
Observations and Activities of the Naturalist at the Desert Tortoise Research Natural Area, Kern County, California: March 12 through June 7, 2004

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&

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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 12, 2004 to June 7, 2004. The Naturalist, Jan Kaur, was stationed at the DTNA Interpretive Center. During the 79 days the Naturalist was on duty, 387 visitor groups totaling 965 individuals were recorded at the interpretive center, and they stayed on average of 92 ± 90 minutes. The Naturalist contacted 357 (92%) of the visitor groups totaling 885 (91.7%) individuals.

Most visitors (74%) were from California. There were visitors from sixteen additional states including Arizona, Colorado, Connecticut, Washington D.C., Florida, Hawaii, Maine, Massachusetts, Nevada, New Hampshire, New Mexico, New York, Oregon, Pennsylvania, Vermont, and Washington, and nine foreign countries including one group each from Austria, Canada, Finland, France, Germany, Holland, Iceland, Luxembourg and Scotland.

Some of the visitor groups arrived by off-highway vehicle (66 groups; 17%). The mean stay of off-highway vehicle users (34.7 ± 30.8 minutes) was one hour shorter than for other visitors (104 ± 93.8 minutes).

Ninety eight visitor groups comprised of 233 (32.0%) individual members of the public reported seeing at least one tortoise. Thirty visitor groups comprised of 56 individuals saw two or more tortoises.

No attempts to collect wild tortoises in the interpretive center area were witnessed. No attempts to release captive tortoises were observed, however, one group of visitors brought an escaped captive tortoise, found wandering in the commercial area of California City, to the Naturalist.

Of 46 respondents to a visitor survey, 14 (30%) were repeat visitors. The most common ways that visitors learned about the DTNA were from tour books/guides, the DTPC website, presentations, and road signs and maps. The DTNA was the sole destination for 39% of the respondents to the visitor survey. Red Rock Canyon was the most frequently visited other attraction that was part of the outing to the DTNA.

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 Desert Tortoise Research Natural Area (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 2003, the DTPC staffed a Naturalist at the DTNA from mid-March to mid-June. This marks the fifteenth 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, Section 34. In the southeast corner of Section 34, a dirt road leads from Mojave-Randsburg Road to a small gravel parking area at the IC. 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 (URTD).

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 six days each week, approximately 10 hours per day for 79 days between March 12 and June 7, 2004. The Naturalist was headquartered at the DTNA Interpretive Center in the DTPC's "Desert Tortoise Discovery Center" (DTDC) motor home that was positioned between the parking lot and the main trailhead. The Naturalist leads scheduled tours, interacts with visitors, collects visitation data, monitors activity at the Interpretive Center, performs routine sign and trail maintenance, and sells DTPC merchandise.

The Naturalist on duty at the DTNA in 2004 was Jan Kaur. Michael J. Connor, Ph.D., Executive Director of the Desert Tortoise Preserve Committee supervised the Naturalist. Training was provided as needed by Michael J. Connor, DTPC Trustee Laura Stockton, and DTPC volunteer Susan Moore. The Naturalist had a cellular telephone, and was in regular contact with and 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

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, and Connor and Hemingway, 2003) were conducted to compare data gathered between 1989 and 2003 with the 2004 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.

Data was entered into a Microsoft © Access database and statistical analysis performed using 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.

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". Rainfall was measured in a rain gauge located near the DTDC.

Other monitoring duties included picking up trash and cigarette butts, cleaning the outhouse, keeping the outhouse door closed to prevent entry of rattlesnakes, removing black widow spiders from the outhouses, 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.

Another duty of the Naturalist was to sell DTDC products. Products were displayed on a table, along with educational materials, in front of the DTDC.

RESULTS

Collection of visitor data

On Site Presence

The Naturalist was present at the Interpretive Center on 79 days between March 12 and June 7, 2004. This included: 17 days in March; 27 days in April; 28 days in May; and, 7 days in June. The Naturalist was on duty about 10 hours a day for 6 days per week. The Naturalist stayed overnight in the DTPC's motor home so on site presence was higher than is indicated by her time on duty. The Naturalist took one day off each week, usually on Tuesday or Wednesday. These days have had the lowest visitation rates at the DTNA in previous years. The dates on which visitation and monitoring data were not collected were: March 23, March 30, April 6, April 20, April 28, May 4, May 11, May 18, May 25, and June 1.

Visitation

A total of 965 individuals in 387 visitor groups were recorded on the 79 days the Naturalist was on duty an average of 12.2 individuals per day (Table 1). This included 512 males, 340 females, and 113 unknown.

In 2003, a total of 1243 individuals in 467 visitor groups were recorded on the 79 days the Naturalist was on duty from 21 March through 19 June 2003, an average of 15.7 individuals per day. This included 632 males, 452 females, and 159 unknown. In 2002, a total of 1119 individuals in 418 visitor groups were recorded on 66 days from 15 March through 31 May 2002, an average of 17.2 individuals per day. This included 593 males, 449 females, and 75 unknown. In 2001, a total of 1140 individuals (607 males, 491 females, and 28 unknowns) in 412 visitor groups were recorded on 68 days from 16 March through 31 May 2001, an average of 16.8 individuals per day. In 2000, a total of 1040 (421 males, 400 females, and 219 unknowns) were recorded on the 65 days from 30 March through 9 June 2000, an average of 16.0 individuals per day.

Group Size

Average number of individuals in each visitor group was 2.49 (± 2.26) (Table 1). Average group size for the season was similar to that of 2003 (2.66 ± 3.24), 2002 (2.68 ± 3.77), 2001 (2.76 ± 2.45) and 2000 (2.79 ± 2.82). Average length of stay of groups for the 2004 season was 1 hour 32 minutes compared to 1 hour in 2003, 1 hour 29 minutes in 2002, 1 hour 35 minutes (± 1.42) in 2001 and 1 hour 29 minutes (± 1.37 hours) in 2000. Average time of day of visit for the season was 12:24 PST.

Table 1. Summary of visitation by month at the Desert Tortoise Research Natural Area in the spring of 2004. (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	17	104	238	2.28 ± 2.21	86 ± 79	$11:58 \pm 2.40$
April	27	160	459	2.87 ± 2.74	99 ± 91	$12:15 \pm 2.52$
May	28	113	250	2.21 ± 1.40	90 ± 100	$12:49 \pm 3.04$
June	7	10	18	1.80 ± 1.55	45 ± 37	$14:57 \pm 2.20$
Overall	79	387	965	2.49 ± 2.26	92 ± 90	$12:24 \pm 2.54$

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

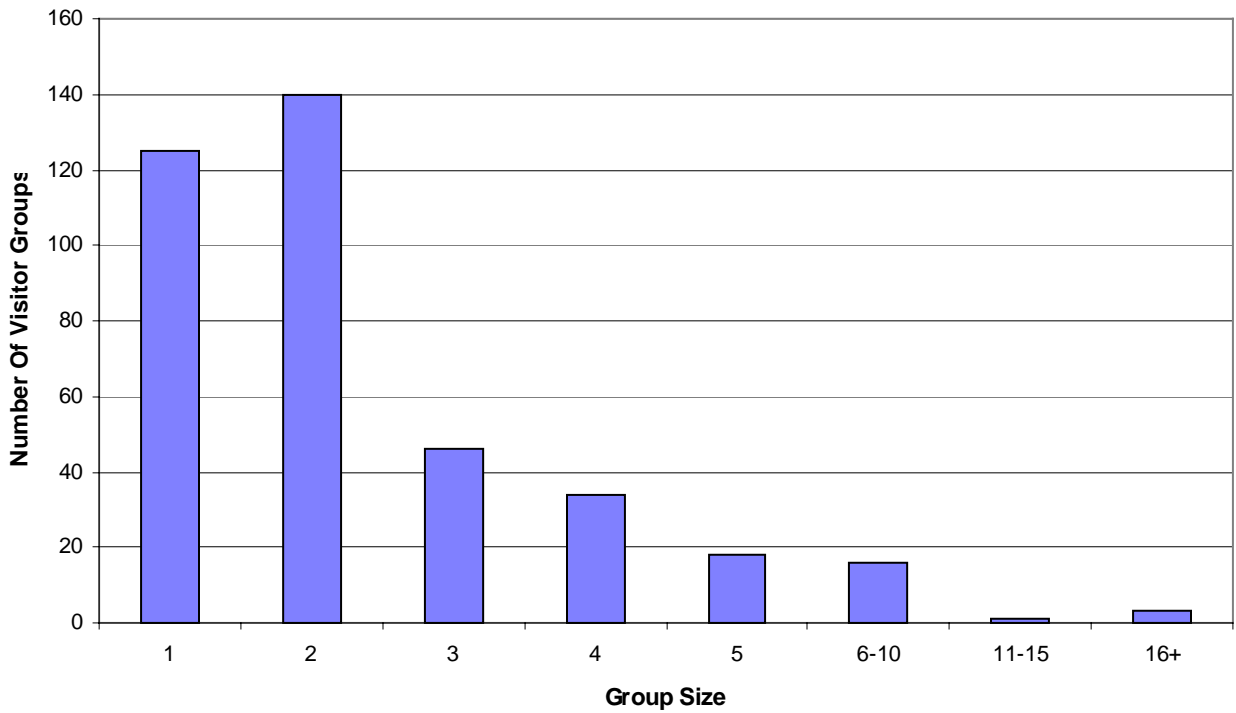


Figure 1. Numbers of visitors counted in each of eight group sizes visiting the Desert Tortoise Research Natural Area in spring of 2004.

The largest groups were family gatherings (including a group of 22 family members from Frazier Park), a girl scout troop from China Lake, a Sierra College class, a tortoise training group led by Tracey Bailey, and attendees for the DTPC's spring work party.

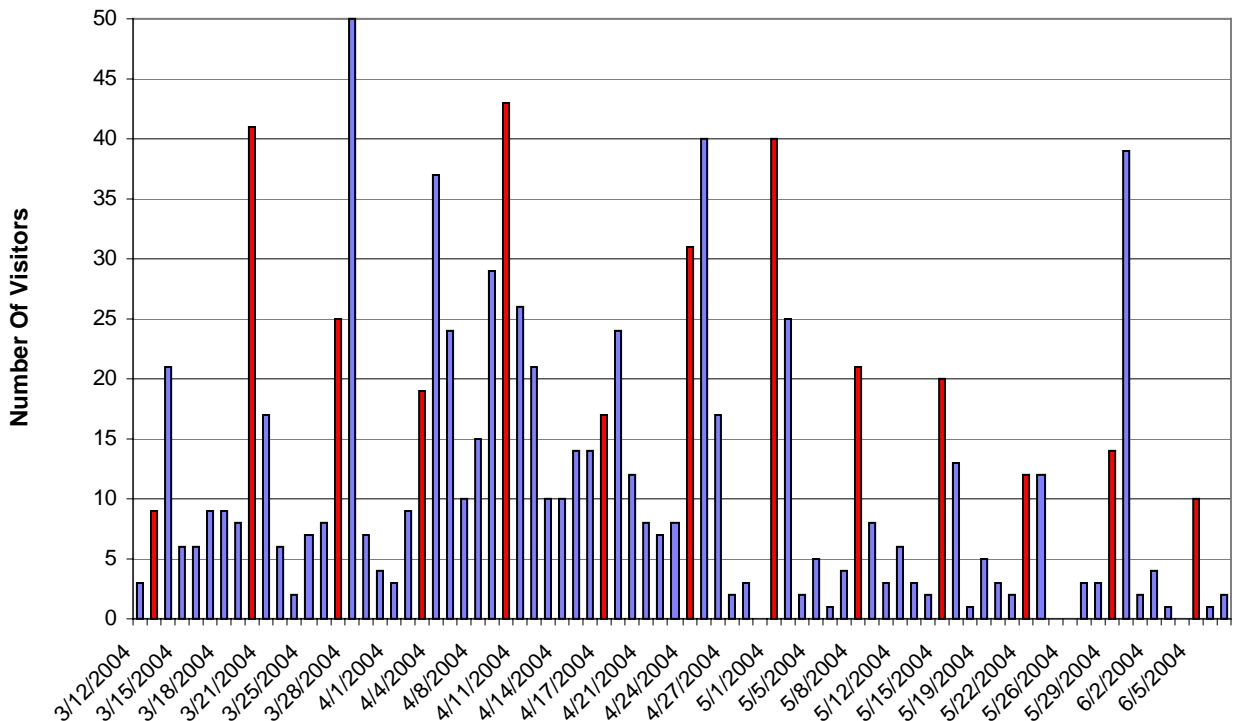


Figure 2. Daily visitation at the Desert Tortoise Research Natural Area, spring 2004. Saturdays are shown as red bars.

The greatest number of visitors (N=50) was recorded on Sunday, 28 March (Figure 2).

There were no visitors for four (5.0%) out of the seventy-nine days: April 30, May 24, May 26, and June 4. In 2003, there were no visitors for five (7.5%) out of the sixty-six days: May 8 and June 2, 4, and 17. In 2002, there were no visitors for two (3%) out of the sixty-six days: 15 May and 20 May but observations ended on May 31, 2002. In 2001, there were no visitors observed on 3 days (4%). In 2000, there were no visitors for five (8%) out of sixty-five days, 18 April, 2 May, 4 May, 11 May and 18 May. In 1999, there were no visitors for eight (12%) out of sixty-five days, 29 March, 31 March, 7 April, 12 April, 20 April, 28 April, 12 May, and 21 May.

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). The average length of visit was similar in March, April and May but was much shorter in June.

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 significant differences in average length of visit or average arrival time on the weekend days as compared to weekdays although average stays on weekend days tended to be shorter. Overall mean arrival time was about 1 hour earlier in 2004 compared to 2003, and similar to the mean arrival time in 2002.

Table 2. Summary of visitation at the Desert Tortoise Research Natural Area in the spring of 2004 by day of the week.

Day	Group size mean (\pm SD)	Length of visit minutes (\pm SD)	Mean time of visit PST (\pm SD)	Number of groups
Monday	2.15 \pm 2.41	120 \pm 103	11:56 \pm 2:59	48
Tuesday	1.80 \pm 1.48	122 \pm 137	13:00 \pm 1:41	10
Wednesday	2.03 \pm 1.43	82.4 \pm 106	13:41 \pm 3:11	31
Thursday	1.81 \pm 1.23	111 \pm 92.4	12:20 \pm 2:51	38
Friday	2.65 \pm 3.63	82.7 \pm 69.1	12:31 \pm 2:54	34
Saturday	2.56 \pm 1.99	76.6 \pm 86.9	12:34 \pm 3:02	118
Sunday	2.90 \pm 2.36	94.6 \pm 81.6	12:01 \pm 2:41	108

Visitation by off-highway vehicle users

Of the 387 visitor groups recorded, 66 (17%) arrived on an OHV (Table 3). The latter number is proportionately smaller than in 2003 when 21% of visitors arrived on an OHV.

Table 3. Visitation by visitor type at the Desert Tortoise Research Natural Area in the spring of 2004. 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	3.98 \pm 3.59	34.7 \pm 30.8	12:23 \pm 2:55	66 (17%)
Non-OHV	2.17 \pm 1.71	104 \pm 93.8	12:24 \pm 2:54	321 (83%)
Probability	N.S.	$<0.0001^*$	N.S.	

There were some differences in visitation patterns between OHV users and non-OHV users. For the season, there was no significant difference in the average size of groups of visitors arriving by OHV: group size was 2.96 individuals per group of visitors arriving on an OHV compared to 2.58 individuals per group of non-OHV users. However, average length of visit was 34.7 minutes for visitors arriving by OHV compared to

an average length of visit of 104 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 13:20 and for non-OHV visitors was 13:11.

During their visits, a number of OHV users (N=7; 11%) drove through the parking lot without stopping or stayed for 5 minutes or less. Seventeen (26%) of visitors arriving on OHV stayed for 10 minutes or less with many of these stopping in to use the restroom. The remainder of the visitors arriving by OHV behaved just 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, or took long walks looking for tortoises.

Several OHV groups (n=13) stayed for an hour or longer raising the mean stay to 34.7 minutes. The Naturalist was sought out by a number of family groups that arrived by OHV for her interpretive services. Examples of these encounters from the Naturalist's notes include two family groups from Pico Rivera and Huntington Beach.

The first was a Hispanic family from Pico Rivera that included father, mother, son and daughter. The family was dressed in new OHV gear and had new vehicles. The father was very intent on bringing his children to the DTNA to specifically educate them about the desert wildlife and environments. The family walked the animal loop trail and spent 20 minutes at the Kiosk discussing the information there. They saw a desert tortoise and several lizards.

The second family was an all male group of father, 2 sons and 2 nephews from Huntington Beach. They spent about 1 hour walking the trails and about 15 minutes at the Kiosk. Again with this group, the father's specific expressed intent was to visit the DTNA to educate the children. All the children had their own OHVs.

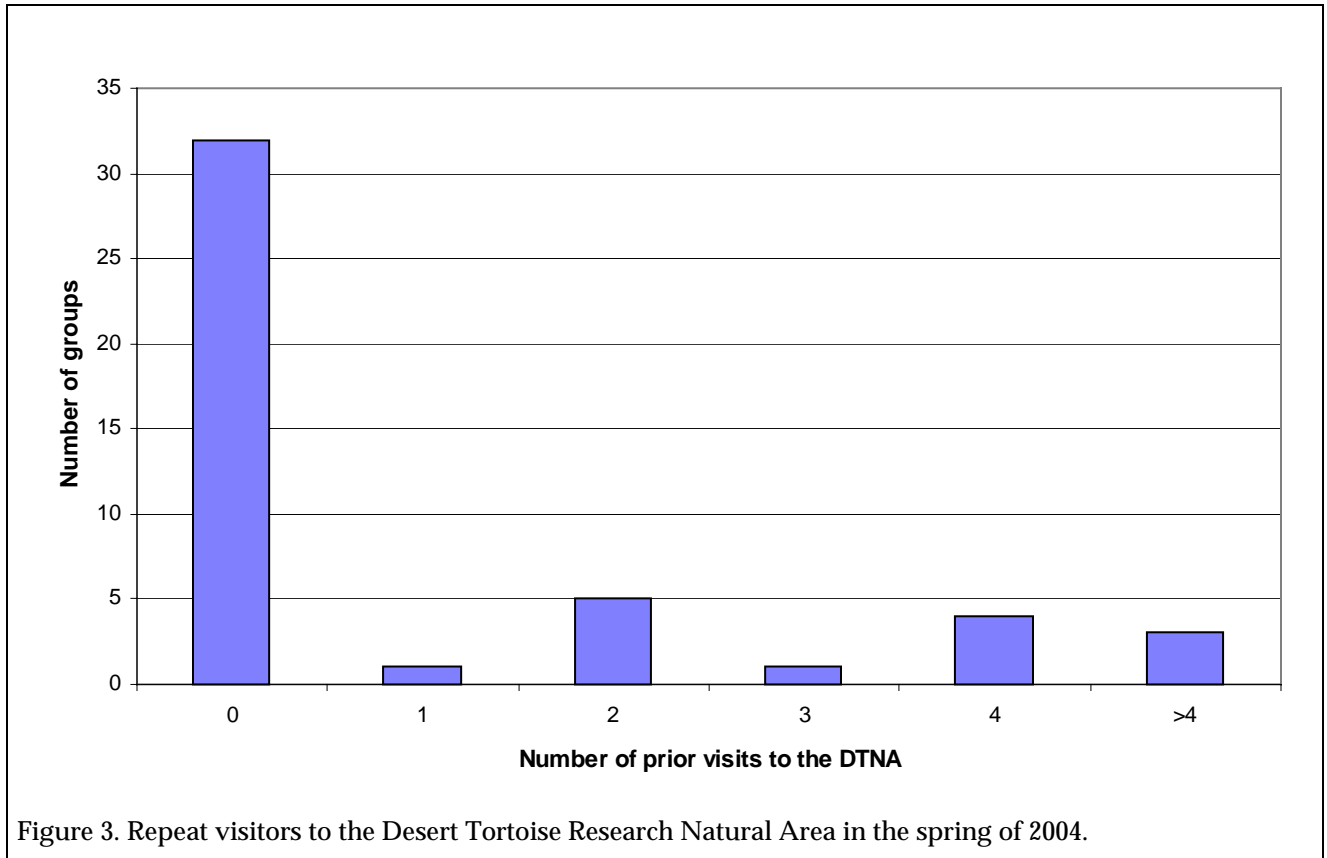
General information on visitors

The Naturalist made contact with 92% (n=357) of the 387 visitor groups for a total of 885 (91.7%) individuals.

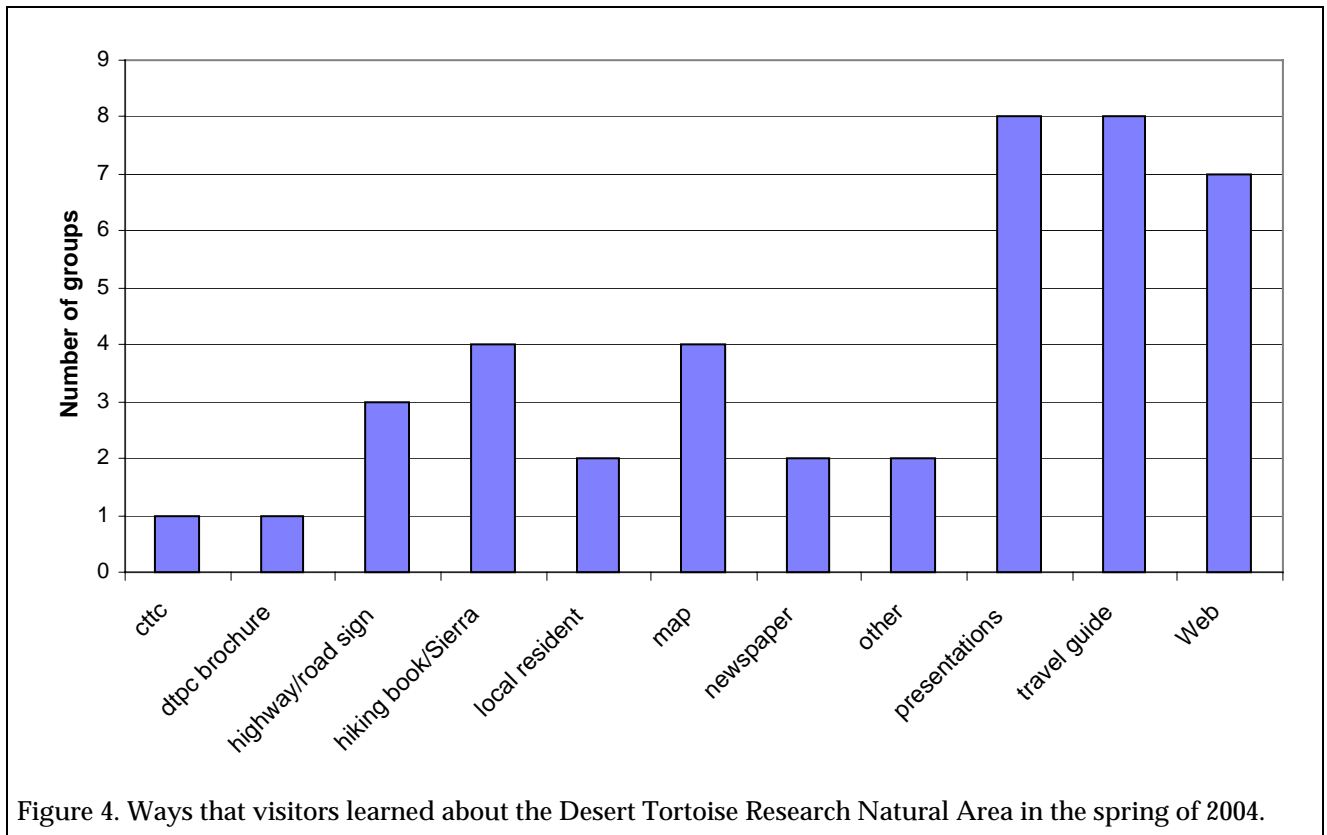
Most (74%) of the visitors who completed the Visitor Survey Form, made an entry in the Recreation Register or reported to the Naturalist were from California (Appendix 3) and the other 26% were from out of state. There were visitors from at least sixteen additional states, including Arizona, Colorado, Connecticut, Washington D.C., Florida, Hawaii, Maine, Massachusetts, Nevada, New Hampshire, New Mexico, New York, Oregon, Pennsylvania, Vermont, and Washington. Visitors from foreign countries included one group each from Austria, Canada, Finland, France, Germany, Holland, Iceland, Luxembourg and Scotland.

Members of forty-six groups completed Visitor Survey Forms, representing a 13% sample of the 357 visitor groups contacted by the Naturalist. This compares with forty-two groups, representing a 10.0% sample of 419 visitor groups contacted by the Naturalist in 2003, thirty-seven groups, representing a 9.6% sample of the 387 visitor groups contacted by the Naturalist in 2002 and sixty-two out of the 366 visitor groups (17%) contacted by the Naturalist in 2001.

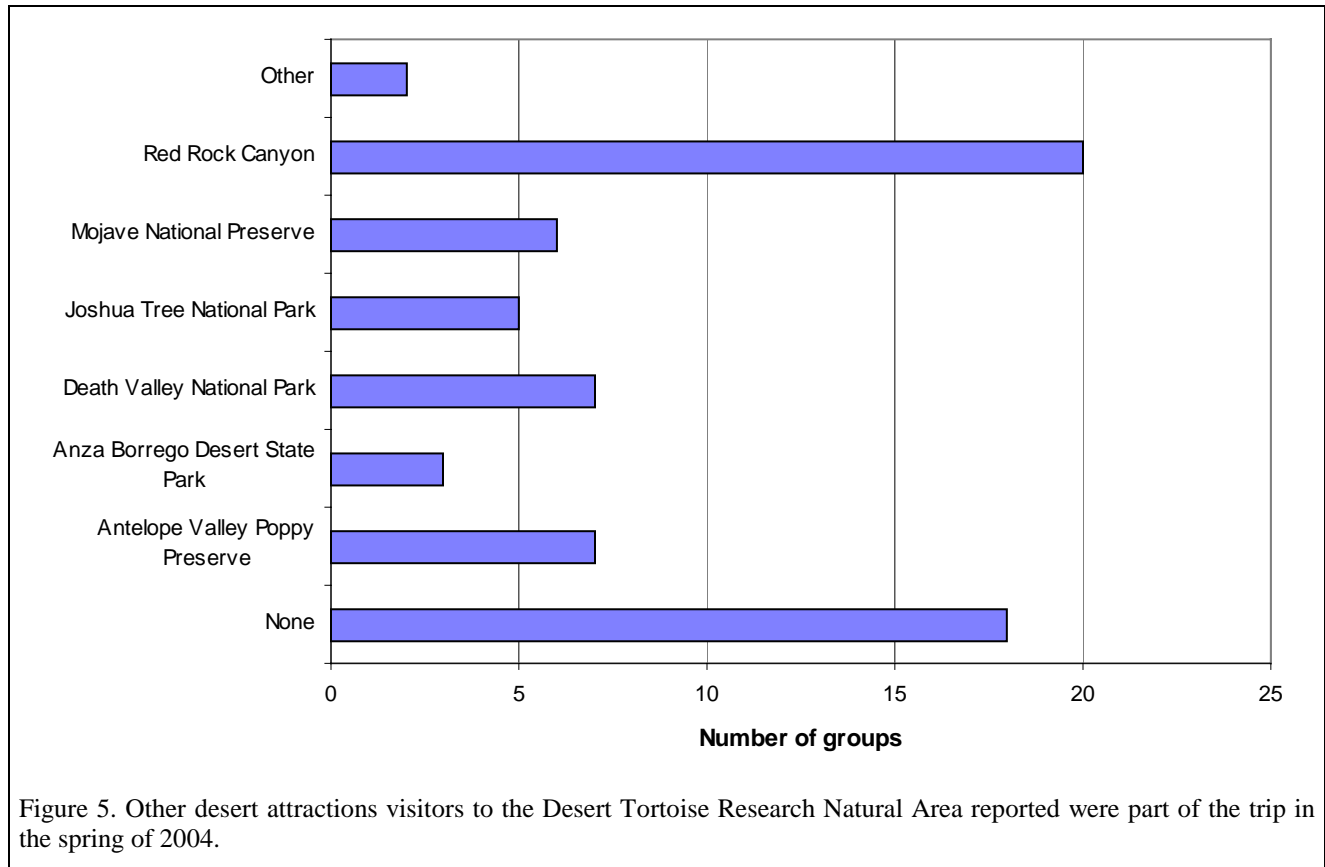
Of the 46 respondents to the visitor survey, 14 (30%) had visited the DTNA before and 32 (70%) had not (Figure 3). Two respondents (4.3%) indicated that they were Desert Tortoise Preserve Committee members.



Visitors reported learning about the DTNA in a variety of ways. The most common ways were from travel guides, the Internet, and from DTPC talks and presentations (Figure 4).



Among visitors responding to the survey, 18 (39%) 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 5).



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 Antelope Valley Poppy Preserve, Mojave National Preserve, and Joshua Tree and Death Valley National Parks.

Interpretive services

Visitor knowledge and expectations were varied and diverse, and this is reflected in both the Naturalist's data sheets and in written comments made by visitors. Most visitors had a basic awareness that the tortoise population is in trouble, and many were familiar with some of the reasons for the decline of the species. Many visitors knew that the desert tortoise is both state and federally protected, but were not sure what provisions are addressed by the Endangered Species Act, and what penalties and fines are applied when these laws are violated. Most visitors used the term "rare," "threatened," or "endangered" interchangeably. Some considered these all to simply mean "hard to find" or "uncommon." Others perceived the terms to mean that the tortoise is heading for extinction.

Almost all visitors were sympathetic to, and expressed concern over, the predicament of wild tortoises. One interesting facet of this was a poaching story shared by one of the visitors. On Monday, April 18th a group of about 20 adult students arrived from the Sacramento area. The Naturalist gave the group a short orientation and took questions for about 20 minutes. Afterwards, while the main group went exploring the various trails, the van driver stayed back with the vehicles and talked to the Naturalist. He had been raised at Edwards Air Force Base in the late 1950's and early 1960's. During that time, he said he had come many times with his father to explore the desert in the area that is now the DTNA. He said that he felt guilty because his father used to bring his pickup truck and they would fill the cargo area with desert tortoises. The

tortoises would be taken back home and distributed to friends and neighbors as pets. The Naturalist asked him if he knew if anyone who still had any of those tortoises. He answered yes, he knew several people who still did, including one woman who now lived in Colorado.

Many visitors that exhibited tortoise knowledge were owners of registered captives, and were members or had been educated through the activities of the California Turtle and Tortoise Club (CTTC) or similar organizations. These visitors, in particular, enjoyed sharing entertaining stories and behavioral observations from their captive tortoise experiences. Many of the visitors mentioned their use of the DTTC website at <http://www.tortoise-tracks.org> and its value in educating themselves and other members of the public. Typical of captive tortoise owners was one visitor from Tehachapi. He was a well-equipped OHV rider. He came to check out the DTNA because he had a pet tortoise he had rescued from a construction site near his home. He spent 45 minutes at the DTNA, 20 minutes of which was spent describing the elaborate environment he had created for the tortoise in his backyard. He had removed a concrete patio to return it to soil and had planted native plants and created a burrow for his tortoise. He was very taken with his tortoise, with his love of the desert and with riding as a way of enjoying it, and took immense joy in sharing his passions with the Naturalist.

However, familiarity with the species did not always evince sympathy for the plight of wild species such as the tortoise. One couple included a man who proudly stated that he had a personal "collection" of 150 various species of reptile. The Naturalist asked him if he had considered that collecting listed species could significantly impair their recovery as well as impacting the health of the desert ecosystem as a whole. He insisted that a friend who is a California Fish and Game biologist had told him many times that collecting has no impact whatsoever on the health of a species and the ecosystem it lives in.

Many visitors expressed their complete support for the DTTC's campaign to preserve desert tortoise habitat and the species (see Appendix 4 for visitor comments). Most visitors made a point to mention their appreciation of the DTTC's conservation efforts, and that they were glad the DTNA existed and urged the Committee to continue its efforts with comments such as "Thank you for your constant efforts and dedication to the desert environment and its species". Several visitors encouraged further land acquisition with written comments such as "We need more places like this".

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, and gave specific reasons. Many valued the opportunity provided to learn useful information about desert tortoises and their habitat from the Naturalist. The comments "Appreciate the information given by the host" and "Informative. Good information" being typical.

Because this was a wet year, many visitors made written and spoken comments and had questions relating to the DTNA's flora. The spectacular displays of annual flowers in April helped many visitors see the general value of closing areas such as the DTNA to livestock grazing and OHV activities. Written comments included "The flowers were nice this year."

Many visitors commented on the trails and hiking opportunities afforded by the DTNA including "Outstanding interpretive trails and trail guides. Very enjoyable" and succinctly, "Nice trails!"

Many visitors mentioned the location of tortoise sightings in the Register so that others would know where to look. Locality information cited included references to points on the ground "Tortoise 1050 near Animal Loop #18" as well as GPS data "1 adult tortoise at 35 11.66N 117 52.9W" Visitors also listed other animal species they had encountered.

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. A typical comment being "The area is beautiful, the interpretive trails outstanding! Saw 3.5 feet King Snake."

The Naturalist encouraged visitors to stop by the DTDC before they began their walks. This provided the Naturalist with an opportunity to remind visitors how to respect all forms of plant and animal life and to be aware of rattlesnakes. Visitors posed questions about the DTNA and made comments that were similar to

those reported by Ginn (1990), Boland (1994 and 1995) and Connor (2000 and 2001). The most frequent questions posed by visitors were “How many tortoises are there?” and “Where can I see one?” Many visitors extolled the educational opportunities presented by the Naturalist, interpretive trails and kiosk. “We were very happy to see a tortoise after enjoying the trail. It was a good first experience for our boys,” and “Very interesting. Trails easy to follow but felt very natural; will check your website from home.”

Monitoring

Daily Temperatures

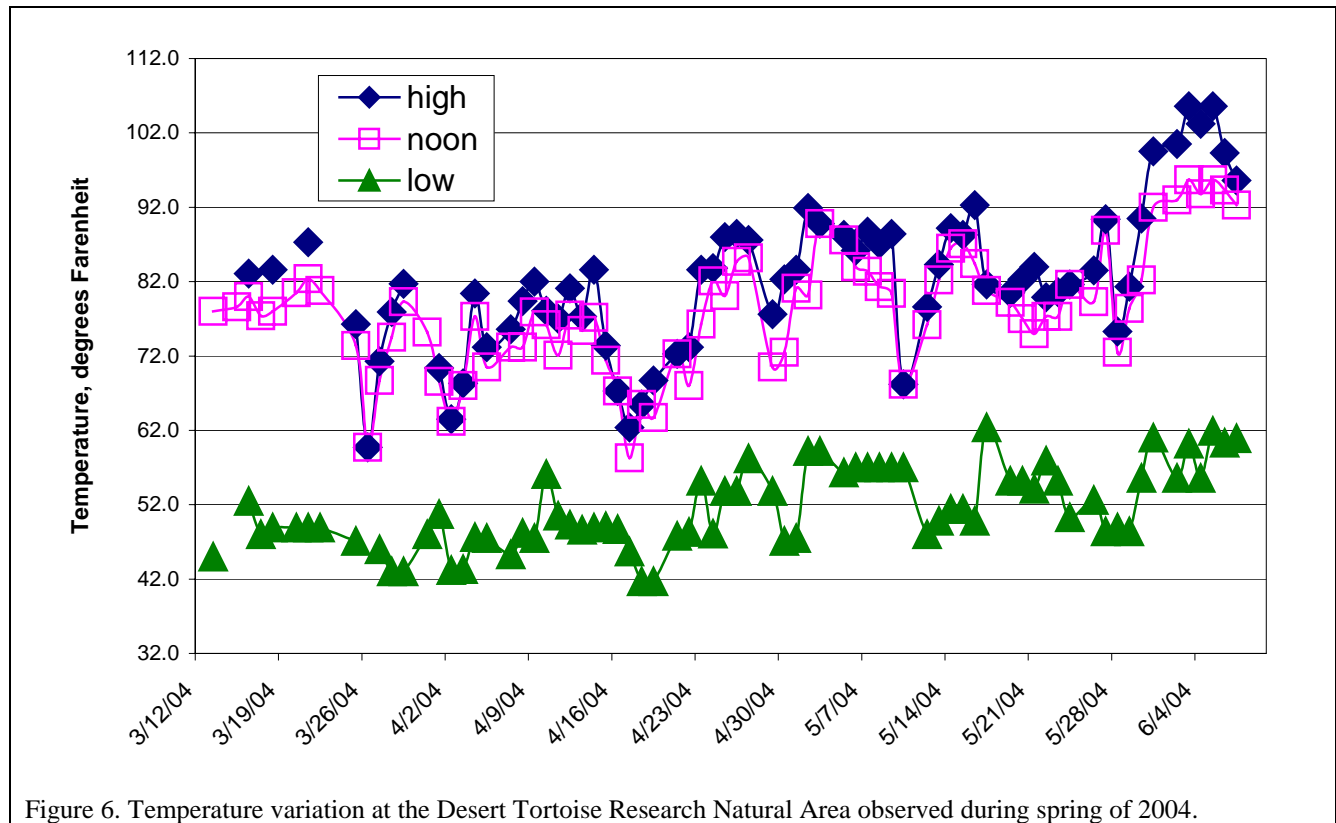


Figure 6 shows the daily high, low and noon temperatures recorded by the Naturalist from March 12 to June 7, 2004. The average daily high, noon and low temperatures were 82.3 ± 9.9 , 78.3 ± 8.2 , and 51.4 ± 5.2 degrees Fahrenheit respectively.

Sightings of tortoises by visitors

A total of 98 (29.5%) of 332 visitor groups contacted by the Naturalist as they were leaving the DTNA saw at least one desert tortoise during the 79 days in 2004 (Table 4). The 98 groups included 233 persons, or 32% of visitors that the Naturalist contacted. In spring 2003, a total of 91 (28%) of 329 visitor groups contacted saw at least one desert tortoise. The 91 groups included 315 persons, or 32% of visitors that the Naturalist contacted. In spring 2002, a total of 116 (37%) of 313 visitor groups contacted by the Naturalist reported seeing at least one desert tortoise. The 116 groups included 363 persons, or 38.9% of visitors that the Naturalist contacted. In 2001 a total of 94 (26.6%) of 354 visitor groups saw at least one desert tortoise during a three month period. The 94 groups in 2001 included 294 persons, or 28.9% of visitors that the Naturalist contacted.

Although 29.5% of all visitor groups contacted by the Naturalist in 2004 saw at least one tortoise, only 12 out of 57 (21%) visitor groups arriving on an OHV saw a tortoise.

Table 4. Summary of tortoise sightings by visitors at the Desert Tortoise Research Natural Area in the spring of 2004.

Tortoises seen	Number of groups	Number of visitors	Length of Stay
0	234	605	75.0 ± 69.9
1	68	178	111 ± 79.6
2	22	42	214 ± 160
3	7	11	252 ± 110
4	1	2	235
≥ 1	98	233	146 ± 117

Table 5. Summary of tortoise sightings by visitors at the Desert Tortoise Research Natural Area by month.

Month	Number of groups	%	Number of visitors	%
March 2004	39	49%	100	54%
April 2004	39	28%	97	24%
May 2004	19	18%	35	15%
June 2004	1	14%	1	6%

Forty nine percent (49%) of visitor groups contacted by the Naturalist reported seeing at least one tortoise in March, twenty eight percent (28%) in April, eighteen percent (18%) in May and fourteen percent in June. In 2003, twenty three (25%) of visitor groups contacted by the Naturalist reported seeing at least one tortoise in March, 38 groups (27%) in April, and 28 groups (35%) reported seeing at least one in May. No visitors reported seeing tortoises in June. In 2002, 36 groups (33.3%) reported seeing at least one tortoise in March, 57 groups (40.7%) in April, and 23 groups (35.4%) in May. The higher number of visitors seeing a tortoise in March 2002 may be due to the presence of a tortoise that had created a burrow in the IC parking lot, and the presence of a tortoise survey crew contracted by DTPC for part of the season.

The relationship between the number of tortoises seen and length of stay was investigated by regression analysis. The number of tortoises seen correlated positively with the length of visitor stay ($R^2 = 0.203$; $p < 0.05$). The longer the visit, the more likely was a visitor to encounter a tortoise. Because the visitors arriving on an OHV stayed for shorter periods than the other visitors, this explains why fewer of them saw a tortoise.

The relationship between visitor group size and whether or not they encountered a tortoise is examined in Table 6. As was the case in 2003, larger groups were not more likely to see a tortoise than smaller groups.

Table 6. Tortoise sightings at the Desert Tortoise Research Natural Area in 2004 by visitor group size.

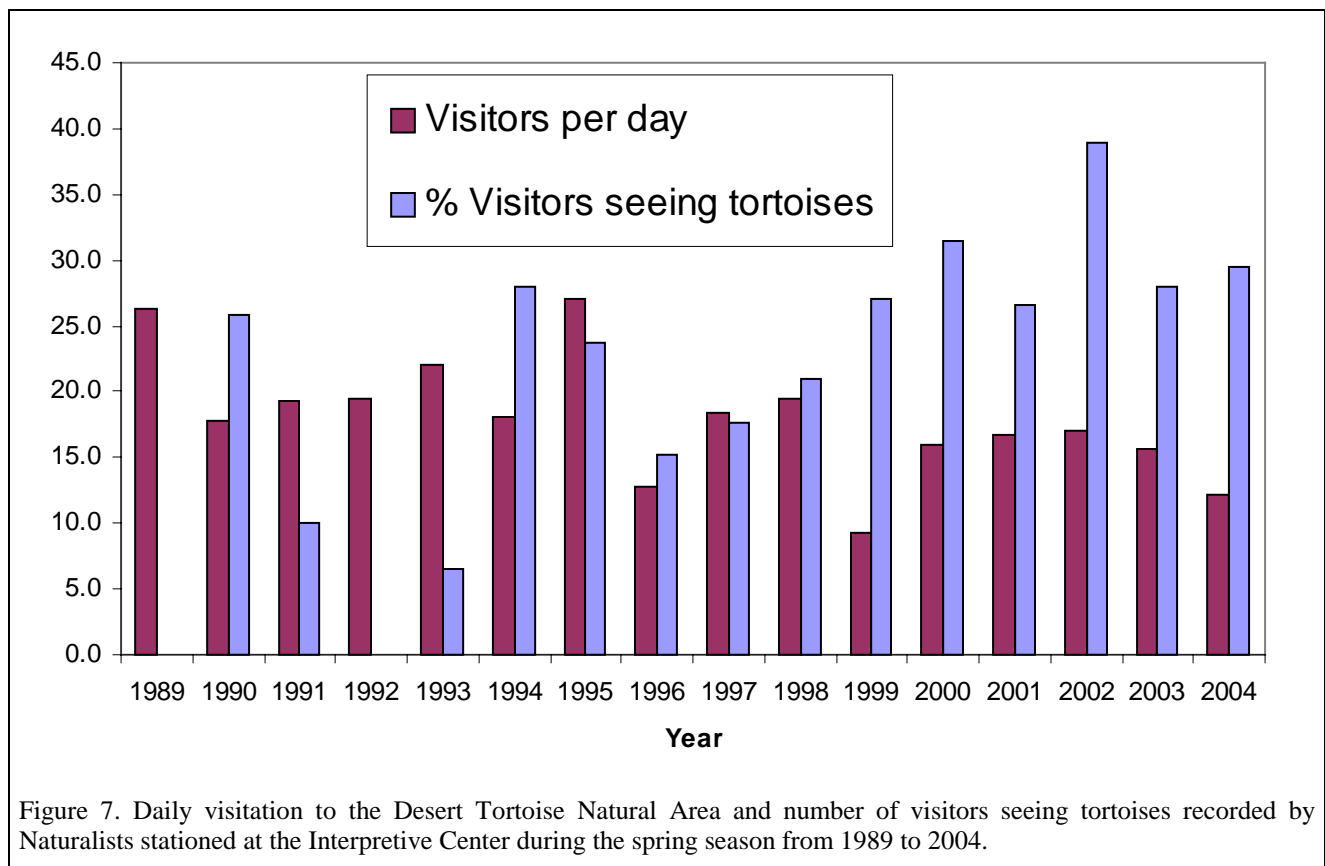
Tortoises seen	Size of group
0	2.61 ± 2.35
1	2.62 ± 2.64
2	1.91 ± 0.75
3	1.57 ± 1.33
4	2.00

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

Figure 7 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 2004.

Comparison of the 2004 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. The average number of visitors per day in the spring 2004 season (12.1) was slightly lower than the average of all the spring seasons from 1989 to 2004 (17.0 ± 4.63) but this reflects the inclusion of 6 days in June, a low visitation month, whereas in most years, monitoring ended by June 1. The percentage of visitor groups that saw a tortoise on their visit in 2004 was 29.5%. Between 1989 and 2004, the mean percentage of visitor groups seeing a desert tortoise ranged from 6.5% to 39.5% with a mean of 24.5 ± 8.9 . In spring 2002, 39.5% of visitors saw a desert tortoise on their trip to the DTNA making this the highest year on record. In 2001, there were 1140 visitors in 412 visitor groups. In 2000, there were 1040 visitors in 323 visitor groups. In 1999, there were 213 visitor groups totaling 595 visitors (9.2 individuals/day), significantly less than in 1998. In 1998, there were 561 visitor groups comprised of 1580 individuals, an average of 19.5 individuals/day. In 1997, there were 327 visitor groups comprised of 1,124 individuals, an average of 18.4 individuals/day. In 1996, there were 1,068 visitors (12.7 individuals/day). In 1995, there were 2,483 visitors (27.0 individuals/day), over twice as many visitors than in 1996. In 1994, there were 1,668 visitors (18.1 individuals/day) and in 1993, there were 2,003 visitors (22.0 individuals/day).



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. There was one major incident involving 3 motorcyclists that were seen driving through the DTNA. On Saturday May 1, 2004, the weekend of the California City Desert Tortoise Days a 12:30 pm a regular visitor to the DTNA reported to the Naturalist that he had seen 3 motorcyclists inside the Natural Area. He had seen them traveling south of him near Discovery Trail Loop markers 17 and 18. He and DTPC volunteer Chuck Hemingway then left the Interpretive Center to survey the southern and southwestern fence line. They found OHV tire tracks exiting the DTNA at the southern fence-line due south of the tire tracks at Discovery Loop markers 17 & 18.

The Naturalist telephoned the BLM dispatch office in San Bernardino. BLM Ranger Bob Trantor was on duty in the area and returned the Naturalist's call within 10 minutes. Ranger Trantor said he would come to the DTNA as soon as he could and that he was about 10-15 minutes drive northeast of the DTNA changing a flat tire on the BLM truck. He arrived within 30-45 minutes. Ranger Trantor surveyed the south fence-line and the pit area (section 3 south of the Natural Area) as well.

Ten days later, DTPC Executive Director Michael Connor and volunteer Chuck Hemingway located the riders' entry point while they were doing site inspections. The entry point was through a "closed gate" into section 1 on the eastern fence-line near the terminus of a popular OHV trail, that had been pried open.

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. A group of citizens from California City found a tortoise wandering on California City Boulevard in the commercial center of the town. They brought this to the DTNA and gave it to the Naturalist. The animal appeared to be a long-term captive and was given to California Turtle and Tortoise Club for adoption to a new home.

Resident tortoise observations

The Naturalist and visitors observed tortoises on 48 days out of the 79 days (61%). Nine individual marked tortoises (#212, #467, #599, #789, #979, #999, #1009, #1055, #1059) and as many as 16 unmarked tortoises (1 of which was a captive brought to the DTNA and given to the Naturalist) were observed. In 2003, thirteen marked tortoises (#212, #467, #599, #672, #789, #849, #893, #999, #1055, #1059, #1091, #1108, #1151) and 13 unmarked tortoises were observed (2 of which were seen outside the DTNA fence line in section 13 in the area known as "the pit"). In 2002, twelve individual marked tortoises (#212, #467, #568, #573, #595, #789, #827, #1060, #1083, #1128, #1129, #1151) and 12 unmarked tortoises were observed. In 2001, eight individual marked tortoises (#420, #568, #573, #789, #894, #983, #999, #1004) and 14 unmarked tortoises were observed. Three (25%) of the marked tortoises seen in 2002 had been seen in 2001. Four (33%) of the tortoises seen in 2002 had been seen in the year 2000 when eight individual marked tortoises were reported (#467, #568, #573, #789, #999, #1002, #1108, and #1054).

The Naturalist and visitors sighted tortoises on 16 days in March, 16 days in April, 14 days in May, and 2 days in June.

Venomous animals

There were four sightings of rattlesnakes during the period March 12 through June 9, 2004. On three occasions, the sighting was of a Mojave rattlesnake. The fourth was of a sidewinder. 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.

One visitor group remained in the parking lot when one member of the group realized that there was a possibility of seeing a snake while hiking at the Natural Area. This contrasts sharply with the expressed expectation by most visitors of wanting to see a variety of reptiles.

Raven observations

Ravens were observed on 50 (63%) of the 79 days that the Naturalist was present. Ravens were observed on 10 days in March, 20 days in April, 19 days in May and 1 day in June. These observations were usually of small flocks of 1 to 3 birds with multiple sightings of ravens made throughout the day. Since the Naturalist was unable to distinguish individual birds, it is possible that these were repeated observations of

the same birds. No large flocks of ravens were seen in 2004 although flocks of ten or more ravens have been observed in prior years, (Boland 1995; Connor 2001).

Observations of other animals

A list of vertebrate species observed in and around the Interpretive Center in spring 2004 can be found in Appendix 5. Several species were observed that have not been seen in recent years or were new to the inventory. The most unusual was a flock of ten Black-necked Stilts, *Himantopus mexicanus* that was seen in April. Other new additions include the California Quail, *Callipepla californica*, and the Hooded Oriole, *Icterus cucullatus*. Other unusual appearances included a number of sightings of the Roadrunner, *Geococcyx californianus*, observed at the DTNA for the first time in several years. The rare Short-eared Owl, *Asio flammeus*, was seen twice in April. An Osprey, *Pandion haliaetus* was seen soaring across the DTNA in March and in May. Visitors reported seeing Mohave Ground Squirrels near the Animal Loop on several occasions, with two confirmed sightings being made by the Naturalist in April. A newspaper reporter took a photograph of the Mohave Ground Squirrel seen on April 23 and this was featured in an article on the DTNA in the Bakersfield Californian.

Table 7. Sightings of other listed, sensitive or rare species at the Desert Tortoise Research Natural Area in the spring of 2004

Species	Date	Time	Location*	Notes
Burrowing Owl, <i>Athene cunicularia</i>	3/29/04		DL21	Flushed from wash
	4/2/04	13:30	AL	Heard calling
Short-eared Owl, <i>Asio flammeus</i>	4/7/04		DL27	Flushed to confirm id
	4/29/04		Quad28	
Mohave Ground Squirrel, <i>Spermophilus mohavensis</i>	4/19/04	16:30	AL	3 seen in wash SW of AL
	4/23/04	16:00	AL	Sat haunched, watching visitors
Osprey, <i>Pandion haliaetus</i>	3/23/04		DL	
	5/15/04	19:00	flying over DL	
Loggerhead Shrike, <i>Lanius ludovicianus</i>	resident		IC	
LeConte's Thrasher, <i>Toxostoma lecontei</i>	resident		IC	
Badger, <i>Taxidea taxus berlandieri</i>	4/24/04	8:00	140th St	2 seen

* Abbreviations: AL, Animal Loop; DL, Discovery Loop; IC, Interpretive Center

DISCUSSION

Visitation

Average daily visitation (12.2 visitors/day) during the spring 2004 season was slightly below the fifteen-year average of 17.1 visitors/day. This may be because there was unseasonably cold or wet weather during usually busy weekends such as that coinciding with California City's "Desert Tortoise Days." As has been true in all previous years, visitation was highest at the weekends. This year, as in 2002 and 2003, the busiest visitation day was Saturday.

Most of the visitors were from California (Appendix 3) but 26% were from out of state. There were visitors from at least sixteen additional states, including Arizona, Colorado, Connecticut, Washington D.C., Florida, Hawaii, Maine, Massachusetts, Nevada, New Hampshire, New Mexico, New York, Oregon, Pennsylvania, Vermont, and Washington. Visitors from foreign countries included one group each from Austria, Canada, Finland, France, Germany, Holland, Iceland, Luxembourg and Scotland. Because of its location, most visitors to the DTNA travel through California City. Based on analysis of completed Visitor Survey forms, 39% of visitors gave the DTNA as their sole destination for that day. Given the local, national, and international visitation, it is likely that DTNA visitation may significantly contribute to the local economy by visitors who stop in California City and Mojave. Clear demonstration of the value that the DTNA contributes to the local economy could offer a tool to gain stronger local support for desert tortoise conservation.

Interpretive services

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. 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.

Most visitors were not only sympathetic to the desert tortoise population faced with all the direct and indirect problems in its habitat, but were also anxious to learn how they might help save the species. People are fascinated by learning just how fragile and delicate the desert habitat is, the abundance of life it supports, and how long it takes to recover from disturbance and injury, despite its seemingly harsh appearance. Several groups made management suggestions for the DTNA including expanding the area and controlling/managing the unauthorized OHV use outside the fence.

Interestingly, many of the visitors who arrived on OHVs also expressed their concern for the desert and for the desert tortoise, and were supportive of the DTNA. A number expressed their concern that the behavior of the few who abuse the desert with their OHVs is more likely to result in the creation of "more fences" or closed areas. The Naturalist was surprised by the fervor with which one OHV enthusiast described his love of the desert and how riding was his way of enjoying it. The same individual had a pet tortoise on which he had lavished considerable time and expense.

In 2004, 29.5% of visitor groups were able to see at least one tortoise. This is higher than the 16-year average of 24.5%. Some 30 visitor groups saw more than one tortoise on their visit compared to only 16 groups in 2003. This most likely reflects the proximity to the Animal Loop of 2 adult female tortoises (#599 and #1055) but at least one visitor group reported observing apparent courtship behavior between two other tortoises.

Group size did not seem to make a difference in the chances of a group finding tortoises in 2004. In part this reflects the fact that large, organized groups were managed by the Naturalist to minimize any potential impacts to habitat around the Interpretive Center. Typically, the Naturalist would walk large groups around the main loop and instruct them to remain on the trail as much as possible. Additionally, visitors experienced in finding tortoises tended to arrive in small groups.

Monitoring

Generally, visitors were well mannered and well behaved. There was a major incident of deliberate trespass by a group of three men on dirt motorbikes on May 1, 2004. This was the weekend of the California City Desert Tortoise Days festival.

Status of 2003 Recommendations

- (1) On April and May weekends have two people on duty. This will enable one of them to take care of product sales and visitor survey forms during periods of high visitation freeing the other to peruse monitoring and interpretive services.

This DTPC priority is subject to funding and staff availability.

- (2) Keeping some OHV users on the road and operating at a safe speed can be quite challenging. Speed limit signs may help improve management of OHVs at the Interpretive Center. This could reduce impacts to visitors such as noise, fumes and contribute to visitor safety as well as reducing impacts to habitat and reducing the risks to tortoises.

New speed limit signs have been installed.

2004 Recommendations

Acquire the following equipment to facilitate climate monitoring:

- (1) Weather Radio. These receive round-the-clock reports from NOAA and are readily available at low cost from Radio Shack.
- (2) Wind Gauge. Low cost gauges are available from Home and Garden stores that could be removed at the end of the season.

ACKNOWLEDGMENTS

We thank the following organizations and individuals for contributing to the ongoing success of the DTPC Naturalist program: the Bureau Of Land Management for providing matching funds to support the Desert Tortoise Preserve Committee's Naturalist program at the DTNA in 2004; the DTPC Trustees for their efforts in establishing and expanding the DTNA and for their continued interest in tortoises and ongoing educational outreach to the public, with particular thanks to Laura Stockton for her years of unstinting support and encouragement for the program; the many DTPC members and contributors for their financial support; DTPC volunteer Chuck Hemingway; BLM support staff who assisted the Naturalist and helped maintain the facilities; Susan Moore for supervising merchandise sales at the DTNA; and a special thanks to Field Manager Hector Villalobos, Bob Parker, Jeff Aardahl, and Ranger Robert Trantor of the Bureau of Land Management's Desert District Ridgecrest Field Office for all their considerable support and help.

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APPENDIX 1. Visitor survey form used at the Desert Tortoise Research Natural Area, spring of 2004.

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 2004.

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____ Day _____

Name Jan Kaur

Start time (PST) _____

End time (PST) _____

Total time (hrs) _____

WEATHER DATA

Temperatures LOW: _____ NOON: _____ HIGH: _____

Winds _____

Cloud cover _____

Precipitation _____

Group #	Number in group	Vehicle description (for identification of group only)	Arrival time (PST)	Departure time (PST)	OHV recreationalist?	Contact by naturalist?	# of males	# of females	# of unknown gender	# of tortoises seen	Visitor knowledge
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
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APPENDIX 2 (cont). Data Sheet used by the Naturalist at the Desert Tortoise Research Natural Area in the spring of 2004.

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____
 Name Jan Kaur

NOTES ON TORTOISES OBSERVED. Report observations of live tortoises and carcasses. Include detailed location using grid system (where possible), size (MCL in mm or size class), sex (male, female, or unknown), behavior (walking, resting, fighting, feeding, etc.), and any other notes.

Tortoise ID	Live/dead?	Location	Size	Sex	Behavior	Other notes

VERTEBRATE SPECIES LIST

Species	Time	Numbers	Location	Activity and other notes

RAVEN OBSERVATIONS. Include sightings and number in flock

GENERAL NOTES. Include attempted collection, harassment, and releases of desert tortoises, garbage, behavior, etc.

APPENDIX 3. Reported places of residence of visitors to the Desert Tortoise Research Natural Area in the spring of 2004 from Visitor Survey Forms, Naturalist Data Sheets and the Recreation Area and Site Register.

Country	City	State	Number
Austria			
Finland			1
Holland	Leiden		1
Iceland			1
Luxembourg	Luxembourg		1
Scotland	Errol		1
USA	Antioch	CA	1
USA	Apple Valley	CA	2
USA	Bakersfield	CA	2
USA	Buena Park	CA	1
USA	California City	CA	5
USA	Cantil	CA	1
USA	Chino Hills	CA	1
USA	Claremont	CA	1
USA	Eureka	CA	1
USA	Fresno	CA	2
USA	Galt	CA	1
USA	Gardena	CA	1
USA	Glendale	CA	1
USA	Hawthorne	CA	1
USA	Huntington Beach	CA	1
USA	Kilroy	CA	1
USA	Lancaster	CA	3
USA	Livermore	CA	1
USA	Long Beach	CA	3
USA	Los Alamitos	CA	1
USA	Los Angeles	CA	4
USA	Manteca	CA	1
USA	Mill Valley	CA	1
USA	Monterey	CA	1
USA	Morgan Hill	CA	2
USA	Oakland	CA	1
USA	Ojai	CA	1
USA	Palmdale	CA	1
USA	Palos Verdes	CA	1
USA	Pasadena	CA	2
USA	Petaluma	CA	1
USA	Pico Rivera	CA	1
USA	Placentia	CA	1
USA	Port Hueneme	CA	1
USA	Redondo Beach	CA	1
USA	Richmond	CA	1
USA	Ridgecrest	CA	2
USA	Riverside	CA	4
USA	Sacramento	CA	1
USA	San Bernardino	CA	1
USA	San Diego	CA	5
USA	San Francisco	CA	2

Country	City	State	Number
USA	Santa Ana	CA	1
USA	Santa Barbara	CA	2
USA	Santa Clarita	CA	1
USA	Santa Ynez	CA	1
USA	Simi Valley	CA	2
USA	Stockton	CA	1
USA	Swarthmore	CA	1
USA	Tehachapi	CA	4
USA	Temple City	CA	1
USA	Thousand Oaks	CA	3
USA	Torrance	CA	1
USA	Ventura	CA	1
USA	Victorville	CA	1
USA	Visalia	CA	1
USA	Walnut Creek	CA	1
USA	West Sacramento	CA	2
USA	Willow Creek	CA	1
USA	Wrightwood	CA	1
USA	Yorba Linda	CA	1
USA	Yosemite	CA	1
USA	Durango	CO	1
USA		CT	1
USA	Washington	DC	1
USA	Jacksonville	FL	1
USA	Las Cruces	NM	1
USA	Reno	NV	1
USA	Brooklyn	NY	1
USA	Ithaca	NY	2
USA	NY	NY	1
USA	Ithaca	NY	1
USA	Eugene	OR	1
USA	Brattelboro	VT	1
USA	Bellevue	WA	1

APPENDIX 4. Comments from visitor survey forms and register, Desert Tortoise Research Natural Area, spring of 2004.

Thanks - we had a great time!
Thank you for a great experience.
2 tortoises seen - 1 inside bush in hole, 1 in shade of bush near Animal Loop #19.
Saw #999.
A wonderful place. We need more places like this.
Saw a 2-3 year old, #566 and a large unmarked male on Main Loop near junction with Animal Loop.
Fabulous Place!
"stumbled on it"
Lots of wildlife.
Great place (learned about it from college field trips in the 70s).
Informative. Good information.
We were very happy to see a tortoise after enjoying the trail. It was a good first experience for our boys.
Outstanding interpretive trails and trail guides. Very enjoyable!
We enjoy coming here when we're camping and dirt biking.
I am a teacher.
Very interesting. Trails easy to follow but felt very natural; will check your website from home.
Thank you!
The area is beautiful, the interpretive trails outstanding! Saw 3.5 foot king snake.
Cool and windy. Saw one tortoise.
The flowers were nice this year.
Great! We love tortoises!
Have postcards of tortoises for those not lucky enough to see real ones.
Thank you!
Nice trails.
Enjoyed my walk.
Cool place.
Good spacing on interpretive posts and exhibits.
Prospecting.
Thank you for your constant efforts and dedication to the desert environment and its species.
Found 2 tortoises "communicating" out in the open after a 1 hour search!
1 tortoise near post #20! Mocking birds and horned lark seen, no lizards.
Tortoise #1050 near Animal Loop #18.
9:10 am, tortoise 250 feet from Animal Loop #23.
It is really hot and windy as hell!
Back again!
Thank you!
Nice trails!
Nice place!
Cool place!
Good exhibit trails.
Saw hatchling tortoise.
Saw tortoise in den - could not id.
Good early morning desert walk.
1 tortoise, 3 horned lizards, 4 whiptails late afternoon.

1 horned lizard, loads of lizards and birds.
2 tortoises, 1 horned lizards, 1 infant coachwhip, lots of whiptails, jack rabbit.
Appreciate the information given by the host.
1 horned lizard, a beautiful day!
We love it here.
Here to photograph lizards of California.
Looking for the tortoises.
Saw 3 tortoise carcasses, 1 live.
From Reno, saw Preserve on a map.
On photo assignment - too windy.
1 sidewinder, 1 adult tortoise at 35 11.66N 117 52.9W.
Saw a black tailed hare.
Playin' hookey!
Desert horned lizard, leopard, western whiptail, side-blotched.
Had fun.
We need water at here!
Camping.
Saw two tortoises #999.
Saw #1050 near marker 20 on the Animal Loop.
10th visit.
Want to see tortoises.
Saw one male at marker 11.

APPENDIX 5. Vertebrate species observed in and around the Interpretive Center and within 0.5 mile of the visitor area between March 12 and June 7, 2004.

CLASS REPTILIA

ORDER TESTUDINATA

FAMILY TESTUDINIDAE

Desert Tortoise

Gopherus agassizii

ORDER SQUAMATA

FAMILY IGUANIDAE

Zebra-tailed Lizard

Callisaurus draconoides

Desert Iguana

Dipsosaurus dorsalis

Leopard Lizard

Gambelia wislizenii

Side-blotched Lizard

Uta stansburiana

Desert Horned Lizard

Phrynosoma platyrhinos

Desert Spiny Lizard

Sceloporus magister uniformis

Desert Iguana

Dipsosaurus dorsalis

FAMILY TEIIDAE

Western Whiptail Lizard

Cnemidophorus tigris

FAMILY COLUBRIDAE

King Snake

Lampropeltis getulus californiae

Coachwhip Snake

Masticophis flagellum

Glossy Snake

Arizona elegans

Gopher Snake

Pituophis melanoleucus

Long-nosed Snake

Rhinocheilus lecontei

Mojave Patch-nosed Snake

Salvadora hexalepis mojavensis

Western Ground Snake

Sonora semiannulata

FAMILY VIPERIDAE

Mojave Rattlesnake

Crotalus scutulatus

Sidewinder Rattlesnake

Crotalus cerastes

CLASS AVES

ORDER APODIFORMES

FAMILY TROCHILIDAE

Costa's Hummingbird

Calypte costae

ORDER CAPRIMULGIFORMES

FAMILY CAPRIMULGIDAE

Lesser Nighthawk

Chordeiles acutipennis

Poor-will

Phalaenoptilus nuttallii

ORDER CHARADRIIFORMES

FAMILY RECURVIROSTRIDAE

Black-necked Stilt

Himantopus mexicanus

ORDER COLUMBIFORMES

FAMILY COLUMBIDAE

Mourning Dove

Zenaida macroura

ORDER CUCULIFORMES

FAMILY CUCULIDAE

Greater Roadrunner

Geococcyx californianus

ORDER FALCONIFORMES

FAMILY ACCIPITRIDAE

Northern Harrier

Circus cyaneus

Osprey

Pandion haliaetus

Red-tailed Hawk

Buteo jamaicensis

FAMILY CATHARTIDAE

Turkey Vulture

Cathartes aura

FAMILY FALCONIDAE

Kestrel

Falco sparverius

ORDER GALLIFORMES

FAMILY PHASIANIDAE

California Quail

Callipepla californica

Chukar	<i>Alectoris chukar</i>
ORDER PASSERIFORMES	
FAMILY ALAUDIDAE	
Horned Lark	<i>Eremophila alpestris</i>
FAMILY CORVIDAE	
Common Raven	<i>Corvus corax</i>
FAMILY EMBERIZIDAE	
Sage Sparrow	<i>Amphispiza belli</i>
Lesser Goldfinch	<i>Carduelis psaltria</i>
House Finch	<i>Carpodacus mexicanus</i>
Bullock's Oriole	<i>Icterus galbula</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Western Tanager	<i>Piranga ludoviciana</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
FAMILY FRINGILLIDAE	
Black-throated Sparrow	<i>Amphispiza bilineata</i>
FAMILY HIRUNDINIDAE	
Barn Swallow	<i>Hirundo rustica</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Tree Swallow	<i>Iridoprocne bicolor</i>
FAMILY ICTERINAE	
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>
Hooded Oriole	<i>Icterus cucullatus</i>
Western Meadowlark	<i>Sturnella neglecta</i>
FAMILY LANIIDAE	
Loggerhead Shrike	<i>Lanius ludovicianus</i>
FAMILY MIMIDAE	
LeConte's Thrasher	<i>Toxostoma lecontei</i>
Mocking Bird	<i>Mimus polyglottus</i>
FAMILY PARULINAE	
Audubon's Warbler	<i>Dendroica coronata</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
FAMILY MUSCICAPIDAE	
Ruby-crowned Kinglet	<i>Regulus calendula</i>
FAMILY REMIZIDAE	
Verdin	<i>Auriparus flaviceps</i>
FAMILY PTILOGONATIDAE	
Phainopepla	<i>Phainopepla nitens</i>
FAMILY STURNIDAE	
European Starling	<i>Sturnus vulgaris</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>
FAMILY MUSTELIDAE	
American badger	<i>Taxidea taxus berlandieri</i>
ORDER LAGOMORPHA	
FAMILY LEPORIDAE	
Black-tailed Hare	<i>Lepus californicus</i>
Audubon Cottontail	<i>Sylvilagus auduboni arizonae</i>

ORDER RODENTIA

FAMILY CRICETIDAE

Deer Mouse

Peromyscus maniculatus sonoriensis

Desert Woodrat

Neotoma lepida lepida

FAMILY HETEROMYIDAE

Merriam's Kangaroo Rat

Dipodomys merriami

FAMILY SCIURIDAE

Antelope Ground Squirrel

Ammospermophilus leucurus

Mojave Ground Squirrel

Spermophilus mohavensis