota, Vermont, Washington, and West Virginia, and from eight foreign countries including one group each from Brazil, Ireland, Mexico, New Zealand, and Switzerland, two each from Canada, and France, and four groups from England.

Many of the visitor groups arrived by off-highway vehicle (159 groups; 38%). This is the highest proportion of visitor groups arriving on OHVs on record and continues a positive trend evident since 2000. The mean stay of OHV user groups (16.1 ± 16.1 minutes) was one hour shorter than for other visitor groups (75.6 ± 65.6 minutes).

One hundred and thirty two visitor groups (46%) comprised of 525 individual visitors reported seeing at least 1 desert tortoise. Forty seven (16%) visitors groups comprising 116 (11%) individual visitors reported seeing more than 1 desert tortoise.

No attempts to collect wild desert tortoises were witnessed. No attempts to release captive desert tortoises were observed.

INTRODUCTION

Founded in 1974, the Desert Tortoise Preserve Committee (DTPC) works to promote the welfare of the California state reptile, the desert tortoise (*Gopherus agassizii*) in its native wild state in the southwestern United States. It strives to do this by working:

(a) To establish and/or assist in establishment of preserves for the desert tortoise in locations within the southwestern United States where there are habitats and ecosystems which support it.

(b) To provide information, education and research regarding ecosystems critical to the desert tortoise and to associated animal and plant species that may be included in these ecosystems.

(c) To develop and implement management programs for preserves, including other land associated with any preserve, to protect the desert tortoise and the biodiversity of the ecosystems in which it lives.

(d) To foster and to publicize the uses for these preserves for selected forms of recreation, for education, for conservation and for research.

The DTPC was instrumental in establishing the 39.5 square mile DTNA in the western Mojave Desert. Since its foundation, DTPC has worked to consolidate the Natural Area by raising funds for purchasing and managing private land within the DTNA and surrounding habitat, and to educate the public about the desert tortoise and the DTNA. The DTPC has funded a Naturalist position at the DTNA each spring, the season when tortoises were most active and visitation is greatest, since 1989 in keeping with its goal to protect the

desert tortoise and to educate the public. In 2006, the DTPC staffed a Naturalist at the DTNA from mid-March to the first week in June. This marks the eighteenth consecutive year in which the DTPC has had a Naturalist on site at the DTNA.

The DTNA is located northeast of California City in the western Mojave Desert of Kern County, California. Initial protection for the area came in 1973 when it was closed to off-highway vehicle (OHV) use (Bureau of Land Management 1973). The Bureau of Land Management (BLM) established the DTNA in 1976 (BLM 1976) as a Wildlife Habitat Management Area and developed its first management plan in 1977. This plan was updated in 1979 (BLM 1979). The perimeter of the DTNA (except for two 1-mile sections) was fenced in 1977-78 (BLM 1988) and it was closed to grazing in 1978 (BLM 1979). In 1980, the public lands were withdrawn from mining and designated as a Research Natural Area and an Area of Critical Environmental Concern (BLM 1980). A primary reason for establishment of the DTNA in its location was because, at the time, it supported the highest known density of desert tortoises (BLM and California Department of Fish and Game 1988).

The DTNA Interpretive Center (IC) is located in Township 31 South, Range 38 East, in the southeast corner of Section 34. The IC is reached by a dirt road leads from Randsburg-Mojave Road. The IC includes a small gravel parking area. There is an outhouse for visitor use. An interpretive kiosk, constructed in 1980 (BLM 1988), and self-guided nature trails are open for use all year. The kiosk, a 15 x 15 foot shelter, includes eight natural history interpretive panels. The self-guided nature trails consist of a plant loop and an animal loop, each approximately 0.5 mile long, and a shorter main loop. The three trails have numbered interpretive trail posts with corresponding trail guides, available in metal boxes at the beginning of each trail. There is also a discovery loop trail that is approximately 1.75 miles long for the more venturesome visitors.

In addition to these year-round facilities, during the spring months the DTPC places a motor home, the Desert Tortoise Discovery Center (DTDC), on site. The DTDC is a recreational vehicle thirty-two feet in length, with brightly colored tortoises and other desert fauna and flora painted on its sides. It is used as a base and living quarters for the Naturalists and as storage space for the associated educational displays and DTPC fundraising products. The DTDC educational displays include information on Mojave rattlesnakes, black-tailed hares, kit foxes, and common ravens, as well as tortoise shells, DTPC newsletters and handouts on desert tortoise natural history, and upper respiratory tract disease.

Duties of the Naturalist included:

- (1) Data collection: recording information about visitors and visitation patterns.
- (2) Monitoring: observing the conduct of visitors and taking appropriate action when prohibited activities were observed, recording wildlife sightings, maintaining exhibits along trails, monitoring outhouses for venomous animals, and collecting litter.
- (3) Interpretive services: educating visitors and answering their questions about desert tortoises, other fauna and flora around the IC, and the desert ecosystem; and discussing the DTNA and its role in conserving a part of the desert biome.
- (4) Assisting with DTPC activities: taking part in DTPC programs such as guided tours; selling DTPC fundraising products, such as T-shirts, patches, tie tacks, and postcards.
- (5) Reporting: assisting in preparing a final report for the DTPC, summarizing the activities and observations of the Naturalist during the spring season. The report format is similar to that of reports from previous years and contains comparable analyses.

METHODS

Naturalist

DTPC staffed and supervised a Naturalist on-site at the DTNA for seven days each week, approximately 10 hours per day for 82 days between March 16 and June 5, 2006. The Naturalist was headquartered at the DTNA Interpretive Center in the DTPC's Desert Tortoise Discovery Center motor home that was positioned between the parking lot and the main trailhead. The Naturalists lead scheduled tours, interacted with visitors, collected visitation data, monitored activity at the Interpretive Center, performed routine sign and trail maintenance, and sold DTPC merchandise.

The lead Naturalist on duty at the DTNA in the 2006 season was retired Bureau of Land Management Ranger Edward Patrovsky who was present on 55 days. Chuck Hemingway acted as relief Naturalist on the Naturalist's day off or when the lead Naturalist was unavailable, and served on 27 days. The Naturalist was supervised by DTPC Executive Director, Michael J. Connor, Ph.D. Training was provided as needed by Michael J. Connor and DTPC volunteer Susan Moore. The Naturalist had a cellular telephone, and was in regular contact with the DTPC Executive Director. In addition, the DTPC Executive Director or other support personnel made on-site visits at least once every two weeks.

Collection of data

Information on visitors was collated from three sources: (1) "Visitor Survey Form for the Desert Tortoise Natural Area" (Appendix 1); (2) the Bureau of Land Management's Recreation Area and Site Register; and (3) data that had been collected verbally or by observation by the Naturalist and noted on the "Data Sheet for the Desert Tortoise Naturalist" (Appendix 2).

(1) "Visitor Survey Form for the Desert Tortoise Natural Area" (Appendix 1)

When visitors arrived they were asked if they would complete a "Visitor Survey Form for the Desert Tortoise Natural Area" at the end of their visits, because the Naturalist was interested in what they observed and any suggestions they might have. Information recorded by the visitors on the visitor survey form included date of visit, name, address, telephone number, number of individuals in their group, other desert attractions included in this trip, how they learned about the DTNA, previous visits to the DTNA, if the interpretive kiosk, self-guided trails, and the Naturalist were informative and helpful, if they are members of the DTPC, if they would like information sent to them about the Committee and other desert conservation organizations, and if they would like educational materials sent to them about the California desert and the desert tortoise.

(2) Bureau of Land Management's "Recreation Area and Site Register"

The Bureau of Land Management's Recreation Area and Site Register is located between the visitor entrance gate and the kiosk at the Interpretive Center. Visitors can record the date, their city or state of origin, the number of people in their party, the length of their stay and any comments they wish to include. The Naturalist did not ask visitors to write in the register but a pen is made available in case they wish to do so. Some visitors who have completed a Visitor Survey Form on a prior visit and do not wish to do so again will sometimes write comments in the Register. Also, the Register is useful to determine how many visitors may have visited while the Naturalist was off duty. At times, when the Naturalist is leading a tour and is away from the visitor's center, data on other visitors may not be recorded but the Register is always available.

(3) "Data Sheet for the Desert Tortoise Naturalist" (Appendix 2)

Data recorded by the Naturalist on the "Data Sheet for the Desert Tortoise Naturalist" included date, name of the Naturalist, start and end time, weather conditions, numbers of groups and individuals, vehicle descriptions, arrival and departure times, visitor gender, length of stay, whether visitors filled out a "Visitor Survey Form for the Desert Tortoise Natural Area," whether visitors were contacted by the Naturalist, notes on tortoises and other species observed, notes on human related impacts, general visitor knowledge, and

whether the visitors arrived on an off-highway vehicle (OHV). An OHV is defined as any 2, 3, or 4-wheeled vehicle that is not designated for use on a highway (i.e. is not considered "street-legal"). Length of stay was determined by recording vehicle arrival and departure times. Visitor gender was categorized as male, female or unknown. The category "unknown" included OHV users who arrived at the DTNA and did not remove their helmets, groups with some members who remained inside their vehicles, and members of large tour groups.

Analysis of data

Data was entered into a Microsoft © Access database and statistical analysis performed with Microsoft © Excel using tools available in the Analysis Toolpak. Chi-square tests were used to evaluate overall and OHV visitation by month and by day (weekday, weekend, holiday). Mondays through Fridays were considered weekdays, Saturdays and Sundays were considered weekends. For each of these analyses expected values were compared to observed values. The null hypotheses used were that visitation was equally distributed by month (corrected for the number of days in each month) and that visitation was equally distributed by type of day (corrected for the numbers of each type of day). An unpaired t-test was used to determine if the parameters of group size, length of stay, and time of day of visit varied between OHV and non-OHV users. Relationships between visitor group size, length of stay and visitor encounters with tortoises were examined by regression analysis and analysis of variance (ANOVA) as appropriate.

Analyses similar to previous Naturalists' reports (Howland 1989, Ginn 1990, Jennings 1991, Ogg and Gallant 1992, Kidd 1993, Boland 1994 and 1995, On-Track Consulting and Research 1996, 1997, 1998, 1999, Connor 2000, 2001, 2002, Connor and Hemingway, 2003, Connor and Kaur, 2004, 2005) were conducted to compare data gathered between 1989 and 2005 with the 2006 data sets. These analyses focused on average group size, average length of visit for a group, and average time of day of visit and how these parameters varied by month and type of day, as well as differences in visitation by OHV users versus non-OHV users. Similarly, groups rather than individuals were used as the unit of comparison in analyses of visitation patterns in previous years because individuals within a group cannot be treated as statistically independent observers. Trends in visitation by OHV users were examined by regression analysis and analysis of variance (ANOVA).

In all analyses, test results with a probability of less than 0.05 were considered significant.

Interpretive services

The DTDC was parked perpendicular to the fence in an open flat area west of the parking lot by the main trailhead. Most interpretive services took place in front of the DTDC where the displays, specimens, literature/handouts, and DTPC merchandise were located. When visitors were few, the Naturalist would accompany a group on their walk, help them search for a tortoise, and answer any questions that came up along the way. The DTPC encourages large visitor groups to call in advance and arrange visits on weekdays when visitation is lower.

The Naturalist greeted most visitors as they approached the DTDC to welcome them and answer any initial questions they might have before they began their walks. After welcoming visitor groups to the DTNA, the Naturalist made an attempt to cover the following topics:

- (1) a brief history and purposes of the DTNA; the reason for being set aside, and the mission/goals of the DTPC and partnership agencies;
- (2) direct and indirect human impacts on the Mojave Desert and desert tortoise;
- (3) raven predation, and other reasons for the decline in tortoise populations;
- (4) release of captive tortoises and URTD;
- (5) desert tortoise ecology and natural history, including current and historic geographic range;

- (6) flora and fauna of the Mojave Desert;
- (7) visitation guidelines to be observed while visiting the DTNA:
 - a. minimize the impact to the desert--emphasizing this is a "natural area";
 - b. do not harass or collect tortoises, lizards, snakes, plants or disturb their habitats;
 - c. be alert for rattlesnakes; and
 - d. protect self from the desert elements.

Visitors were then directed to the kiosk where additional tortoise information and graphics, as well as illustrations of wildflowers, mammals, birds, snakes, and lizards could be found, and the self-guiding trailheads.

The Naturalist attempted to contact all visitors upon their departure to find out what they had seen on their walks, help them identify unknown flora and fauna, or answer questions that may have arisen during their walks. Sometimes they were reminded to fill out visitor survey forms.

Monitoring

Most of the Naturalists' time was spent observing visitor conduct and monitoring arrival and departure times of visitor groups. When visitor behavior was inappropriate, intervention by the Naturalist was necessary. Visitors arriving with dogs were intercepted before they passed through the entrance and asked to tether their pet to their vehicle or in the shade of the DTDC.

Tortoises and other vertebrate species that were observed by the Naturalist and visitors were recorded on the "Data Sheet for the Desert Tortoise Naturalist." General weather conditions were recorded on data sheets (wind speed, cloud cover, and rain events), and daily high and low temperatures. The daily high, low and noon temperatures were determined with an electronic thermometer (Precisetemp Weather Center, model 91047W, manufactured by Springfield Precision) that was mounted near the DTDC and logged on the "Data Sheet for the Desert Tortoise Naturalist".

Other duties

Naturalists duties included picking up trash and cigarette butts, cleaning and stocking the outhouse, keeping the outhouse door closed to prevent entry of rattlesnakes, removing black widow spiders from the outhouse, returning used trail guides to their appropriate boxes and restocking them when necessary, replacing exhibits, and cleaning out the artificial tortoise burrows on the nature trails.

The Naturalist also sold DTPC products. Products were displayed on a table, along with educational materials, in front of the DTDC.

Abbreviations

AL, Animal Loop.

BLM, Bureau of Land Management.

DL, Discovery Loop.

DTDC, Desert Tortoise Discovery Center – The motor home parked in the IC that acts as the Naturalists' headquarters.

DTNA, Desert Tortoise Research Natural Area.

DTPC, Desert Tortoise Preserve Committee.

IC, Interpretive Center.

OHV, Off Highway Vehicle or Off Road Vehicle

PL, Plant Loop.

RESULTS

Collection of visitor data

On Site Presence

A Naturalist was present at the Interpretive Center on 82 days from March 16 and June 5, 2006. This included: 16 days in March; 30 days in April; 31 days in May; and, 5 days in June. A Naturalist was on duty about 10 hours a day for 7 days per week. The Naturalist usually stayed overnight in the DTDC so actual presence of DTPC staff at the IC was higher than indicated by the duty time. The Naturalist on duty at the DTNA in 2006 for most of the season was Edward Patrovsky who was present on 55 days (67%). Chuck Hemingway acted as relief Naturalist on the Naturalist's day off or when the Naturalist was unavailable, and served on 27 days (33%).

Visitation

A total of 1427 individuals in 418 visitor groups were recorded on the 82 days that a Naturalist was on duty (Table 1), an average of 17.4 ± 22.2 individuals per day and 5.1 ± 5.2 groups per day. This included 689 males, 444 females, and 294 individuals of unreported gender.

Table 1. Summary of visitation by month at the Desert Tortoise Research Natural Area in the spring of 2006. (SD = Standard deviation).

Month	Number of Days	Number of Groups	Number of Individuals	Group size mean (\pm SD)	Length of visit minutes (\pm SD)	Mean time of visit PST (\pm SD)
March	16	62	297	4.79 ± 9.65	57 ± 50	$12:39 \pm 2:25$
April	30	202	666	3.30 ± 3.71	53 ± 51	$12:40 \pm 2:31$
May	31	141	440	3.12 ± 2.68	46 ± 73	$12:48 \pm 3:02$
June	5	13	24	1.85 ± 1.14	35 ± 32	$12:59 \pm 2:43$
Overall	82	418	1427	3.41 ± 4.81	52 ± 59	$12:43 \pm 2:41$

Overall visitation was lower in 2006 than in 2005, with a total of 1686 individuals in 594 visitor groups was the highest recorded visitation since 1995. However, visitation in 2006 was still the second highest since 1998 (see Comparison of visitation and sightings of tortoises by visitors in prior years on page 16).

Group Size

The mean number of individuals in each visitor group was 3.41 ± 4.81 (Table 1). Average group size for the season was the highest in recent years. Average group size for the 2005 season was $2.84 (\pm 2.53)$, and was 2.49 ± 2.26 in 2004, 2.66 ± 3.24 in 2003, 2.68 ± 3.77 in 2002, 2.76 ± 2.45 in 2001, and 2.79 ± 2.82 in 2000.

Average length of stay of groups for the 2006 season was 52 minutes compared to 1 hour 27 minutes in 2005, 1 hour 32 minutes in 2004, 1 hour in 2003, 1 hour 29 minutes in 2002, 1 hour 35 minutes in 2001 and 1 hour 29 minutes in 2000. Average time of day of visit for the season was 12:43 PST.

More visitors arrived in groups of two than any other group size (Figure 1).

The largest groups were museum and college groups on field trips and a Ridgecrest girl scouts troupe. Most of these groups had contacted the DTPC office ahead of time allowing the Naturalist to both allocate time to be with the group and to pre-locate active tortoises for them to see. This ensured that 4 of the 5 largest groups all saw tortoises. Desert tortoise #1056 was seen by the 23 members of Professor Kelly's CSUB class field trip and by all 60 members of a group of students and faculty from Citrus College. The 32 members of a group of docents from Oakland National Science Museum were escorted by the Naturalist to see desert tortoise #1059, as were the 7 members of Professor McIntyre's University of Redlands class field trip, and the 35 members of the Ridgecrest girl scouts troupe. The 11 members of the group from Tulane High School saw 2 desert tortoises. The only large group not to see a desert tortoise was that composed of 48

students and staff from Springville High School, who came on cool day at the end of March.

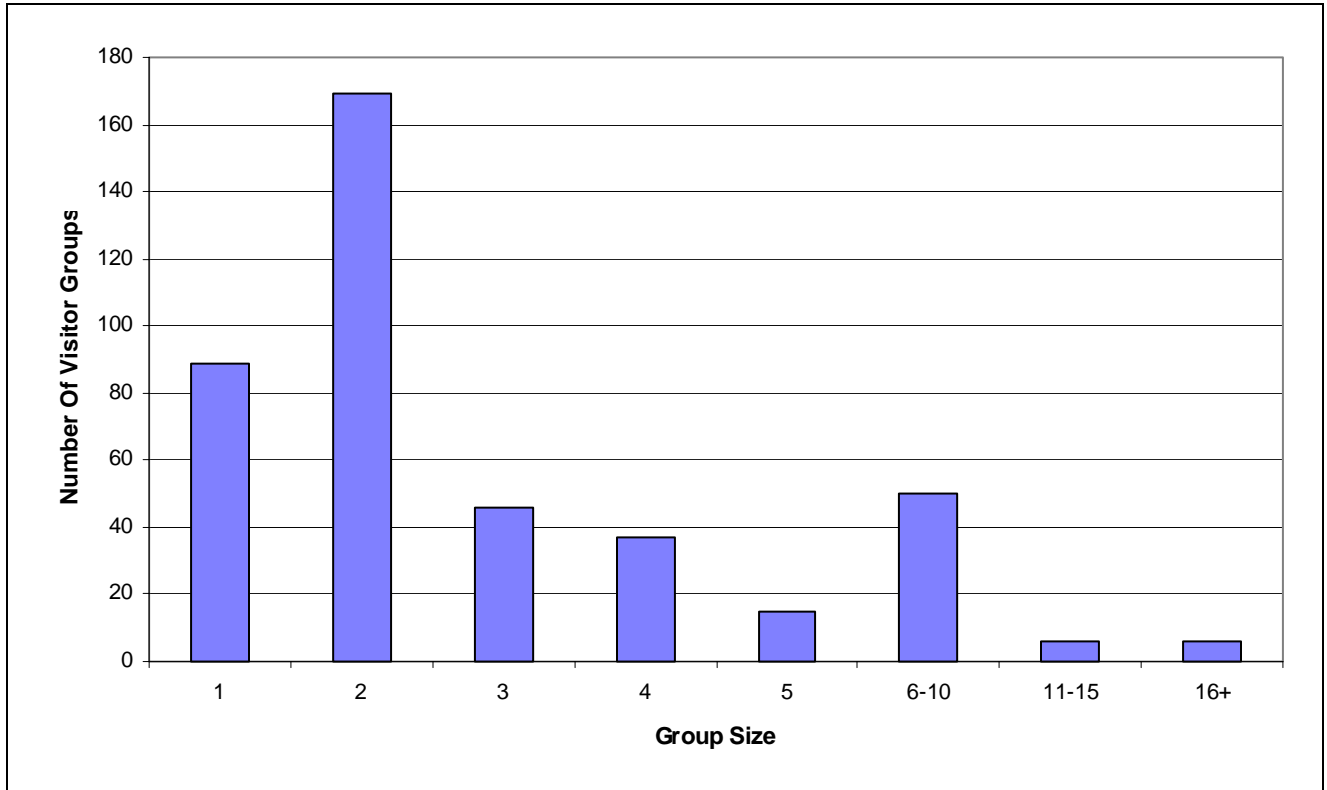


Figure 1. Numbers of visitors counted in each of eight group sizes visiting the Desert Tortoise Research Natural Area in spring of 2006.

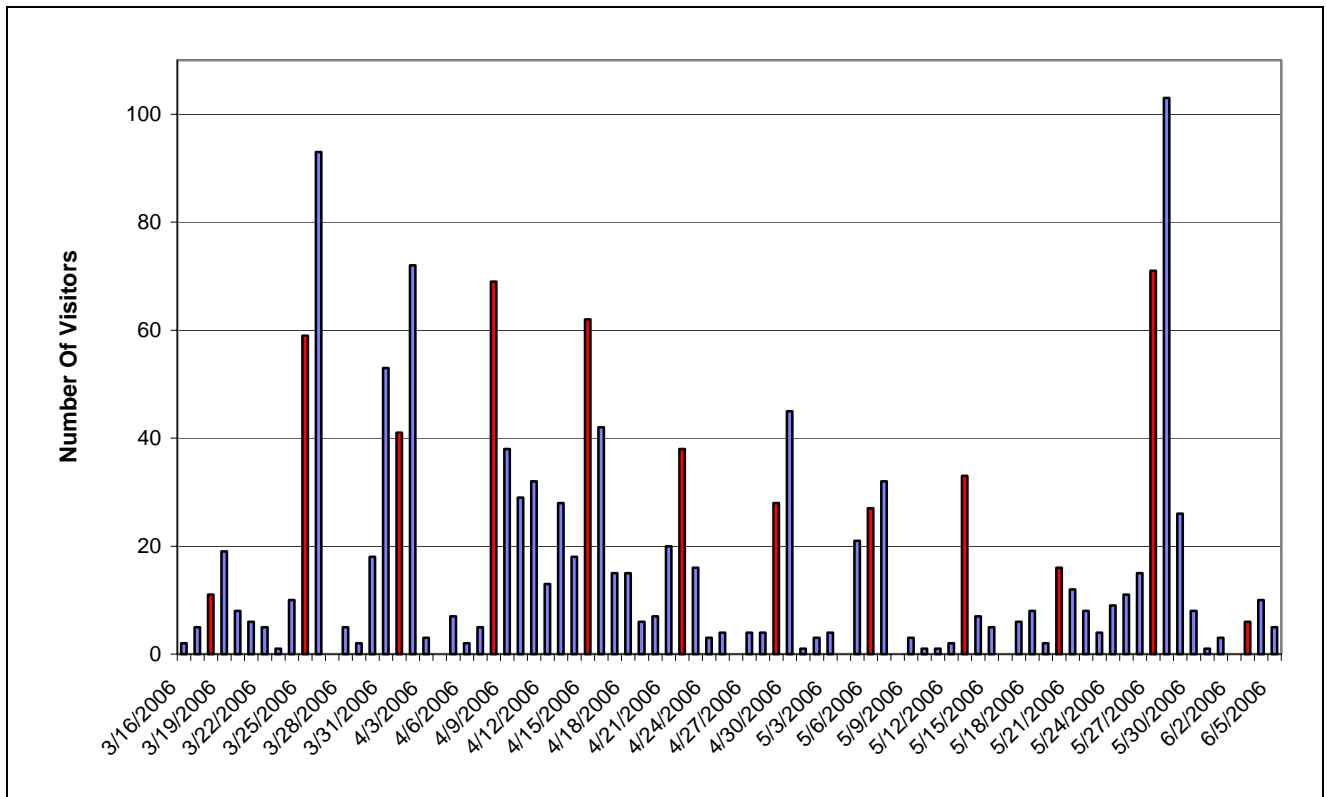


Figure 2. Daily visitation at the Desert Tortoise Research Natural Area, spring 2006. Saturdays are shown as red bars.

The largest numbers of visitors were recorded on Sunday, March 26 (N=95) and Sunday, May 28 May (N=103) (Figure 2). The visitors arriving on the weekend of May 27-28 were largely off-road vehicle enthusiasts, accounting for 65 (92%) out of the 71 visitors on Saturday, May 27 and 76 (74%) out of 103 visitors on Sunday May 28.

There were no visitors for seven (8.5%) out of the eighty-two days: Monday March 27, Tuesday April 4, Wednesday April 26, Thursday May 4, Monday May 8, Tuesday May 16, and Friday June 2. This is a higher number than in recent years in part because this year a relief Naturalist was on duty on the Naturalist's days off. The Naturalist's day off is typically on Tuesday or Wednesday, the two lowest visitor days (Table 2). In 2005, there were no visitors for 3 (4.0%) out of 74 days. In 2004, there were no visitors for 4 (5.0%) out of 79. In 2003, there were no visitors for 5 (7.5%) out of 66 days. In 2002, there were no visitors for 2 (3%) out of 66 days. In 2001, there were no visitors observed on 3 days (4%). In 2000, there were no visitors for 5 (8%) out of 65 days. In 1999, there were no visitors for 8 (12%) out of 65 days.

Seasonality of visitation was examined by comparing group size, length of visit, time of day of visit, and total number of visiting groups by month (Table 1). Group size decreased during the season and was significantly lower in June than in March through May ($p < 0.05$). The average length of stay was lowest in June but this difference was not statistically significant.

Visitation was further examined by comparing group size, length of visit, time of arrival, and total number of groups of visitors by day of the week (Table 2). There were more groups on weekend days compared to weekdays. There were no statistically significant differences in average length of visit or average arrival time on the weekend days as compared to weekdays. Overall mean arrival time in 2006 was 12:43 \pm 2:41. This is similar to 2005 (12:42 \pm 2:31) and about 1 hour earlier than in 2004.

Table 2. Summary of visitation at the Desert Tortoise Research Natural Area in the spring of 2006 by day of the week.

Day	Number of groups	Group size mean (\pm SD)	Length of visit minutes (\pm SD)	Mean time of visit PST (\pm SD)
Monday	33	3.12 \pm 2.79	45 \pm 48	11:57 \pm 1:52
Tuesday	29	2.76 \pm 1.77	52 \pm 23	13:44 \pm 2:40
Wednesday	29	1.86 \pm 1.13	61 \pm 48	13:21 \pm 2:43
Thursday	30	2.83 \pm 2.10	67 \pm 23	13:13 \pm 2:53
Friday	44	3.52 \pm 7.30	55 \pm 64	12:21 \pm 2:39
Saturday	134	3.44 \pm 3.85	54 \pm 73	12:48 \pm 2:47
Sunday	119	4.11 \pm 6.32	44 \pm 54	12:56 \pm 2:14

Visitation by off-highway vehicle users

Of 418 visitor groups, 159 (38%) arrived on an OHV (Table 3). This is the highest proportion of OHV groups recorded and continues a rising trend that began in 2000 (see *Comparison of visitation and sightings of tortoises by visitors in prior years* on page 15). In 2005, of 594 visitor groups, 126 (21%) arrived on an OHV. In 2004 when 17% arrived on an OHV and in 2003 21% of visitors arrived on an OHV.

Table 3. Visitation by visitor type at the Desert Tortoise Research Natural Area in the spring of 2006. Probabilities of < 0.05 are considered significant and are shown with an asterisk.

Visitor Type	Group size mean (\pm SD)	Length of visit minutes (\pm SD)	Mean time of visit PST (\pm SD)	Number of groups
OHV	3.90 \pm 2.86	16.1 \pm 16.1	12:37 \pm 2:47	159 (38%)
Non-OHV	3.12 \pm 5.67	75.6 \pm 65.6	12:47 \pm 2:38	259 (62%)
Probability	$< 0.05^*$	$< 0.0001^*$	N.S.	

There were some differences in visitation patterns between OHV users and non-OHV users. For the season, there was a significant difference in the average size of groups of visitors arriving by OHV: group size was 3.90 individuals per group of visitors arriving on an OHV compared to 3.12 individuals per group of non-OHV users (Table 3). This difference may in part reflect the monitoring technique as well as differences in behavior. For example, a group of 4 dirt bike riders driving through the parking lot together would be treated as a single group by the naturalist. A group of non-OHV visitors may arrive in several vehicles at slightly different times and not be counted as one group. OHV recreationists did tend to travel in groups with only 22 (14%) of 159 OHV visitor groups consisting of a single individual. This compares to 67 (26%) out of 259 of the non-OHV groups consisting of a single individual.

Average length of stay was 16.1 minutes for visitors arriving by OHV compared to an average length of stay of 75.6 minutes for visitors arriving on street legal vehicles. This difference is statistically significant. Time of day of visit for the two subgroups was similar. The average time of day of visit for visitors arriving on an OHV was 12:37 and for non-OHV visitors was 12:47.

Data on the number of motor vehicles per group was available for 110 (69%) out of the 159 OHV groups (Table 4). Members in this subgroup arrived by motorcycle (dirt bike), ATV, quad, sand rail or dune buggy. The mean number of vehicles in each OHV group was 3.05 ± 2.20 .

Table 4. Vehicle use by visitor type at the Desert Tortoise Research Natural Area in the spring of 2006. Probabilities of <0.05 are considered significant and are shown with an asterisk.

Visitor Type	Number of groups	Number of visitors	Number of Vehicles	Vehicles per visitor	Group size mean (\pm SD)	Vehicles per group (\pm SD)
OHV	110	350	335	0.96	3.18 ± 2.18	3.05 ± 2.20
Non-OHV	256	689	270	0.39	2.69 ± 3.75	1.05 ± 0.36
Probability				$<0.001^*$		$<0.001^*$

Data on the number of vehicles used by each non-OHV group were available for 256 (99%) out of 259 groups (Table 4). Members in this subgroup arrived by car, SUV, or van with 2 large groups arriving by bus. The vast majority (246 or 96%) of the non-OHV groups arrived in a single vehicle. The mean number of vehicles per non-OHV group was 1.06 ± 0.36 . This was significantly lower than the 3.05 ± 2.20 vehicles for the OHV groups ($p < 0.001$, Students t-test). The number of vehicles per visitor was also significantly lower for the non-OHV groups ($p < 0.001$, Chi-square test).

Data on specific type of OHV vehicle were available for 105 (66%) out of the 159 OHV groups. The 105 groups included 325 vehicles (3.1 vehicles per group). The 105 groups consisted of 62 (59.0%) groups of motorcyclists including 211 vehicles (64.9%); 36 (34.3%) groups of all-terrain-vehicles (ATV) including 96 (29.5%) vehicles; 3 (2.9%) groups of sand rails including 4 (1.2%) vehicles; 3 (2.9%) groups on quads including 11 (3.4%) vehicles; and 1 (1.0%) group on dune buggies including 3 (0.9%) vehicles. The other 54 OHV groups were either recorded on the data sheets as mixed groups (usually motorcycles with other vehicles) or were simply annotated as OHV.

Some 21% of the OHV user groups (34 out of 159) drove through the parking lot without stopping or stayed for less than 5 minutes, whereas only 1.5% (4 out of 259) of the non-OHV groups did so. Eighty seven (55%) of visitor groups arriving on OHV stayed for 10 minutes or less with many of these stopping only to use the restroom, compared to 20 (7.7%) of the non-OHV groups. Visitors arriving by OHV who stayed longer than 10 minutes tended to behave as the other visitors and looked at the displays, talked with the Naturalist at length about tortoises and other wildlife they have seen while riding, picnicked in the kiosk, or took long walks looking for tortoises. Only 3 of the OHV groups stayed for an hour or more compared to 127 out of 232 non-OHV groups. The average stay of the non-OHV groups is slightly underestimated because length of stay requires that both arrival and departure times be recorded but several non-OHV groups did not depart until after the Naturalists were off duty.

General information on visitors

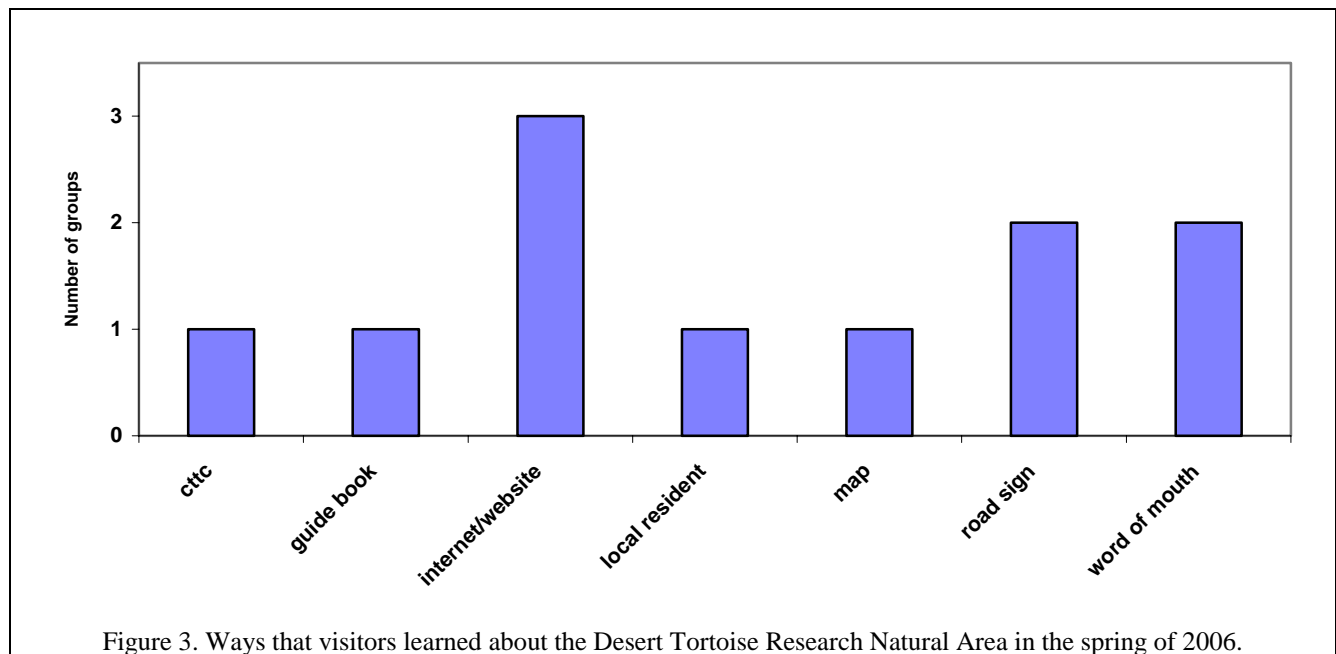
The Naturalist made contact with 373 (89%) of the 418 visitor groups contacting a total of 1307 (92%) individuals. This included contact with 257 (99%) of the 259 non-OHV groups and 119 (75%) of the 159 OHV groups. The lower percentage of contact with groups arriving on OHVs was because of the proportionately higher number of OHV groups that did not stop or stayed for only a few minutes.

Most (85%) of the 218 visitor groups who completed the Visitor Survey Form, made an entry in the Recreation Register or reported their place of residence to the Naturalist were from California (Appendix 3). There were 20 groups of visitors from thirteen additional states including Alabama, Illinois, Massachusetts, Michigan, Minnesota, New York, North Carolina, Ohio, Oregon, South Dakota, Vermont, Washington, and West Virginia, and from eight foreign countries including one group each from Brazil, Ireland, Mexico, New Zealand, and Switzerland, two each from Canada, and France, and four groups from England.

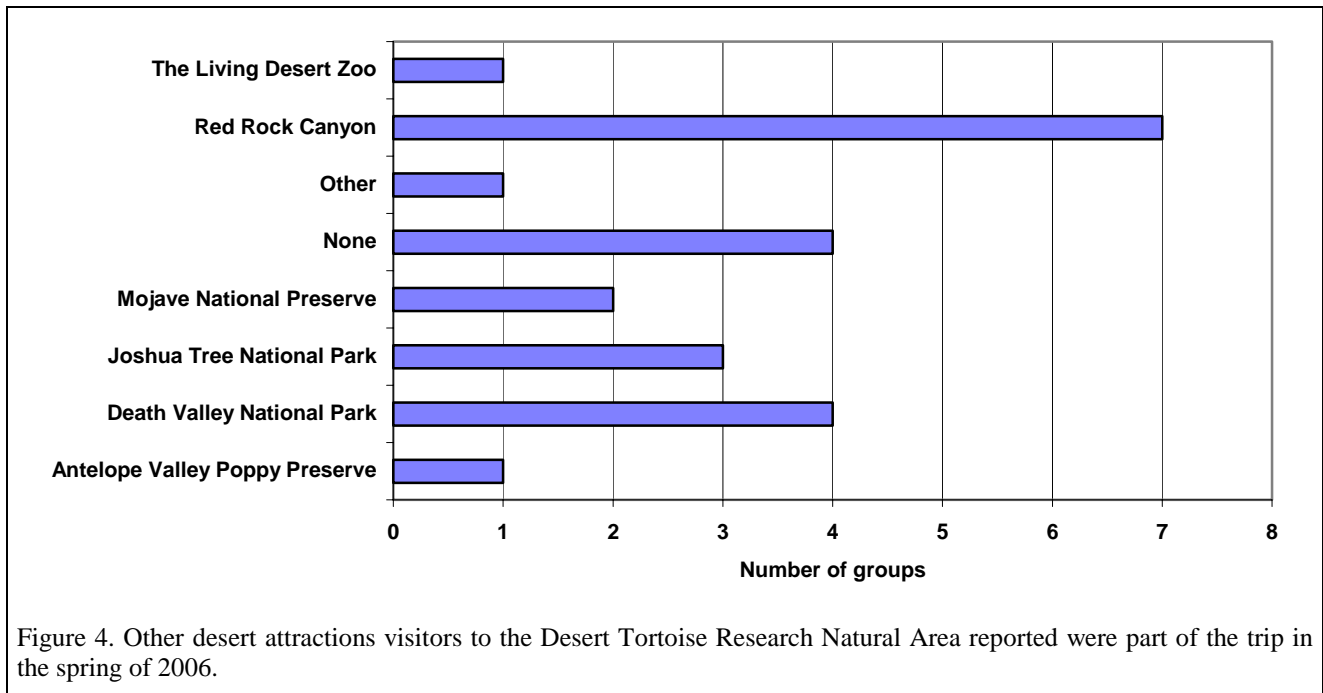
Members of 13 groups completed Visitor Survey Forms, representing a 3.5% sample of the 373 visitor groups contacted by the Naturalist. This compares with 37 groups representing a 6.9% sample of the 538 visitor groups contacted by the Naturalist in 2005, 46 groups, representing a 13% sample of 357 visitor groups contacted by the Naturalist in 2004, 42 groups, representing a 10% sample of 419 visitor groups contacted by the Naturalist in 2003, 37 groups, representing a 9.6% sample of the 387 visitor groups contacted by the Naturalist in 2002 and 62 out of the 366 visitor groups (17%) contacted by the Naturalist in 2001.

Of the 13 respondents to the visitor survey, 2 (15%) had visited the DTNA before and 11 (85%) had not. The sample size was too small to do further analysis. Only one respondent (8.3%) out of the 12 who completed that line on the form indicated that they were DTPC members.

Visitors reported learning about the DTNA in a variety of ways in the visitor survey. The most common ways were from the Internet, road signs and by word of mouth (Figure 3).



Among visitor groups responding to the survey, 4 (31%) indicated that the DTNA was the sole destination of their outing. The rest of the surveyed visitors indicated that their visit to the DTNA was part of a trip that included one or more destinations (Figure 4). Those visitors planning on visiting other desert attractions most frequently reported that they would be visiting Red Rock Canyon State Park which is relatively close to the DTNA followed by the Mojave National Preserve, and Joshua Tree and Death Valley National Parks.



Interpretive services

Naturalists made contact with 373 visitor groups comprising 1307 individuals. A number of school and other organized groups received short presentations and guided tours by the Naturalists. These included the group of docents from Oakland National Science Museum, CSUB group, the Citrus College group, the University of Redlands group, groups from Tulane and Springville High Schools, and the Ridgecrest girl scouts troupe. The Naturalists also escorted a number of smaller visitor groups around the trails.

Visitor knowledge and expectations were varied and diverse, and this is reflected in the comments in the Naturalist's data sheets and in written comments made by visitors. Most visitors had a basic understanding that the desert tortoise population is in trouble, and many were familiar with some of the reasons for the decline of the species. Many visitors knew the desert tortoise was protected by state and federal law, but tended to use the terms "rare," "threatened," or "endangered" interchangeably.

The comment written on a visitor survey form "Have juvenile captive bred (permitted) tortoises" was echoed by a number of other visitors orally (see Appendix 4 for visitor comments). Many visitors owned registered captive desert tortoises, and were often members or had been educated through the activities of the California Turtle & Tortoise Club and similar organizations. These visitors exhibited tortoise knowledge in particular, and enjoyed sharing entertaining stories and behavioral observations with the Naturalist.

Many of the visitors mentioned their use of the DTPC website and its value in educating themselves and other members of the public. Most visitors made a point to mention their appreciation of the DTPC's efforts in conserving the area and the benefits of the DTNA. The trails and opportunities to enjoy nature afforded by the DTNA were the subject of many written comments such comments as "Well sign posted and good trail guides"; "Very nice and informative"; "Nice place. My kids loved. We loved too"; "We are having a lot of fun seeing tortoises wild!"; and, "Very nice. Keep up the good work."

Some of the visitors arriving on OHVs were supportive, others not so. One OHV group riding dirt bikes stated that tortoise densities were higher outside DTNA. The Naturalist took this as an opportunity to explain that the biological data shows a 3 to 1 ratio of desert tortoises inside versus immediately outside the DTNA fence line even though the fence is permeable to tortoises. Other OHV enthusiasts expressed their genuine interest in the DTNA and environmental issues related to desert conservation.

As in previous years, many of the written responses on the Visitor Survey Form or in the Register are comments strongly supporting the value of having a host interpreter present. Many visitors valued the opportunity provided to learn useful information about desert tortoises and their habitat from the Naturalist leaving comments such as “Helpful, friendly naturalist”; “Thanks! Saw burrowing tortoise thanks to guide”; “Thanks Ed for leading us to the tortoise!”; “Appreciate ranger’s info and guide to see a tortoise”; and “Thanks Chuck for an informative visit!”.

Many visitors mentioned the location of tortoise sightings in the Register so that others would know where to look. Visitors also listed other animal species they had encountered. Locality information cited included references to points on the ground “2 adults (1 male 1 female) Animal Trail #20”; “Saw a tortoise on Animal Loop marker 15”; and “Saw 2 tortoises and a Mojave rattlesnake (Main Loop #2)”.

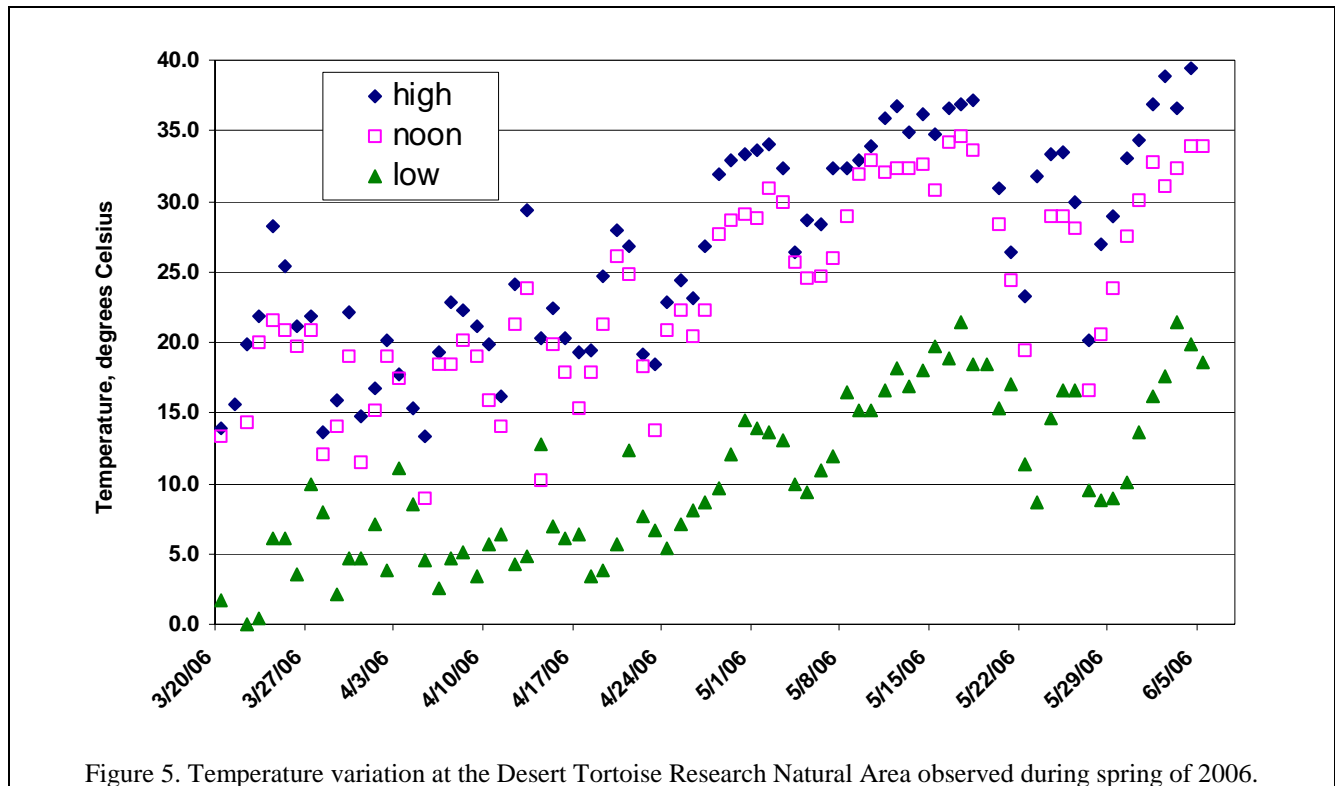
Visitors that were unable to find a tortoise usually expressed some disappointment, but enjoyed seeing flowers, lizards, and snakes, and just walking through the desert. Typical comments being “No tortoise, but still loved it!”; “We were here 2 years ago -- March April successful! Not successful this time!”; and, “Nice place. We saw some lizards and jack rabbits. No tortoises at this time.” A number of visitors unsuccessful on their first try made return visits during the season to try to see desert tortoises. And the complementary was also true. One OHV enthusiast who was excited by seeing a desert tortoise at the IC brought his father the following day to see a tortoise too.

As part of his duties, the Naturalist replaced the Carsonite posts and stickers on the Animal Loop, greatly improving the appearance of the trail.

Monitoring

Daily Temperatures

Figure 5 shows the daily low, noon and high temperatures recorded by the Naturalist from March 20 to June 6, 2006. The average daily low, noon and high temperatures were $10.2 \pm 5.7^\circ\text{C}$ ($44.9 \pm 12.9^\circ\text{F}$), $23.4 \pm 7.0^\circ\text{C}$ ($65.7 \pm 15.0^\circ\text{F}$), and $26.5 \pm 7.3^\circ\text{C}$ ($73.3 \pm 19.2^\circ\text{F}$).



Seasonal rainfall data was obtained for the Mojave station from the Western Regional Climate Center website. The Mojave station is the closest reporting station to the DTNA. Rainfall for the 2005-2006 season totaled 5.98 inches. Rainfall for the previous 2004-2005 season totaled 11.33 inches.

Sightings of tortoises by visitors

A total of 132 (46%) of 288 visitor groups contacted by the Naturalist as they were leaving the DTNA saw at least one desert tortoise during the 82 days in 2006 (Table 5). The 132 groups included 525 persons, or 50% of visitors that the Naturalist reported on. This percentage is high in part because one tortoise was seen by 2 of the largest visitors groups that included 90 individuals. It was also helped by desert tortoises being present found in the IC parking area and on the entry road on 15 days (see Table 9). This is the second season in a row of high encounter rates between visitors and desert tortoises. In spring 2005, a total of 192 (37%) of 523 visitor groups including 580 persons, or 39% of visitors that the Naturalist contacted, saw at least one desert tortoise.

Forty six percent (46%) of visitor groups contacted by the Naturalist in 2006 saw at least one desert tortoise. For visitor groups arriving on OHVs, 25 out of 62 (40%) groups contacted saw at least one desert tortoise. However, the latter number is an overestimate of the actual percentage of OHV riders who saw tortoises because the Naturalist was unable to determine if the 22% of OHV riders who stayed for 5 minutes or less saw a desert tortoise. Given the shortness of their stay, most of these are unlikely to have.

Table 5. Tortoise sightings by visitors at the Desert Tortoise Research Natural Area in the spring of 2006.

Tortoises seen	Number of groups	Number of visitors	Length of Stay
0	156	524	54.1 ± 40.5
1	85	409	70.8 ± 47.4
2	34	85	112 ± 121
3	7	16	140 ± 55.1
4	4	10	207 ± 83.5
>4	2	5	105 ± 21.2
1 or more	132	525	89.7 ± 79.7

Forty seven (16%) visitors groups including 116 (11%) individuals reported seeing more than 1 tortoise. In 2005, fifty two groups including 165 individuals reported seeing more than 1 tortoise on their visit. This compares to only 31 groups comprising 55 individuals seeing more than 1 tortoise in 2004, 16 groups comprising 78 individuals seeing more than 1 tortoise in 2003, 29 groups comprising 66 individuals seeing more than 1 tortoise in 2002, and 38 groups comprising 129 individuals seeing more than 1 tortoise in 2001.

Table 6. Tortoise sightings by visitors at the Desert Tortoise Research Natural Area by month in the spring of 2006.

Month	Number of groups	%	Number of visitors	%
March 2006	13	24%	107	39%
April 2006	95	63%	364	68%
May 2006	21	29%	50	22%
June 2006	3	33%	4	22%

Tortoises were observed on 7 out of 16 days in March, 27 days out of 30 in April, 12 days out of 31 in May, and 2 days out of 5 in June. Twenty four percent (24%) of visitor groups contacted by the Naturalist

reported seeing at least one tortoise in March, sixty three percent (63%) in April, twenty nine percent (29%) in May and thirty three (33%) percent in June (Table 6). In 2005 with its unusually high rainfall and extended season for the desert annuals, forty two percent (42%) of visitor groups contacted by the Naturalist reported seeing at least one desert tortoise in March, thirty five percent (35%) in April, thirty four percent (34%) in May and twenty three (23%) percent in June.

The relationship between the number of tortoises seen and length of stay was investigated by regression analysis (table 4). The number of tortoises seen correlated positively with the length of visitor stay (R squared = 0.14; p<0.01). The longer the stay, the more likely was a visitor to encounter a tortoise.

The relationship between visitor group size and whether or not they encountered a tortoise is examined in Table 7. As was the case in 2005, the size of groups not seeing a desert tortoise was the same as the size of groups that saw 1 or more desert tortoises and larger groups were not more likely to see a tortoise than smaller groups.

Table 7. Tortoise sightings at the Desert Tortoise Research Natural Area in 2006 by visitor group size.

Tortoises seen	Size of group
0	3.38 ± 4.20
1	4.81 ± 8.18
2	2.50 ± 2.22
3	2.29 ± 1.11
4	2.50 ± 2.38
>0	3.41 ± 4.81

Comparison of visitation and sightings of tortoises by visitors in prior years

Comparison of the 2006 visitation rates to those of previous years is complicated by variations in length and hours of service by the Naturalists, and minor variations in monitoring and reporting but some general conclusions can be drawn.

Figure 6 shows daily visitation (number of visitors per day) and the percentage of visitors who saw a live tortoise recorded by DTPC Naturalists each spring between 1989 and 2006.

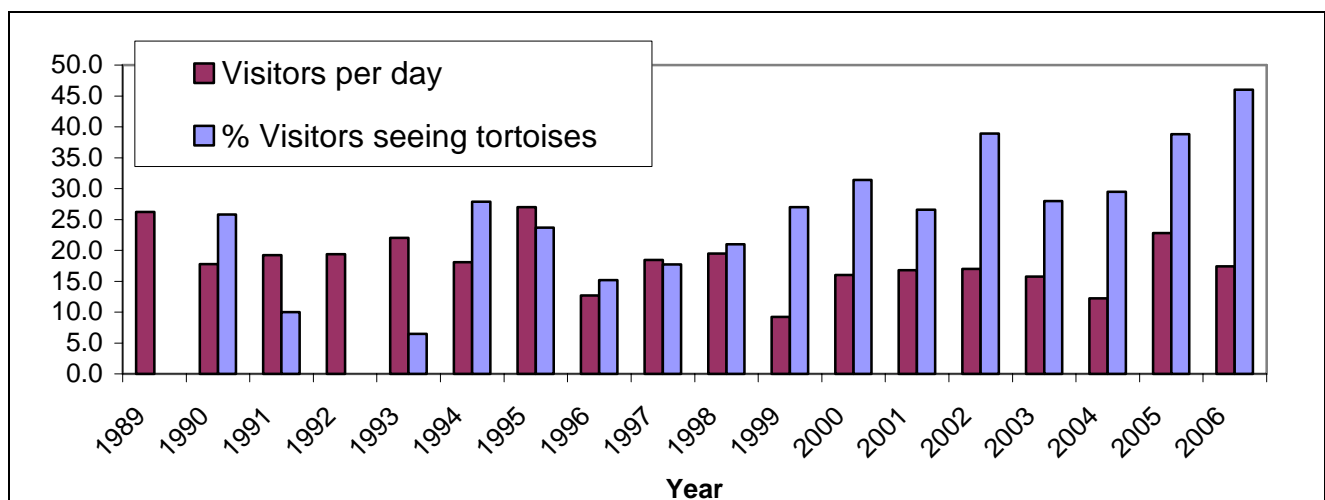


Figure 6. Daily visitation to the Desert Tortoise Research Natural Area and number of visitors seeing tortoises recorded by Naturalists stationed at the Interpretive Center during the spring season from 1989 to 2006.

The 1427 individual visitors in 418 visitor groups recorded on the 82 days the Naturalists were on duty averages to 5.1 ± 5.2 groups per day and 17.4 ± 22.2 individuals per day. The overall mean visitation rates documented by the DTNA Naturalists for the period 1989 to 2006 are 6.3 ± 1.8 groups per day and 18.2 ± 4.5 individual visitors per day. Although overall visitation in 2006 was slightly lower than the 17 year average it was still the second highest since 1988 (Figure 6).

The percentage of visitor groups that saw a desert tortoise on their visit in 2006 was 46% and the percentage of individual visitors seeing a desert tortoise was 50%. The percentage of visitor groups that saw a desert tortoise on their visit in 2005 was 36.7% and the number of individual visitors seeing a desert tortoise was 38.8%. These are among the highest percentages of visitors encountering a desert tortoise on record (Figure 6). Between 1989 and 2005, the mean percentage of visitors seeing a desert tortoise ranged from 6.5% to 39.5% with a mean of $25.9\% \pm 10.4$. This mean was greatly exceeded in both 2005 and 2006.

Thirty nine percent of visitor groups arrived by OHV in 2006. Figure 7 shows the percentage of visitor groups that arrived by OHV each spring between 1989 and 2006 excluding the three years 1992, 1995 and 1996 for which data was not available.

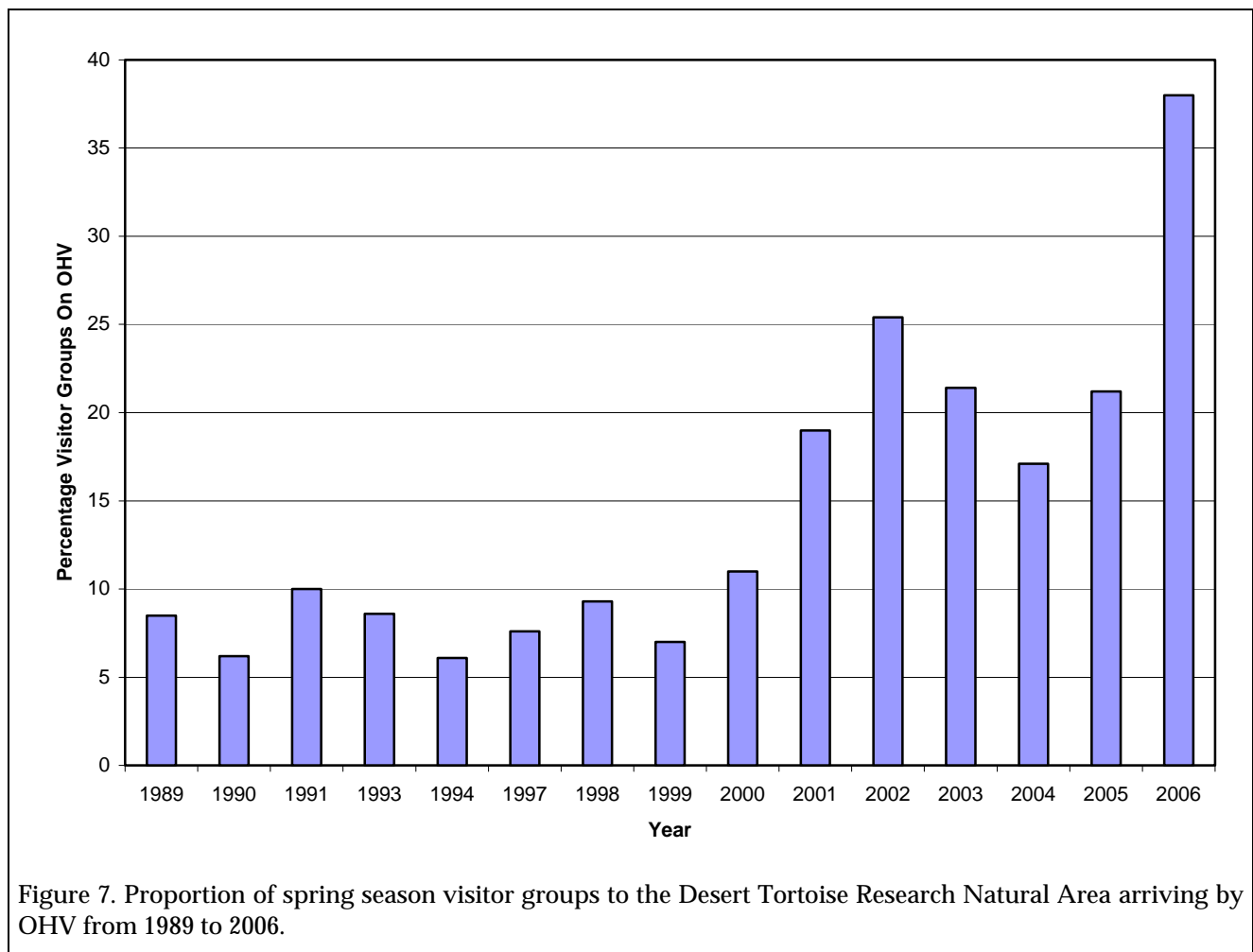


Figure 7. Proportion of spring season visitor groups to the Desert Tortoise Research Natural Area arriving by OHV from 1989 to 2006.

Between 1989 and 2006, the mean percentage of visitors arriving at the DTNA by OHV was $14.4\% \pm 9.12$. As can be seen in Figure 7, the proportion of visitors arriving on OHV shows an increase, particularly in the last seven years (since 2000). This increasing trend is statistically highly significant (ANOVA $p < 0.001$, regression coefficient=0.76 for all years). Because the OHV user groups after 3 times as many vehicles per group as non-OHV visitor groups, the number of motorized vehicles being driven into the DTNA is also increasing.

Visitor behavior

Generally, visitors to the Interpretive Center were respectful and well behaved. Littering along the trails and in the parking lot was not a problem.

No major incidents occurred, and law enforcement was not called for any responses during the season. A few OHV visitors had to be reminded by the Naturalist to keep their speed down, stop churning up gravel in the parking lot, and to stay on the access route and in the lot. Several visitors complained to the Naturalist about the noise generated by off road vehicles being operated in the IC and in adjacent habitat.

Examples of minor incidents noted in the data sheets included incidents of off road driving at the IC. Such an incident occurred on April 14, 2006 when the Naturalist chased a group of 3 dirt bikers off habitat. Groups of OHVs looping along the entry road and passing though the IC parking area without stopping were a regular occurrence, especially on weekends. Often these groups traveled at high speed, were very noisy and were a nuisance to other visitors. Some times visitors on OHVs responded to cautions by the Naturalist such as occurred on April 15, 2006 when 3 riders entered the parking area at high speed and slowed down after being warned. Other dirt bike riders slowed down while in the parking area but then accelerated on the way out. On May 27, 2006 a group of 3 dirt bikers drove by the Naturalist in the parking area and then stopped in the back of the parking area where one of them urinated. On May 28, 5 dirt bikers roared through the parking area together at high speed.

Law enforcement officers visited the DTNA on two days. On April 15, 2005 two BLM Ranger patrols came to the DTNA. On May 28, 2006, two members of the California City Police Department came through on patrol. A California Department of Fish and Game Warden visited the DTNA on April 3, 2006, and exchanged information with the Naturalist. Two BLM biologists participated in the DTNA work party in April, and provided materials and equipment for the Naturalist. The BLM also provided a portable radio in case an emergency contact needed to be made.

Release, collection and harassment of wild tortoises and other wildlife

Intentional harassment of tortoises was not observed, but visitors frequently had to be reminded to step back and observe the wild tortoises from a respectful distance. Occasionally excited visitors were reminded that not only tortoises, but snakes, lizards, insects, and plants are all protected within the DTNA, and that capture, collection, or harassment are not permitted.

No attempted collection of a wild tortoise was observed. No releases of tortoises were observed.

On May 26, 2006 a motorcycle visitor reported that he had seen a dead juvenile desert tortoise that had been run over and killed by an off-road vehicle on the knoll 1 mile NE of the Interpretive Center. He had observed carcass the previous week.

Resident tortoise observations

The Naturalist and visitors observed tortoises on 49 out of the 82 days (60%). The Naturalist and visitors sighted tortoises on 7 days in March, on 27 days in April, on 13 days in May, and on 2 days in June.

Eleven individual marked tortoises (#395, #596, #599, #600, #789, #935, #1009, #1055, #1056, #1059, and XX71) (Table 7) and at least 13 different unmarked tortoises were observed. Three of the unmarked tortoises remained close to the IC and were seen frequently and were "named" by the Naturalists to aid in reporting their identification (adult male Franklin, and adult females Pat and Starfoot) (Table 7). The damaged carcass of a marked adult female tortoise was found in a wash on March 23, 2006 and partially identified as XX57. Six of the live marked tortoises had also been seen during the 2005 season. Desert tortoise #789, has been observed every year since 2000. Desert tortoises seen in 2005 included 11 marked animals (#467, #596, #599, #602, #789, #983, #999, #1055, #1056, #1065, #1151) and as many as 16 unmarked animals. In 2004, 9 marked animals (#212, #467, #599, #789, #979, #999, #1009, #1055, #1059) and as many as 16 unmarked animals (including a captive brought to the DTNA and given to the Naturalist) were observed. In 2003, 13 marked animals (#212, #467, #599, #672, #789, #849, #893, #999, #1055, #1059, #1091, #1108, #1151)

and 13 unmarked animals were observed. In 2002, 12 marked animals (#212, #467, #568, #573, #595, #789, #827, #1060, #1083, #1128, #1129, and #1151) and 12 unmarked animals were observed. In 2001, 8 marked animals (#420, #568, #573, #789, #894, #983, #999, #1004) and 14 unmarked animals were observed. In 2000, 8 marked animals were reported (#467, #568, #573, #789, #999, #1002, #1108, and #1054).

On May 6, 2006 visitors and the Naturalist saw 8 different individual tortoises. This included a juvenile that was found on it's back near the DL by the Naturalist. The tortoise was righted. It appeared unharmed and was left where it was found.

On April 4, 2006, Naturalist Hemingway found Desert Tortoise eggshell fragments in the mouth of an old tortoise den between markers 31 and 32 on the Discovery Loop.

Table 8. Frequency of observation of identified resident desert tortoises at the Desert Tortoise Research Natural Area in spring 2006.

Tortoise	Sex	Size	Number of days observed	Comments	
#395	F	Adult	1	5/6/06	Seen near the plant loop.
#596	F	Adult	1	5/6/06	Moved from the AL to the kiosk
#599	F	Adult	11	4/7/06 4/28/06	Observed being mounted by #1056. Observed being mounted by #1059.
#600	M	Adult	1	4/15/06	Seen by pallet burrow on AL.
#789	F	Adult	3	5/3/06	#789 was browsing near the kiosk when Starfoot walked through the kiosk at 11:10. #789 approached bobbing her head. Starfoot bobbed head and pushed #789 around for about 5 minutes. Both remained near the kiosk and by 14:00 were both in the shade of the kiosk. #789 left at 1600 heading for the DL. By 16:30 Starfoot was gone.
#935		Adult	1	3/26/06	Reported by visitors in the Camp E area adjacent to the DTNA.
#1009	F	Adult	2		
#1055	F	Adult	1	4/26/06	First observed walking and sniffing ground by the restroom. Observed in ML area for about 2 hours.
#1056	M	Adult	14	4/7/06	Observed mounting #599
#1059	M	Adult	17	4/28/06	Observed mounting #599 twice at 13:00 and 16:45
#XX71		Adult	1	5/8/06	Seen in burrow NE of the PL. Only the last 2 digits of tag visible.
Franklin	M	Adult	5		Seen walking along entry road and by the parking area a number of times.
Pat	F	Adult	2	4/18/06	Walked around the IC parking lot for most of the afternoon.
Starfoot	F	Adult	6	4/20/06 5/3/06	Observed eating filaree, grass and an owl or raven pellet. Observed with #789 in the kiosk. See #789 entry.

Although desert tortoise #1059 was observed on more days than #1056, tortoise #1056 was seen by

more visitors. On March 25, desert tortoise #1056 was seen by 30 visitors, including the CSUB field trip attendees. On March 26, desert tortoise #1056 was seen by the 60 member group from Citrus College .

A number of intraspecific interactions between tortoises were observed, these are summarized in Table 8. In addition to the intraspecific interactions reported in Table 8, a visitor observed 2 unidentified tortoises mating on the AL on April 24, 2006. That location is close to burrows used by tortoises #1056 and #599. Another visitor observed 2 tortoises together on Randsburg Mojave Road on April 25, 2006.

Table 9. Observations of resident Desert Tortoises at the Desert Tortoise Research Natural Area Interpretive Center parking lot and entry road in spring 2006.

Date	Day	Tortoise	Location
4/9/06	Sunday	unmarked adult F	IC Parking area
4/15/06	Saturday	unidentified adult	IC entry road
4/16/06	Sunday	unmarked adult F, long rear claws	IC Parking area
4/18/06	Tuesday	“Pat”	IC Parking area
4/20/06	Thursday	“Starfoot”	IC Parking area
4/21/06	Friday	“Starfoot”	IC Parking area
4/22/06	Saturday	unmarked adult F	IC Parking area
4/26/06	Wednesday	#1055	IC Parking area
4/29/06	Saturday	#789	IC Parking area
		unmarked adult F	IC Parking area
		unmarked J	IC Kiosk
4/30/06	Sunday	unmarked J	IC Kiosk
5/1/06	Monday	unmarked adult F	IC Parking area
5/6/06	Saturday	unidentified A	IC entry road
5/9/06	Tuesday	“Starfoot”	IC Parking area
5/10/06	Wednesday	“Starfoot”	IC Parking area
5/17/06	Wednesday	“Franklin”	IC entry road

Tortoises were observed in the parking lot or on the entry road on 15 (18%) of the 82 days that the Naturalists were on duty (Table 9). Visitors reported observing tortoises on periphery roads around the DTNA on five days (4/22/06, 4/25/06 (2), 5/17/2006, 5/23/2006, 5/27/06).

Venomous animals

Live rattlesnakes were reported to or sighted by the naturalist on ten days (12%) between March 16 and June 5, 2006. On nine days, the sighting was of Mojave rattlesnakes. This included a number of sightings by the restroom at the IC. The other sighting was of a sidewinder rattlesnake observed on the entry road. It

was not necessary to move the animals, but visitors were made aware of a known location of the snake before they left for their walk.

In addition to the live sightings, a dead Mojave rattlesnake was observed on the Randsburg-Mojave Road and a dead sidewinder on Chrysler Drive.

Raven observations

Ravens were observed on 39 (48%) of the 82 days that the Naturalist was present. Ravens were observed on 7 days in March, 22 days in April, 10 days in May and 0 days in June. These observations were usually of small flocks of 1 to 8 birds with multiple sightings of ravens made throughout the day. Ravens were observed feeding on trash at nearby Camp E, and on two occasions were observed eating road killed wildlife.

On the first day of Naturalist duty at the DTRNA, a large, incomplete nest of twigs, sticks and some trash such as string was found on the concrete floor of the kiosk underneath the interpretive panels. The Naturalist removed the nest on March 23, 2006. A pair of ravens continued to be sighted regularly at the kiosk. They placed sticks and twigs on the kiosk floor on March 26, 29, and April 4, 11, 12 and 15. On each occasion the Naturalist removed the material to discourage nesting in the kiosk.

Observations of other animals

A list of vertebrate species observed in and around the Interpretive Center in spring 2006 can be found in Appendix 5. Mohave ground squirrels were observed on fifteen days (Table 10). Burrowing owls were seen on 5 days, as were the rare short-eared owl, *Asio flammeus*, was seen in April (Table 10). Short-eared Owls have been seen near the DL for the last 3 years (Connor & Kaur, 2004; Connor & Kaur, 2005). In April, a golden eagle was observed feeding on road kill on Neuralia Boulevard 1 mile west of the DTNA. As in 2004 and 2005, there were several sightings of the roadrunner, *Geococcyx californianus*, which had not been observed at the DTNA for the previous 6 years. There was a repeat sighting of the blue-gray gnatcatcher, *Poliptila caerulea* first seen at the DTNA in 2005 (Connor & Kaur, 2005).

Table 10. Sightings of other listed, sensitive or rare species at the Desert Tortoise Research Natural Area in the spring of 2006.

Species	Date	Time	Location	Notes
Burrowing Owl, <i>Athene cunicularia</i>	4/24/06	14:00	Section 5	Seen by Connor & Hemingway
	5/8/06	08:30	DTRNA Entry road	
	5/15/06	15:30	E of Randsburg-Mojave Road	Found dead about 100 meters east of the road alerted by circling Turkey Vulture.
	5/15/06	17:00	Section5/6 fence	Seen sitting on fence above burrow.
	6/4/06	20:00	DTRNA entry road	Perched on entry sign.
Short-eared Owl, <i>Asio flammeus</i>	3/16/06	12:15	DL	Pair flushed
	3/18/06	09:00	IC	1 bird
	3/25/06	07:15	DTRNA entry road	Flying over entry gate.
	4/1/06	11:30	DL	1 bird in flight
	4/13/06		kiosk	1 bird flushed after dark

Species	Date	Time	Location	Notes
Mohave Ground Squirrel, <i>Spermophilus mohavensis</i>	3/23/06	16:15	140 Street 0.5 m S	
	3/24/06	19:00	DTRNA entrance	by the Randsburg-Mojave Road sign
	3/30/06	10:00	PL12	Ran across trail
	4/7/06	13:00	AL22	
	4/11/06	15:30	0.25 miles NW of Section 34/27/26 intersection	Observed by D. Pellegrini
	4/15/06	12:00	DC	
	4/24/06	12:00	AL just N of last wash	Froze near burrow, then entered burrow.
	4/25/06	14:30	AL7	
	4/30/06	9:00	AL9	
	5/04/06		Section 31	3 squirrels observed by D. Laberteaux
	5/04/06		Section 19	2 squirrels observed by D. Laberteaux
	5/5/06	11:30	IC	
	5/6/06	16:15	80 m S of restroom	
	5/7/06	16:00	DTNA entry road	
	5/8/06	14:00	PL2	
	5/11/06	7:50	Randsburg-Mojave Road	
Loggerhead Shrike, <i>Lanius ludovicianus</i>	4/12/06		Section 11/14	Observed by D. Pellegrini
	4/12/06	11:10	IC	
	5/04/06		Section 31	Observed by D. Laberteaux
LeConte's Thrasher, <i>Toxostoma lecontei</i>	Resident		IC	
	5/04/06		Section 31	Observed by D. Laberteaux
Swainson's Hawk	4/17/06	16:15	PL	
	4/26/06	12:50	ML	Flew over while Naturalist followed tortoise #1055
Golden Eagle, <i>Aquila chrysaetos</i>	4/28/06	11:00	Neuralia Blvd	Feeding on road kill (Hemingway).
Blue-gray gnatcatcher, <i>Poliophtila caerulea</i>	4/12/06		Section 11/14	Observed by D. Pellegrini

Although sightings of live Coyote and Kit Fox were made on a couple of occasions, a number of carcasses were observed (see table 11). DTPC contractors for the mustard removal project also reported finding a Kit Fox carcass west of the DTNA in early spring (LaBerteaux, personal communication).

Table 11. Observations of Coyote and Kit Fox at the Desert Tortoise Research Natural Area in the spring of 2006.

Species	Date	Location	Description
Coyote, <i>Canis latrans</i>	3/28/2006	IC	Standing yelping. Headed west.
	5/15/2006	Section 17 T31S R39E	Headless carcass found in wash. Head found about 3 meters away.
	5/23/2006	Randsburg-Mojave Road	Dead pup reported by visitors. No visible cause of death.
Kit Fox, <i>Vulpes macrotis</i>	3/30/2006	West of PL7	Kit Fox den complex identified
	4/8/2006	grid 17	Carcass, dead several months?
	4/11/2006	Section 27	Seen by D. Pellegrini, the fox hunkered down and may have been shaking.

Exotic Vegetation

In spring 2006, DTPC contracted with Eremico Biological Consulting to remove exotic mustard plants from the Cache Creek area of the DTNA (LaBerteaux, 2006). Exotic mustard plants were also observed on the disturbed habitat between the Randsburg-Mojave Road and the southeast corner of the DTNA. This area is known variously as Camp E and as the Pit. On May 12, the naturalist identified and removed a mustard plant that was growing about 100 meters south of the restroom.

DISCUSSION

This year the DTPC staffed a Naturalist at the DTNA for the 82 days covering the period March 16-June 5, 2006. Visitation averaged 17.4 individuals per day and 5.1 groups per day. Although overall visitation in 2006 was slightly lower than the 18 year average, it was still the second highest since 1998. The previous year, 2005, recorded the highest visitation since 1995 thanks to an exceptional 11.3 inches of rain that triggered a sensational wildflower display and lengthened the spring season. In contrast, rainfall in 2006 was only 6 inches.

Tortoises were observed on 27 out of the 30 days in April. Tortoises were present in the parking area or entry road on 10 of those days. April also recorded the highest visitation rate with 22.2 visitors per day. More than 2/3 (68%) of visitors contacted by the Naturalist reported seeing a tortoise that month. Although sightings of tortoises in May and June were lower, the overall percentage of visitor group reporting seeing a desert tortoise was a record 47%.

The most commonly seen tortoises were adult males #1056 and #1059 that were seen on 14 and 17 different days respectively. Adult female #599 was seen on 11 days. Tortoise #599 was located on the same stretch of the Animal Loop trail that she occupied in 2004 and 2005. She was the most commonly seen tortoise in 2004 and 2005. She was observed by visitors being courted and mounted by #1056 on April 7 and twice by #1059 on April 28.

An interesting antagonistic interaction between 2 female tortoises was observed on May 3. Adult female #789 approached the unmarked adult female "Starfoot" bobbing her head. Starfoot responded by bobbing her head and pushing #789 over a 5 minute period. Both tortoises remained near the kiosk for about 5 hours. Female-female interactions are rarely seen and this was only the second recorded by the Naturalists at the DTNA. The first was in 2002, when 2 females were observed interacting about 25 meters from the kiosk (Connor 2002).

In 2006, a record 38% of visitor arrived on OHVs. A significant number of these groups did not stop but simply drove through the IC. Others stopped only to use the restroom. Because each individual member of an OHV group tends to ride their own vehicle, the OHV groups consist of multiple vehicles. The proportion of visitors arriving on OHVs has shown a statistically positive trend since 2000. Because the number of motorized vehicles entering the DTRNA is increasing, desert tortoises present in the parking area and on the entry road are being placed at increased risk of being taken. Measures need to be taken to better control vehicle entry to reduce this risk (see *Status of Year 2005 Recommendations* and *Year 2006 Recommendations* below).

Interestingly, many of the visitors who arrived on OHVs also expressed their concern for the desert. The diverse assortment of visitors, and the wide range of awareness, knowledge and perceptions they brought with them made interacting with the public both interesting and enlightening for the Naturalist. The Naturalist also provides a clear degree of security for the area's resources and integrity. Continuing to provide an on-site seasonal Naturalist with sound interpretive skills and enthusiasm is an important tactic in accomplishing the DTPC's goals and objectives.

An additional management issue of growing concern is the presence of exotic mustards on private lands adjacent to the DTNA particularly the Camp E area immediately southeast of the IC. In 2006, the DTPC initiated a program to control the mustard infestation in the southwest corner of the DTNA. The City of California City needs to be encouraged to address the infestation at Camp E if these noxious exotics are to be brought under control.

A number of unusual wildlife observations were made in 2006. A pair of ravens attempted to build a nest on the floor of the kiosk. Even though twigs and sticks left by the raven pair were removed daily, they persisted in their construction attempts until April 15. Another unusual occurrence noted in 2006 was the finding of a number of recently deceased canids in or near to the DTNA. Two Coyote and 2 Kit Fox carcasses were logged. In addition, in April a visiting ornithologist encountered a live Kit Fox that appeared to show unusual behavior consistent with it being diseased. It is possible that this is due to a localized outbreak of

canine distemper or other infectious disease.

Status Of Year 2005 Recommendations

The recommendations for 2005 were:

- (1) On holiday weekends have two naturalists on duty.
- (2) Upgrade weather-monitoring capabilities to facilitate rain and wind measurement.
- (3) Develop and adopt measures to minimize risks to tortoises and other wildlife from vehicles in and around the DTNA. Suggestions include:
 - (a) Limit vehicle speeds to 5 mph.
 - (b) Extend the fence along the DTNA entry road to the Randsburg Mojave Road. This would: Make the DTNA entrance more obvious and attractive to visitors. It would restrict entry to vehicles arriving on the Randsburg Mojave Road eliminating cross-country travel. It would allow entry to the DTNA parking lot to be restricted to street legal vehicles and reduce the number of dangerous drive-through visits. It would also help manage the illegal off-roading now occurring on BLM lands in section 2 north of Randsburg Mojave Road where no routes are designated.

The DTPC Executive Director proposed extending the fence along the DTNA entry road and around the adjacent public lands to the road to the BLM at the Annual BLM/DTPC Coordinating Meeting in June 2005. In 2006, the BLM initiated work on the required Environmental Assessment to put this project in effect. As of December 2006, Environmental Assessment CA-650-2007-113 DTNA Entrance Fence is still pending at this time.

Year 2006 Recommendations

1. DTPC should develop a plan to replace the current DTPC motor home.
2. DTPC should work with the BLM to ensure timely implementation of the DTNA Entrance Fence project. This is fast becoming critical due to increasing use of OHVs on the entry road and in the IC parking area.
3. Have 2 DTPC personnel on duty on busy holiday weekends. This would leave one employee to work the DTDC, and the other to offer interpretive services on the trails during periods of highest visitation.
4. Request more frequent patrols by BLM law enforcement rangers and other staff during the spring season to give a better agency presence and handle enforcement issues that occur.
5. DTPC should work with the City of California City to better manage environmental issues associated with Camp E.

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We thank the following organizations and individuals for contributing to the ongoing success of the DTPC Naturalist program: the many DTPC members and contributors for their financial support; BLM support staff who assisted the Naturalist and helped maintain the facilities; Susan Moore for supervising merchandise sales at the DTNA; BLM enforcement staff and the California City Police Department; and a special thanks to Field Manager Hector Villalobos and Bob Parker of the Ridgecrest Field Office of Bureau of Land Management California Desert District for their considerable support and help.

We dedicate this report to the memory of ornithologist Dharm S. Pellegrini (1963-2006) who helped the authors by providing bird lists and other support for the last 4 seasons.

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APPENDIX 1. Visitor survey form used at the Desert Tortoise Research Natural Area, spring of 2006.

VISITOR SURVEY FORM

for the

DESERT TORTOISE NATURAL AREA



Date of Visit: _____

Name: _____

Address: _____

State: _____ Zip: _____

Number in Party: _____

What other desert attractions are included in this trip?

- None
- Death Valley National Park
- Joshua Tree National Park
- Anza Borrego Desert State Park
- Antelope Valley Poppy Reserve
- Red Rock Canyon
- Mojave National Preserve
- The Living Desert Reserve
- Other (Please list)

How did you learn about the Desert Tortoise Natural Area?

Is this your first visit? YES NO

If not, how many times have you visited the DTNA? _____

Were the interpretive kiosk, self-guided trails, and naturalist informative and helpful?

YES NO

Are you a Desert Tortoise Preserve Committee member?

YES NO

Would you like information sent to you about the Committee and other desert conservation organizations?

YES NO

Would you like educational materials sent to you about the California Desert and the Desert Tortoise?

YES NO

ADDITIONAL COMMENTS:

Thank you for your visit and for completing this survey. Please return this form to the naturalist.

APPENDIX 2. Data sheet used by the Naturalist at the Desert Tortoise Research Natural Area in the spring of 2006.

Page 1

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____		Day _____		WEATHER DATA							
Name Ed Patrovsky				Temperatures LOW: _____ NOON: _____ HIGH: _____							
Start time (PST) _____				Winds _____							
End time (PST) _____				Cloud cover _____							
Total time (hrs) _____				Precipitation _____							
Group #	Number in group	Vehicle description (for identification of group only)	Arrival time (PST)	Departure time (PST)	Contact by naturalist?	OHV recreationalist?	# of tortoises seen	# of unknown gender	# of females	# of males	Visitor knowledge/Comments
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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21											
22											
Page totals											

APPENDIX 3. Reported places of residence of visitor groups to the Desert Tortoise Research Natural Area in the spring of 2006 from Visitor Survey Forms, Naturalist Data Sheets and the Recreation Area and Site Register.

Foreign	
Country	Number
Brazil	1
Canada	2
France	2
Ireland	1
Mexico	1
New Zealand	1
England	4
Switzerland	1

USA		
City	State	Number
Hawthorne	CA	1
Helendale	CA	1
Inglewood	CA	1
Inyokern	CA	1
King City	CA	1
La Canada	CA	2
La Habra	CA	1
La Mirada	CA	1
Lakewood	CA	1
Lancaster	CA	3
Livermore	CA	1
Lompoc	CA	1
Long Beach	CA	4
Los Angeles	CA	6
Marin	CA	1
Mendon	CA	1
Modesto	CA	2
Morro Bay	CA	1
Monterey	CA	1
Newberry Springs	CA	1
Newhall	CA	1
Norco	CA	3
Oakland	CA	3
Orange	CA	6
Oxnard	CA	2
Pacifica	CA	1
Palm Desert	CA	1
Palmdale	CA	3
Pasadena	CA	3
Pacifica	CA	1
Pearblossom	CA	1
Porterville	CA	1
Quincy	CA	1
Rancho	CA	1
Randsburg.	CA	1
Redlands	CA	1
Ridgecrest	CA	7
Riverside	CA	1
Rosamond	CA	4
Roseville	CA	1
Sacramento	CA	3
San Bernardino	CA	2
San Fernando	CA	1

USA		
City	State	Number
San Francisco	CA	3
San Luis Obispo	CA	1
San Mateo	CA	1
Santa Barbara	CA	3
Santa Clarita	CA	2
Santa Cruz	CA	1
Santa Rosa	CA	1
Saugus	CA	1
Simi Valley	CA	4
Springville	CA	1
Sunnyvale	CA	1
Sun Valley	CA	1
Susanville	CA	1
Tehachapi	CA	2
Temecula	CA	1
Thousand Oaks	CA	2
Torrance	CA	1
Tracy	CA	1
Tulane	CA	1
Valencia	CA	1
Ventura	CA	3
Visalia	CA	4
Waterford	CA	1
Watsonville	CA	1
Westchester	CA	1
West Covina	CA	2
West Hills	CA	1
	IL	1
	MA	3
	MI	2
	MN	1
Ithaca	NY	1
Hillsboro	NC	1
Akron	OH	
	OR	3
	SD	2
Pittsford	VT	1
Seattle	WA	2
	WV	1

USA		
City	State	Number
	AL	1
Alhambra	CA	1
Anderson	CA	2
Apple Valley	CA	1
Arroyo Grande	CA	2
Ashland	CA	1
Asuza	CA	1
Bakersfield	CA	3
Barstow	CA	1
Berkeley	CA	1
Bryan	CA	1
Burbank	CA	1
California City	CA	22
Canyon Country	CA	1
Carmel	CA	1
Castro Valley	CA	1
Chino Hills	CA	1
Claremont	CA	1
Clovis	CA	1
Corona	CA	1
Delano	CA	1
Del Aire	CA	1
Dothan	CA	1
Dublin	CA	1
Durham	CA	2
Eureka	CA	1
Fairfax	CA	2
Fontana	CA	2
Fresno	CA	3
Glendora	CA	1
Goleta	CA	1
Grass Valley	CA	1

APPENDIX 4. Comments from visitor survey forms (7 comments) and register (60 comments), Desert Tortoise Research Natural Area, spring of 2006.

Great experience - we saw one tortoise at her burrow. It was a highlight!
Learned off road riding. Visited 12-20 times
Going to camp at Red Rock tonight. Wish we had more time on a better day.
The tour was great. The plants were nice, the rattlesnakes very interesting and jack rabbits. The guide was nice. Thanks Chuck.
Very informative. Brochures were helpful. Local interpreter was great – very, very helpful.
Have juvenile captive bred (permitted) tortoises.
Saw jackrabbit, roadrunner, whiptail lizard, tortoise, rattlesnake.
Grandparents live in California City.
Interesting - no turtles or tortoises
No tortoise, saw squirrel
Saw tortoise "Fluffy" and desert horned lizard "Buffy"
Saw long lizard, harvester ants
Provide benches along path
Taking photos
This is good, very informational
Nice place - saw an awesome d. turtle (30+ years old)
Thanks! Saw burrowing tortoise thanks to guide
Good thanks!
Dirt riding
Dirt riding
Saw tortoise and sage sparrow
Thanks Ed for leading us to the tortoise!
Great spot
It is beautiful
Bassoons rock!
Saw 2 tortoises #1956?
1 tortoise
Black beetles, many flowers, too late in the day for tortoises
Nice nature walk with flowers. No tortoise observation.
5 tortoises, YES!!!
One tortoise one gopher snake!!!
Horned toad
3 tortoises, one horned lizard
4 tortoises, two horned lizards
1 red racer snake
Wow
Saw a tortoise on Animal Loop marker 15
Jack rabbit
Lizards, ground squirrels, jack rabbit, bird
Ready to see a tortoise and did!
Saw 2 tortoises and a Mojave rattlesnake (Main Loop #2)
First sighting in years! Great.
Very nice. Keep up good work.
Appreciate ranger's info and guide to see a tortoise

Confirmed Mohave ground sq. sighting
2 adults (1 male 1 female) Animal Trail #20
Lots of lizards no tortoises
We saw two tortoises
We are having a lot of fun seeing tortoises wild!
Saw one tortoise
Helpful, friendly naturalist
Desert Horned Lizard, Zebra Tailed Lizard
Nice place. We saw some lizards and jack rabbits. No tortoises at this time.
Nice place. My kids loved. We loved too.
Happy Mother's Day
Thanks Chuck for an informative visit!
Well sign posted and good trail guides.
Very nice and informative
We were here 2 years ago -- March April successful! Not successful this time!
To look for tortoises
Here to see the tortoises
Cool place.
Riding the bikes :)
Looking for turtles
No tortoise, but still loved it!
Riding
Here to see wildlife with daughter
Here to see the turtles

APPENDIX 5. Vertebrate species observed in and around the Interpretive Center and within 0.5 mile of the visitor area between March 16 and June 5, 2006. Underlined text indicates an addition to the inventory of vertebrate species.

CLASS REPTILIA

ORDER TESTUDINATA

FAMILY TESTUDINIDAE

Desert Tortoise

Gopherus agassizii

ORDER SQUAMATA

FAMILY IGUANIDAE

Zebra-tailed Lizard

Callisaurus draconoides

Leopard Lizard

Gambelia wislizenii

Desert Horned Lizard

Phrynosoma platyrhinos

Desert Spiny Lizard

Sceloporus magister uniformis

Side-blotched Lizard

Uta stansburiana

FAMILY TEIIDAE

Western Whiptail Lizard

Cnemidophorus tigris

FAMILY COLUBRIDAE

King Snake

Lampropeltis getulus californiae

Coachwhip Snake

Masticophis flagellum

Gopher Snake

Pituophis melanoleucus

FAMILY VIPERIDAE

Sidewinder Rattlesnake

Crotalus cerastes

Mojave Rattlesnake

Crotalus scutulatus

CLASS AVES

ORDER APODIFORMES

FAMILY TROCHILIDAE

Costa's Hummingbird

Calypte costae

ORDER CAPRIMULGIFORMES

FAMILY CAPRIMULGIDAE

Lesser Nighthawk

Chordeiles acutipennis

ORDER COLUMBIFORMES

FAMILY COLUMBIDAE

Mourning Dove

Zenaida macroura

ORDER CUCULIFORMES

FAMILY CUCULIDAE

Greater Roadrunner

Geococcyx californianus

ORDER FALCONIFORMES

FAMILY ACCIPITRIDAE

Golden Eagle

Aquila chrysaetos

Red-tailed Hawk

Buteo jamaicensis

Swainson's Hawk

Buteo swainsoni

FAMILY CATHARTIDAE

Turkey Vulture

Cathartes aura

ORDER GALLIFORMES

FAMILY PHASIANIDAE

California Quail

Callipepla californica

Chukar

Alectoris chukar

Gambel's Quail

Lophortyx gambelii

ORDER PASSERIFORMES

FAMILY ALAUDIDAE

Horned Lark

Eremophila alpestris

FAMILY CERTHIIDAE

Blue-gray Gnatcatcher

Poliophtila caerulea

FAMILY CORVIDAE

Common Raven

Corvus corax

FAMILY FRINGILLIDAE

Sage Sparrow

Amphispiza belli

House Finch

Carpodacus mexicanus

Bullock's Oriole	<i>Icterus galbula</i>
House Sparrow	<i>Passer domesticus</i>
Western Tanager	<i>Piranga ludoviciana</i>
Brewer's Sparrow	<i>Spizella breweri</i>
Western Meadowlark	<i>Sturnella neglecta</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
FAMILY HIRUNDINIDAE	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
FAMILY LANIIDAE	
Loggerhead Shrike	<i>Lanius ludovicianus</i>
FAMILY MIMIDAE	
Mocking Bird	<i>Mimus polyglottus</i>
LeConte's Thrasher	<i>Toxostoma lecontei</i>
Sage Thrasher	<i>Oreoscoptes montanus</i>
FAMILY PARULINAE	
Yellow Rumped Warbler	<i>Dendroica coronata</i>
FAMILY REMIZIDAE	
Verdin	<i>Auriparus flaviceps</i>
FAMILY TROGLODYTIDAE	
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>
FAMILY TYRANNIDAE	
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Say's Phoebe	<i>Sayornis saya</i>
ORDER STRIGIFORMES	
FAMILY STRIGIDAE	
Short-eared Owl	<i>Asio flammeus</i>
Burrowing Owl	<i>Athene cunicularia</i>
CLASS MAMMALIA	
ORDER CARNIVORA	
FAMILY CANIDAE	
Kit Fox	<i>Vulpes macrotis arsipus</i>
Coyote	<i>Canis latrans</i>
ORDER LAGOMORPHA	
FAMILY LEPORIDAE	
Black-tailed Hare	<i>Lepus californicus</i>
ORDER RODENTIA	
FAMILY CRICETIDAE	
Desert Woodrat	<i>Neotoma lepida lepida</i>
Deer Mouse	<i>Peromyscus maniculatus sonoriensis</i>
FAMILY HETEROMYIDAE	
Merriam's Kangaroo Rat	<i>Dipodomys merriami</i>
FAMILY SCIURIDAE	
Antelope Ground Squirrel	<i>Ammospermophilus leucurus</i>
Mojave Ground Squirrel	<i>Spermophilus mohavensis</i>