
Observations and Activities of the Naturalist at the Desert Tortoise Research Natural Area, Kern County, California: March 21 through June 19, 2003

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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 21 March 31, 2003 to 19 June 19, 2003. The Naturalist, Charles Hemingway, was stationed at the DTNA Interpretive Center. During the 79 days the Naturalist was on duty, 467 visitor groups totaling 1243 individuals were recorded at the interpretive center, and they stayed on average of 60 ± 64 minutes. The Naturalist contacted 419 (89.7%) of the visitor groups totaling 1133 (91.1%) individual.

Most visitors (74%) were from California. There were visitors from thirteen additional states and six foreign countries.

Some of the visitor groups arrived by off-highway vehicle (100 groups; 34%). The mean stay of off-highway vehicle users (16.7 minutes) was shorter than for other visitors (72.4 minutes).

Ninety one visitor groups comprised of 329 (29.0%) individual members of the public saw at least one tortoise. Sixteen visitor groups comprised of 78 (6.9%) 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.

Of 42 respondents to a visitor survey, 10 (24%) were repeat visitors. The most common ways that visitors learned about the DTNA were from tour books/guides, the DTPC website, and road signs and maps. The DTNA was the sole destination for 36% of the respondents to the visitor survey. Red Rock Canyon and the Antelope Valley Poppy Preserve were the most frequently visited other attractions that were 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, a freeze-dried tortoise, 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) 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.
- 3) 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.
- 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 21 and June 19, 2003. 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 2003 was Charles C. Hemingway. 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. Charles Hemingway has provided local support for the Naturalist at the DTNA for the previous 6 years, and so is well experienced in working with visitors, collecting data and providing interpretive services. The Naturalist was provided with a cellular telephone, and 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).

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.

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.

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.

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) were conducted to compare data gathered between 1989 and 2002 with the 2003 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.

All data was entered into Microsoft © Access and statistical analysis performed in 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.

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

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.

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.

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 DTPC fundraising products. Products were displayed on a table, along with educational materials, in front of the DTDC. Postcards with photographs of desert species provided a source of conversation and were a good reference for identification of local species.

RESULTS

Collection of visitor data

On Site Presence

The Naturalist was present at the Interpretive Center on 79 days between March 21 and June 19, 2003. This included: 10 days in March; 26 days in April; 28 days in May; and 15 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 about 50% of the time so on site presence was higher than is indicated by his 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 Naturalist also traveled to Ridgecrest on Saturday, June 7 to attend the DTPC/BLM Annual Coordination Meeting where he presented his preliminary observations. The dates on which visitation and monitoring data were not collected were: March 26, April 2, April 16, April 23, April 30, May 6, May 21, May 27, June 3, June 7, June 10, and June 18.

Visitation

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 (Table 1). This included 632 males, 452 females, and 159 unknown. When tour groups were large, the Naturalist did not discern between males and females, but lumped them into one group, "unknown." The category "unknown" also included OHV users who arrived at the DTNA and did not remove their helmets and groups with some members who remained inside their vehicles.

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.

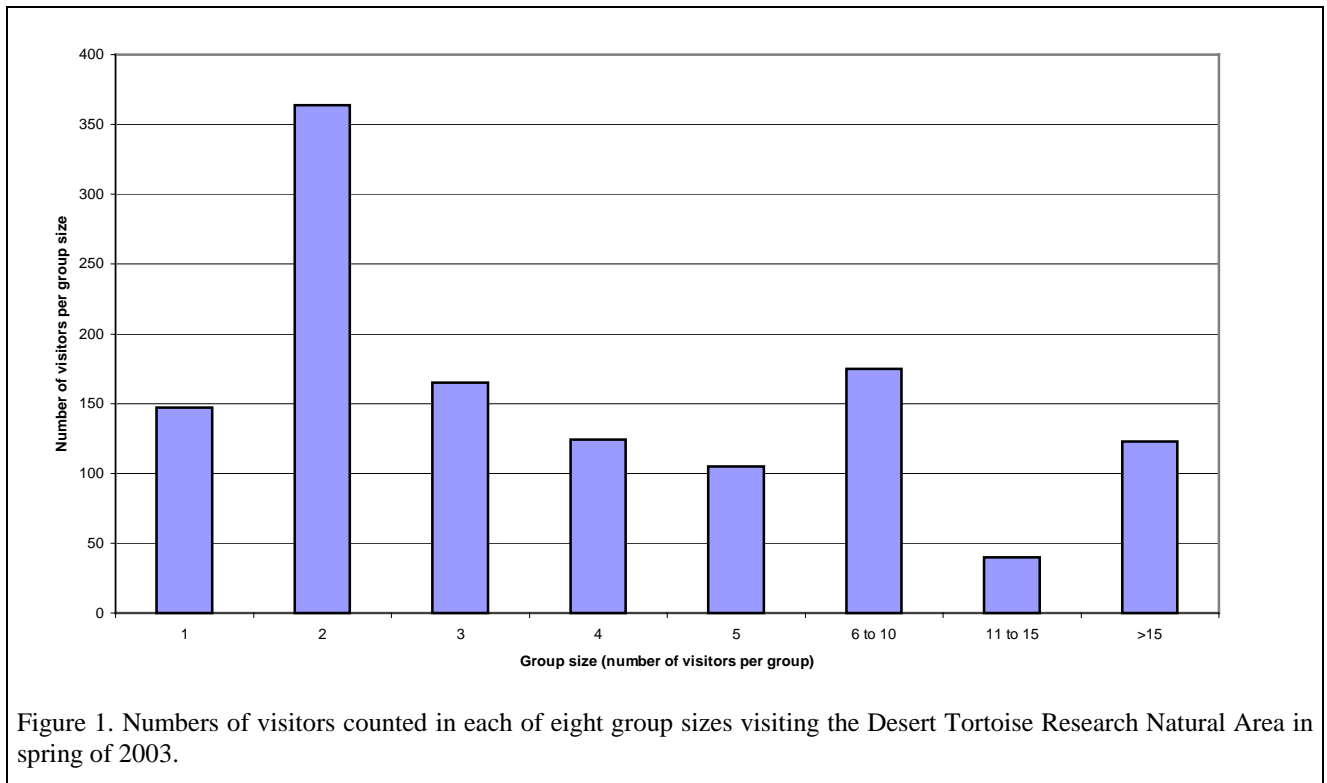
Group Size

Average number of individuals in each visitor group was 2.66 (± 3.24) (Table 1). Average group size for the season was similar to that of 2002 (2.68 ± 3.77), 2001 (2.76 ± 2.45) and 2000 (2.79 ± 2.82). Average length of stay of groups for the 2003 season was 1 hour compared to 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 13:13 hours PST.

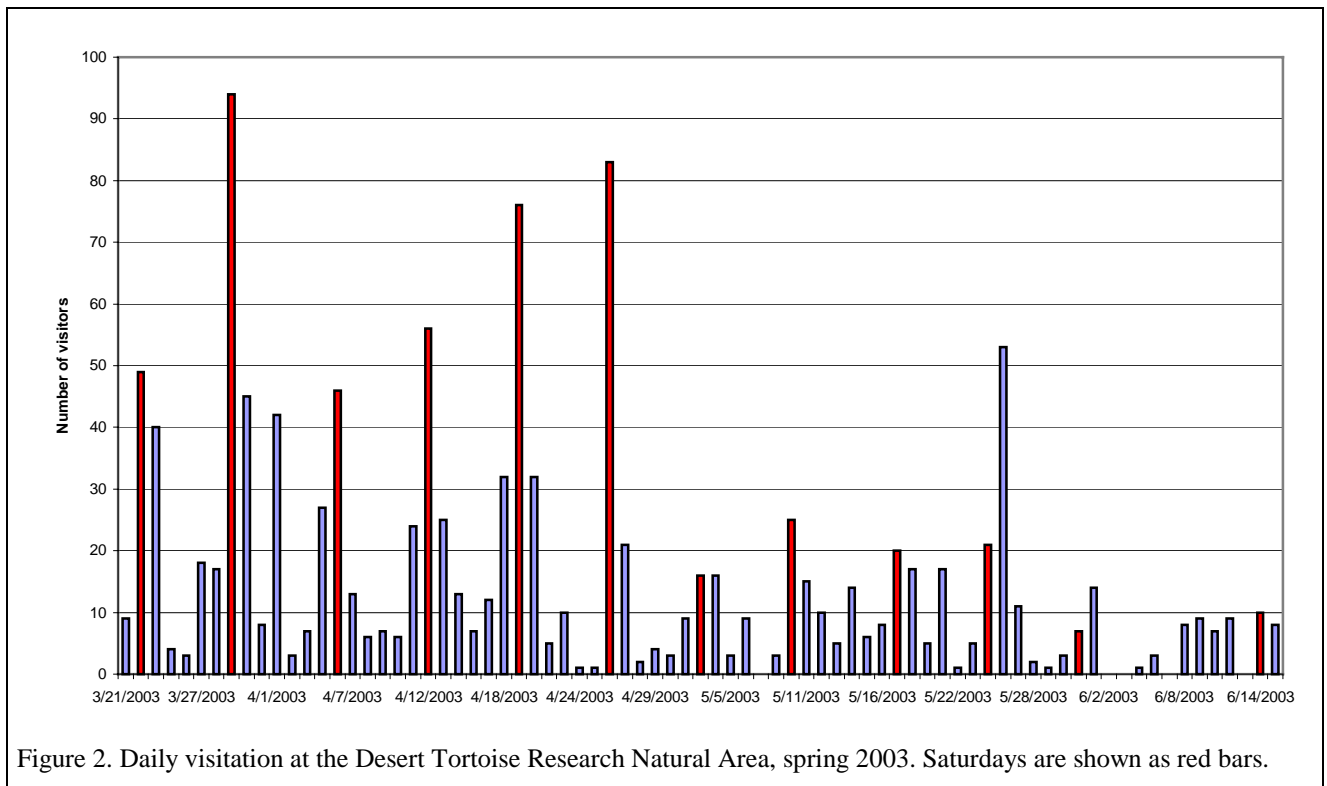
Table 1. Summary of visitation by month at the Desert Tortoise Research Natural Area in the spring of 2003. (SD=Standard deviation).

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	10	104	287	2.76 \pm 4.12	61 \pm 53	13:02 \pm 2.40
April	26	187	561	3.00 \pm 3.70	65 \pm 67	13:16 \pm 2.26
May	28	137	305	2.23 \pm 1.84	59 \pm 62	13:11 \pm 3.01
June	15	39	90	2.31 \pm 1.48	34 \pm 29	13:39 \pm 2.49
Overall	79	467	1243	2.66 \pm 3.24	60 \pm 64	13:13 \pm 2.41

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



The largest groups were attendees for the DTPC’s spring work party (40 on March 29, 2003), a group of museum docents from San Francisco (34 on April 26, 2003), and students from Tulare (26 on April 12, 2003) and Alvin (23 on April 1, 2003) High Schools. Other groups included students from Brooks School of Photography, various school groups, girl scouts, and members of the Inland Empire and Santa Barbara Chapters of the California Turtle and Tortoise Club.



The greatest number of visitors (N=94) was recorded on Saturday, 29 March (Figure 2). This

reflected the presence of members of the Desert Tortoise Preserve Committee's spring work party (n=40) on what is typically a high visitation weekend at the start of spring. Perhaps because it was cold and rainy, only 16 visitors were recorded on May 3, 2003 and 16 on May 4, 2003 coinciding with California City's "Tortoise Days" festival. This is considerably lower than in 2002 when 54 visitors were recorded on May 4, 2002 and 16 on May 5, 2002 coinciding with California City's 2002 "Tortoise Days" festival. There were no visitors for five (6.3%) 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 average arrival time was about 1 hour later in 2003 compared to 2002.

Table 2. Summary of visitation at the Desert Tortoise Research Natural Area in the spring of 2003 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	2.02 \pm 1.12	71 \pm 79.0	12:26 \pm 2:37	42
Tuesday	3.36 \pm 5.01	96.3 \pm 86.7	12:56 \pm 2:14	28
Wednesday	2.29 \pm 1.79	91.5 \pm 65.4	13:15 \pm 2:42	17
Thursday	2.16 \pm 1.44	60 \pm 77.1	13:38 \pm 2:28	37
Friday	2.20 \pm 1.31	62.1 \pm 60.7	13:46 \pm 2:49	55
Saturday	3.03 \pm 4.66	51.9 \pm 60.7	13:32 \pm 2:45	160
Sunday	2.66 \pm 1.80	55.4 \pm 48.8	12:47 \pm 2:41	128

Visitation by off-highway vehicle users

Of the 467 visitor groups recorded, 100 (34%) arrived on an OHV (Table 3). 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 for visitors arriving by OHV was 16.7 minutes compared to an average length of visit for visitors arriving on street legal vehicles of 72.4 minutes. This difference is significant. Average time of day of visit for OHV users was 13:20. Average time of day of visit for non-OHV users was 13:11. This difference was not significant.

Table 3. Visitation by visitor type at the Desert Tortoise Research Natural Area in the spring of 2003. 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	2.96 \pm 2.19	16.7 \pm 20.5	13:20 \pm 2:47	100
Non-OHV	2.58 \pm 3.47	72.4 \pm 66.3	13:11 \pm 2:41	367
Probability	N.S.	<0.0001*	N.S.	

During their visits, a number of OHV users (N=20; 20%) drove through the parking lot without stopping. Sixty (60%) 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 (N=40) 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=15) stayed for 35 to 125 minutes raising the mean stay to 16.7 minutes.

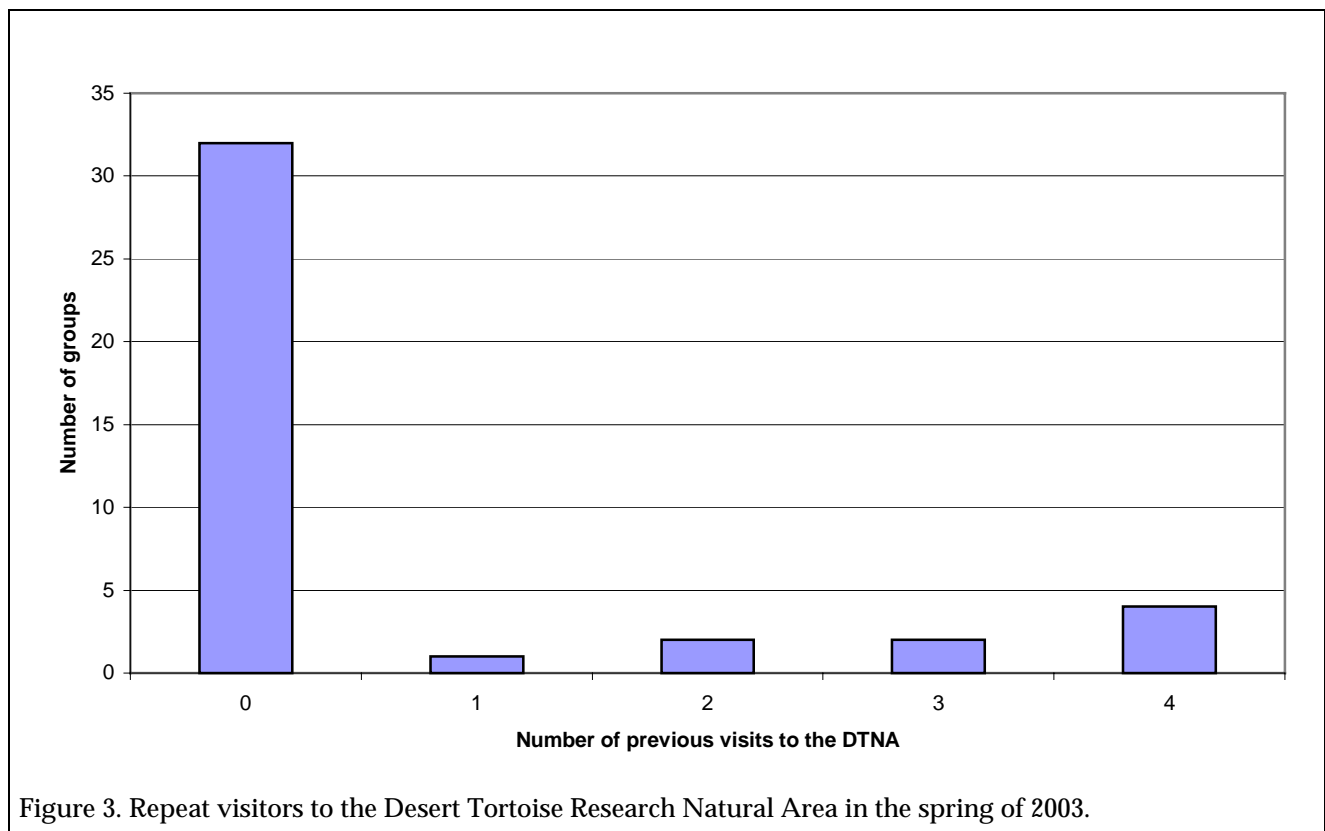
General information on visitors

The Naturalist made contact with 90% (n=419) of the 467 groups of visitors.

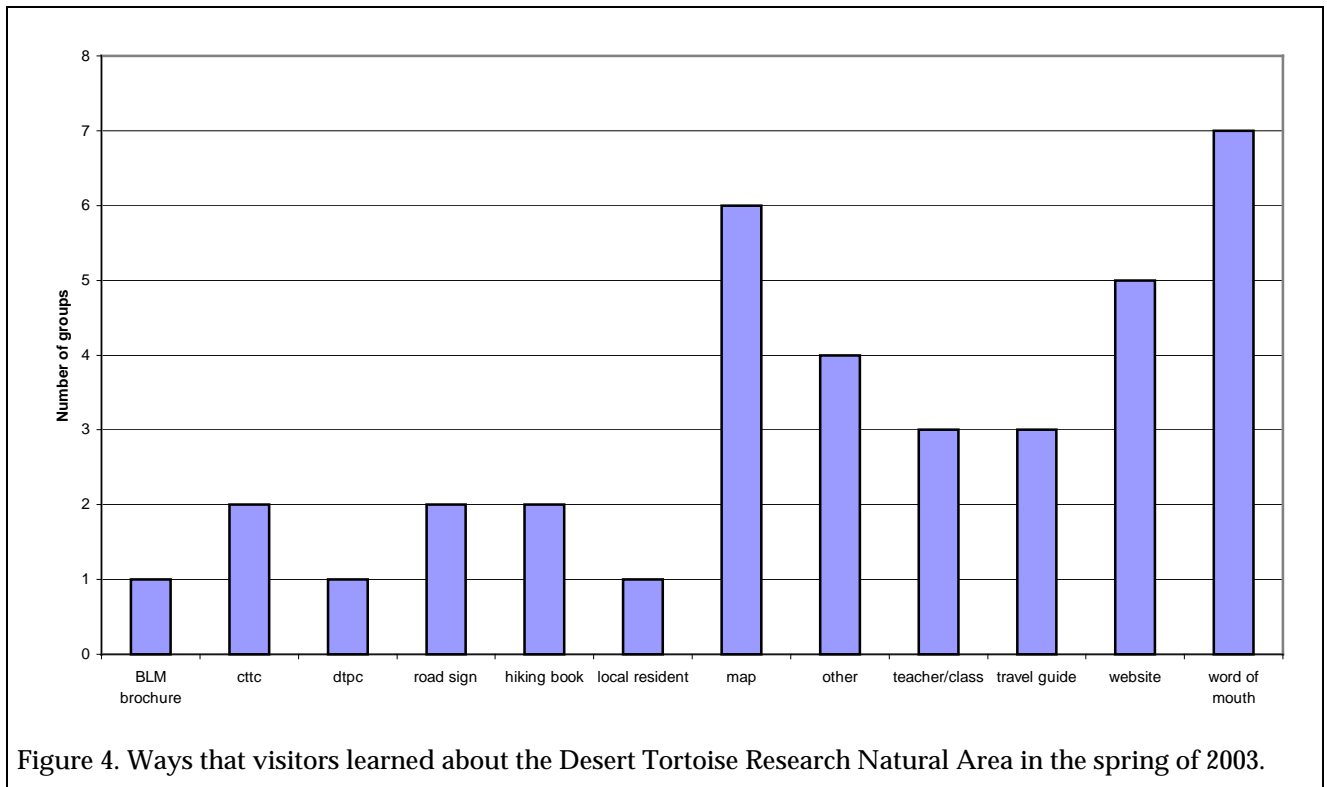
Most (74%) of the visitors who completed the Visitor Survey Form, made an entry in the Recreation Register or reported to the Naturalist were from California (Appendix 3) and the other 26% were from out of state. There were visitors from at least thirteen additional states, including Alaska, Arizona, Colorado, Indiana, Kentucky, Maine, Montana, Nevada, New York, Oregon, Texas, Virginia, and Washington. Visitors from foreign countries included one group each from Australia, Germany, Poland and Sweden, and two groups from Great Britain and from Canada.

Forty-two groups completed Visitor Survey Forms, representing a 10.0% sample of the 419 visitor groups contacted by the Naturalist. This compares with 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.

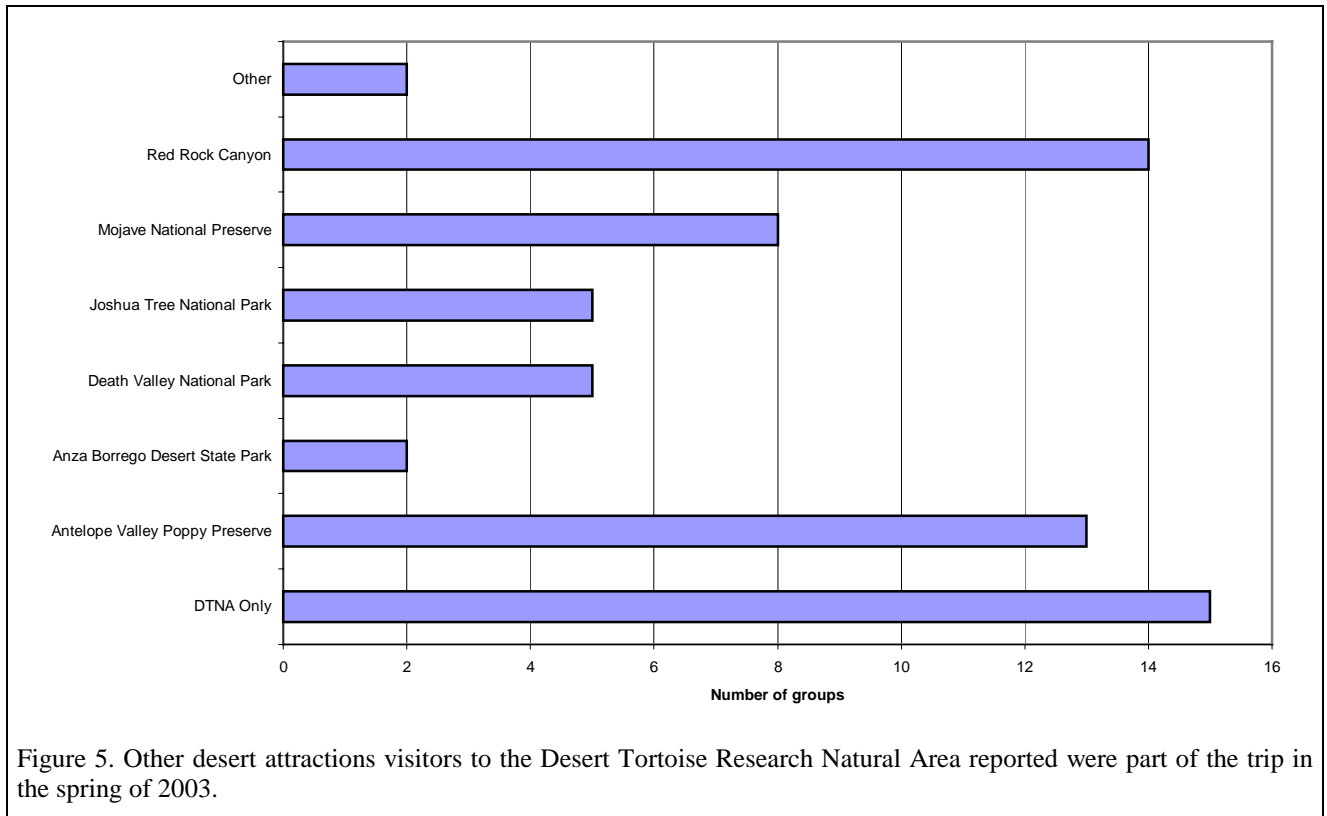
Of the 42 respondents to the visitor survey, 10 (24%) had visited the DTNA before and 32 (76%) had not (Figure 3). Two respondents (5.0%) indicated that they were Desert Tortoise Preserve Committee members.



Visitors reported learning about the DTNA in a variety of ways. The most common ways were from guidebooks, the DTPC website, road signs and maps, and DTPC presentations (Figure 4).



Among visitors responding to the survey, 15 (36%) 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 of two 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 and Antelope Valley Poppy Preserve which are relatively close to the DTNA followed by 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.

Visitors with prior tortoise knowledge attributed their awareness to information and literature that they had obtained at the DTNA in previous years. 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 DTNA website at <http://www.tortoise-tracks.org> and its value in educating themselves and other members of the public. However, familiarity with the species was not always beneficial. On two occasions, pet tortoise owners mentioned touching or moving tortoises they saw during their visit (see below), with the intimation that because they had experience with their own tortoises it was appropriate for them to do so.

Almost all visitors were sympathetic to, and expressed concern over, the predicament of wild tortoises. Many visitors expressed their complete support for the DTNA'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 DTNA's conservation efforts, and that they were glad the DTNA existed and urged the Committee to continue its efforts with comments such as "You guys are awesome... We appreciate you and everything you are doing". Several visitors encouraged further land acquisition with written comments such as "Set aside more habitat"; "...This place is fantastic. We need more like it"; "Keep up the important work and keep out the ATVs".

As in previous years, about half 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. Several referred to the Naturalist by name. The comment "Good nature trail. Great host" 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 "Great flowers. Glad we came." Many visitors also commented on the trails and hiking opportunities afforded by the DTNA including "Greatest roadside rest hike".

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 mentioned the location of tortoise sightings in the Register so that others would know where.

The Naturalist encouraged visitors to stop by the DTDC before they began their walks. This helped to stimulate their curiosity and interest in the tortoise and other wildlife in the Mojave Desert. This also 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. One group of visitors left without entering the Natural Area when they

were told that snakes may be seen here.

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. The comment of one survey respondent “No torts, but nice hike, flowers, butterflies, lizards, birds etc.” being typical.

As reported in previous years, educational opportunities and monitoring abilities were greatly enhanced when the Naturalist was able to accompany visitor groups on the trails. The visitors appreciated assistance in searching for a tortoise and enjoyed having other interesting details and animal signs pointed out to them. “The Naturalist showed us a tortoise – very nice of him.”

Monitoring

Daily Temperatures

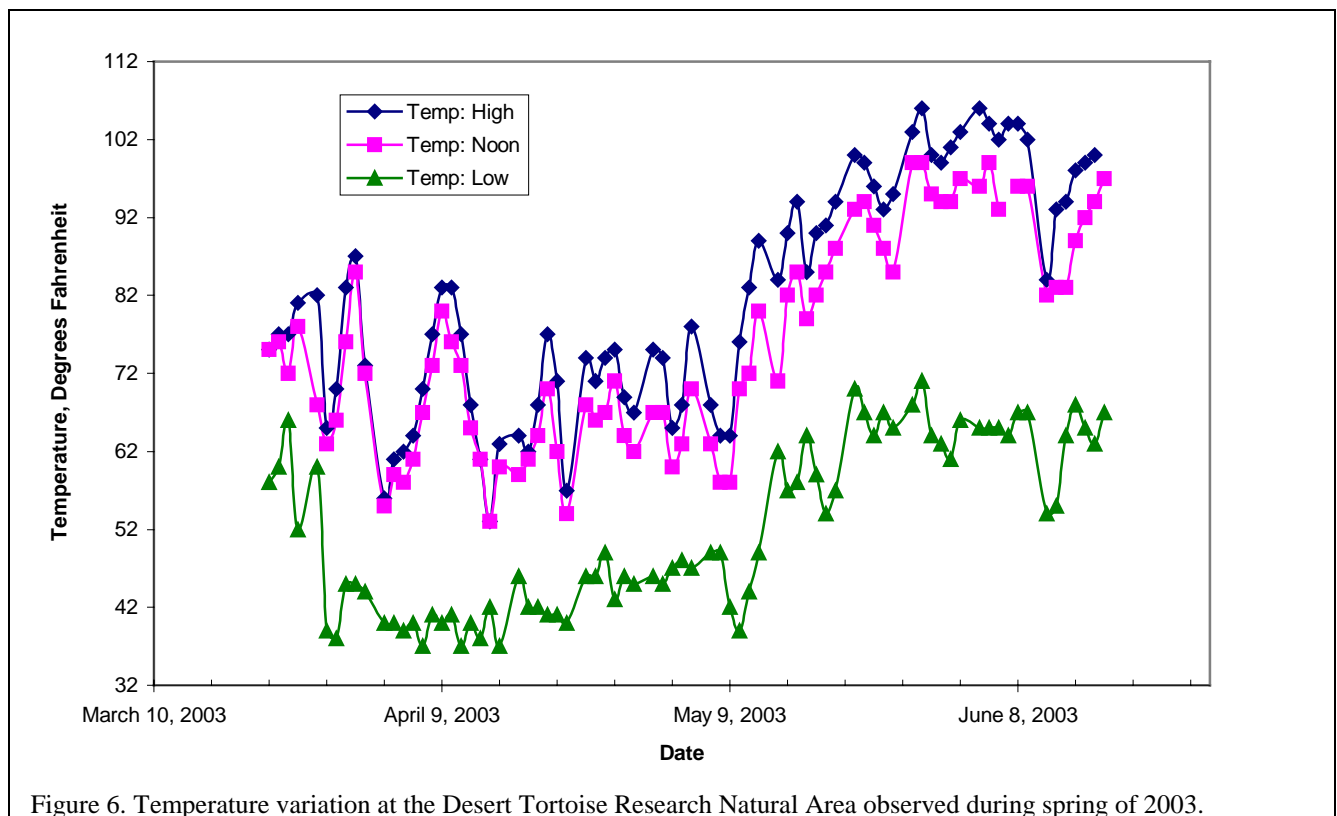


Figure 6. Temperature variation at the Desert Tortoise Research Natural Area observed during spring of 2003.

Figure 6 shows the daily high, low and noon temperatures recorded by the Naturalist from March 22 to June 18, 2003. The average daily high, noon and low temperatures were 81.5 ± 14.8 , 75.9 ± 13.6 , and 52.2 ± 10.9 respectively. The daily measurements can be found in appendix 6.

Sightings of tortoises by visitors

A total of 91 (28%) of 329 visitor groups contacted by the Naturalist as they were leaving the DTNA saw at least one desert tortoise during the 79 days in 2003 (Table 4). 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. In 2003, only 1 visitor group saw 4 or more tortoises in one visit.

Although 28% of all visitor groups contacted by the Naturalist in 2003 saw at least one tortoise only 6 out of 62 (9.7%) visitor groups arriving on an OHV saw a tortoise, and none of them reported seeing more than one tortoise.

Table 4. Summary of tortoise sightings by visitors at the Desert Tortoise Research Natural Area in the spring of 2003.

Tortoise seen	Number of groups	Number of visitors	Length of Stay
0	238	670	62.5 ± 53.4
1	75	237	103 ± 64.6
2	12	65	129 ± 118
3	3	12	195 ± 133
4	1	1	345
≥ 1	91	315	112 ± 80.4

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 2003	23	27%	89	34%
April 2003	38	25%	151	32%
May 2003	28	35%	75	35%
June 2003	0	0%	0	0%

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 significantly correlated with the length of visitor stay ($R^2 = 0.188$; $p < 0.05$). The longer a visit, the more likely was a visitor to encounter at least one tortoise. Because the visitors arriving on an OHV stayed for much shorter periods than the other visitors, this explains why so few of them saw a tortoise and why none reported seeing more than one tortoise.

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

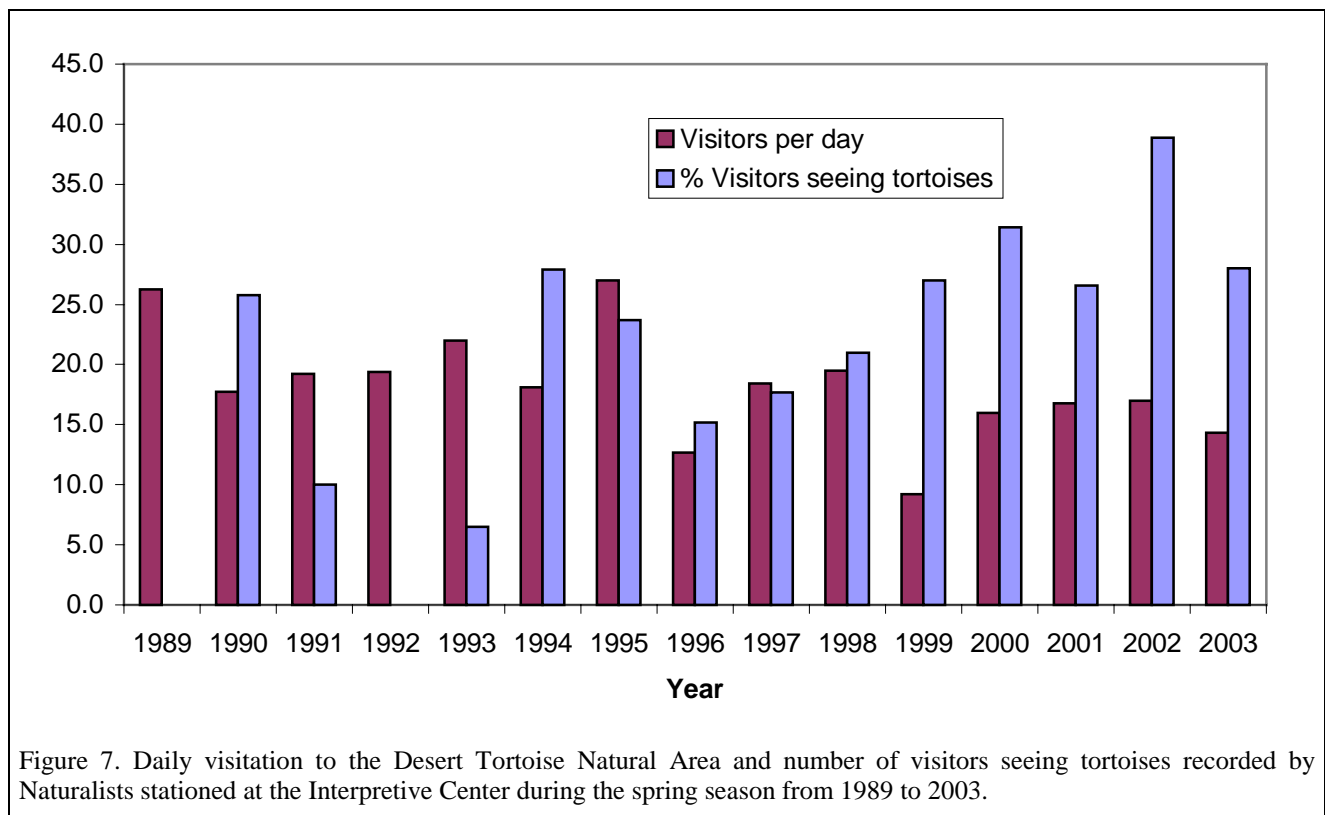
Table 6. Tortoise sightings at the Desert Tortoise Research Natural Area in 2003 by visitor group size.

Tortoise seen	Size of group
0	2.83 ± 2.54
1	3.18 ± 4.53
2	5.42 ± 11.1

3	4.00 ± 2.65
4	1.00

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

Comparison of the 2003 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. The average number of visitors per day in the spring 2003 season (14.3) was slightly lower than the average of all the spring seasons from 1989 to 2003 (17.4 ± 4.60) but this reflects the inclusion of 16 days in June, a low visitation month, whereas in most years, monitoring ended by June 1. Between 1989 and 2003, the percentage of visitors seeing a desert tortoise ranged from 6.5% to 39.5% (mean 24.0 ± 8.7). Figure 6 shows daily visitation (number of visitors per day) and the percentage of visitors who saw a live tortoise recorded by DTNC Naturalists each spring between 1989 and 2003. 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. Young OHV riders on dirt bikes sometimes made themselves

a nuisance by driving at speed through the parking lot and/or by “turning doughnuts” in the gravel parking area. On two occasions, while talking to visitors the Naturalist was forced to excuse himself to talk to OHV riders operating in the parking lot. Several visitors made comments to the Naturalist about the OHV activity occurring outside the DTNA and in the parking lot and wanted to know why it was allowed.

Release, collection and harassment of wild tortoises and other wildlife

Intentional harassment of tortoises was rarely observed, but visitors frequently got caught up in seeing a tortoise, and they had to be reminded to step back and observe the wild tortoise from a respectful distance. The Naturalist found it important to pay additional attention to pet tortoise owners and to photographers because of incidents involving touching or handling of tortoises. In one instance, an elderly couple from Victorville told the Naturalist that they had touched one tortoise “to make sure it was alive.” A second tortoise was referred to as a male “as the bottom wasn’t flat”. The Naturalist observed one avid photographer move a small tortoise seen near the kiosk so he could get a better shot! In each case, the Naturalist carefully explained why it was inappropriate to touch a tortoise and warned the individuals to avoid doing so in the future.

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. On April 19, 2003 one visitor who was a member of a reptile club in Bakersfield displayed a pet desert iguana and a chuckwalla to the Naturalist, a BLM Ranger and 5 visitors in the parking lot. The Naturalist used this opportunity to point out the rules protecting the areas wildlife.

No attempted collection of a wild tortoise was observed. No releases of tortoises were observed. A young, unmarked male tortoise appeared at the Interpretive Center parking lot on May 15 while the Naturalist was out on the Animal Loop. It was unclear if the tortoise was wandering through or had been deliberately translocated. The tortoise behaved as wild tortoise and was not used to people. It constructed several pallet burrows and remained nearby for about 5 days.

Resident tortoise observations

The Naturalist and visitors observed tortoises on 49 days out of the 79 days (62%). Thirteen individual marked tortoises (#’s 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 (#’s 212, 467, 568, 573, 595, 789, 827, 1060, 1083, 1128, 1129, 1151) and 12 unmarked tortoises were observed. In 2001, eight individual marked tortoises (#’s 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 (#’s 467, 568, 573, 789, 999, 1002, 1108, and 1054).

The Naturalist and visitors reported 12 tortoise sightings in March, 38 tortoises sightings in April, 37 tortoise sightings in May, and 3 in June.

Venomous animals

There were seven sightings of rattlesnake near the Interpretive Center during the period March 21 through June 19, 2002. On all occasions, the sighting was of a Mojave rattlesnake. Generally, except on one occasion, 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 young rattlesnake had to be moved from the entry road for it’s own safety.

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.

A member of one visitor group received minor first aid from the Naturalists for a wasp sting that had been received prior to entering the Natural Area

Raven observations

Ravens were observed on 55 days (70%) that the Naturalist was present. These observations were usually of a small flock 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. On 3 separate days during the last week of April and during the first week of May, a flock of 10-11 birds were observed. These appeared to be young ravens. 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 2003 can be found in Appendix 5. Several species were observed that have not been seen in recent years. These include: desert iguana, Mojave patch-nosed snake, northern harrier, and long-nosed snake. The most unusual visitor was a snowy egret that appeared at the Interpretive Center on May 16, 2003. The bird stayed nearby for at least 10 hours. This is the first recorded occurrence of snowy egret at the DTNA.

DISCUSSION

Visitation

The total number of visitors to the DTNA recorded by the Naturalist in spring 2003 was higher than in 2002. However, average daily visitation (15.7 visitors/day) during the spring 2003 season was slightly below the fifteen-year average of 17.7 visitors/day probably because there was an increased presence in June when visitation was low. Unseasonably cold or wet weather during usually busy weekends such as that coinciding with California City's "Desert Tortoise Days" also served to decrease average visitation. As has been true in all previous years, visitation was highest at the weekends. This year, as in 2002, the busiest visitation day was Saturday.

The spring rains of 2003 made for an impressive annual flower display in March and April at the Natural Area, and viewing and photographing the wildflowers was the reason given by a number of visitors for them visiting the area. This may explain why 32% of visitors who responded to the visitors survey reported that they were also visiting the Antelope Valley Poppy Preserve. In contrast, in 2002, a very dry year, only 8.1% of respondents reported that they were also visiting the Poppy preserve (See Connor, 2002).

Most of the visitors were from California (Appendix 3) but 26% were from out of state. There were visitors from Alaska, Arizona, Colorado, Indiana, Kentucky, Maine, Montana, Nevada, New York, Oregon, Texas, Virginia, and Washington. Visitors from foreign countries included groups from Australia, Canada, Germany, Great Britain, Poland and Sweden.

Because of its location, most visitors to the DTNA travel through California City. How significant a contribution to the local economy is made by DTNA visitors who stop in California City is an interesting question that should be amenable to future research. Clear demonstration of the value that the DTNA contributes to the local economy could offer a tool to gain stronger local support.

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. Visitor support of the DTPC mission is clear from the many comments expressing the value seen in the DTPC Naturalist program.

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 still surprised to learn 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. This view was not shared by some of the OHV users. Told that the tortoise was listed under the Endangered Species Act because its population is declining and there is evidence that it could become extinct in the future, one OHV rider asked "will the fence come down then?"

In 2003, 29% of visitor groups were able to see at least one tortoise. This is lower than in 2002 when female tortoise #595 constructed a burrow in the Interpretive Center parking lot but is higher than the 15-year average of 24%. Several return visitors expressed their hope of seeing tortoise #568, an adult female also known as "Fern". Tortoise #568 has been living in the vicinity of the Interpretive Center for the last 5 years. She showed little or no fear of visitors and frequently approached people. Consequently, she was probably

the most seen and photographed tortoise at the DTNA. However, this season the tortoise has been absent. It is interesting that visitors should express concern over one particular, individual tortoise.

In 2003, group size did not seem to make a difference in finding tortoises. 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.

Status of 2002 Recommendations

DTPC involvement in Tortoise Days: In 2002, it was recommended that the Desert Tortoise Preserve Committee, Inc. have a booth or display literature at the California City Tortoise Days. Since the animal the community celebrates is the same animal the DTNA protects, perhaps a DTPC representative should be present or participate in this local event. This could prove to be a productive way to increase public awareness and visitation to the DTNA. It could also be a good opportunity to sell DTPC merchandise and raise funds for tortoise habitat protection.

Unfortunately, the 2003 Desert Tortoise Days was impacted by inclement weather. DTPC anticipates having a booth at the festival in 2004.

No Dogs Policy: It is recommended that the DTNA brochure be modified to mention that dogs are not allowed inside the DTNA. It is recommended that a warning that dogs are not allowed inside the DTNA be added to the DTPC website.

Placing a sign in the IC parking lot that clearly spells out the rules has helped with this issue. A warning notice regarding the “no dogs” policy has been added to the website. New DTNA and Main Loop brochures will also carry notice of the “no dog” policy.

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.
- (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.

ACKNOWLEDGMENTS

We thank the following organizations and individuals for contributing to the ongoing success of the DTPC Naturalist program: the National Fish and Wildlife Foundation for providing matching funds to support the Desert Tortoise Preserve Committee's Naturalist program at the DTNA in 2002 and 2003; 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; BLM volunteers and 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, Ranger Ed Patrovsky, and Ranger Robert Trantor of the Bureau of Land Management's Desert District Ridgecrest Field Office for all their considerable support and help.

WORKS CONSULTED

- Boland, C. 1994. Observations and Activities of the Naturalists at the Desert Tortoise Natural Area, Kern County, California: 1 March through 31 May 1994, for the Desert Tortoise Preserve Committee, Inc. San Bernardino, CA.
- Boland, C. 1995. Observations and Activities of the Naturalists at the Desert Tortoise Natural Area, Kern County, California: 1 March through 31 May 1995, for the Desert Tortoise Preserve Committee, Inc. San Bernardino, CA.
- Bureau of Land Management. 1973. Interim Critical Management Plan for recreation vehicle use in the California Desert. Bureau of Land Management, Sacramento, California.
- Bureau of Land Management. 1976. El Paso Management Framework Plan. Bureau of Land Management, Bakersfield, California.
- Bureau of Land Management. 1979. Desert Tortoise Natural Area Management Plan. Bureau of Land Management, Ridgecrest, California.
- Bureau of Land Management. 1980. The California Desert Conservation Area Plan. Bureau of Land Management, Riverside, California.
- Bureau of Land Management and California Department of Fish and Game. 1988. A Sikes Act Management Plan for the Desert Tortoise Research Natural Area and Area of Critical Environmental Concern.
- Connor, M.J. 2000. Observations and Activities of the Naturalist for the Desert Tortoise Natural Area, Kern County, CA., March 30 – June 9, 2000. Desert Tortoise Preserve Committee Inc., Riverside, CA.
- Connor, M.J. 2001. Observations and Activities of the Naturalist for the Desert Tortoise Natural Area, Kern County, CA., March 16 –May 31, 2001. Desert Tortoise Preserve Committee Inc., Riverside, CA.
- Connor, M.J. 2002. Observations and Activities of the Naturalist for the Desert Tortoise Natural Area, Kern County, CA., March 15 –May 31, 2002. Desert Tortoise Preserve Committee Inc., Riverside, CA.
- Ginn, S.E. 1990. Observations and Activities of the Naturalist for the Desert Tortoise Natural Area, Kern County, CA., March 18 - June 2, 1990. Desert Tortoise Preserve Committee Inc., Ridgecrest, CA.
- Howland, J.M. 1989. Observations and Activities of the Naturalist for the Desert Tortoise Natural Area, Kern County, California, March 12 - July 12, 1989. Desert Tortoise Preserve Committee, San Bernardino, CA.
- Jennings, W.B. 1991. Observations and Activities of the Naturalists for the Desert Tortoise Natural Area, Kern County, CA March 2 - May 27, 1991. Desert Tortoise Preserve Committee, Ridgecrest, CA.
- Kidd, J. 1993. Observations and Activities of the Naturalists at the Desert Tortoise Natural Area, Kern County, California: 1 March through 31 May 1993. Desert Tortoise Preserve Committee, Inc., San Bernardino, CA.
- Ogg, S. and Gallant, S. 1992. Observations and Activities of the Naturalists for the Desert Tortoise Natural Area, Kern County, California, March 3 - May 31, 1992. Desert Tortoise Preserve Committee, San Bernardino, CA.

- On-Track Consulting and Research. 1996. Observations and Activities of the Naturalists at the Desert Tortoise Research Natural Area, Kern County, California: 9 March through 31 May 1996. Desert Tortoise Preserve Committee, San Bernardino, CA.
- On-Track Consulting and Research. 1997. Observations and Activities of the Naturalists at the Desert Tortoise Research Natural Area, Kern County, California: 8 March through 25 May 1997. Desert Tortoise Preserve Committee, San Bernardino, CA.
- On-Track Consulting and Research. 1998. Observations and Activities of the Naturalists at the Desert Tortoise Research Natural Area, Kern County, California: 12 March through 31 May 1998. Desert Tortoise Preserve Committee, San Bernardino, CA.
- On-Track Consulting and Research. 1999. Observations and Activities of the Naturalists at the Desert Tortoise Research Natural Area, Kern County, California: 28 March through 2 May and 8 May through 6 June 1999. Desert Tortoise Preserve Committee, San Bernardino, CA.

APPENDIX 2. Data sheet used by the Naturalist at the Desert Tortoise Research Natural Area in the spring of 2003.

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____ Day _____

Name _____

WEATHER DATA

Temperatures LOW: _____ NOON: _____ HIGH: _____

Winds _____

Cloud cover _____

Precipitation _____

Start time (PST) _____

End time (PST) _____

Total time (hrs) _____

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											
14											
15											
16											
17											
18											
19											
20											
21											
22											
											Page totals

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____
 Name _____

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
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
Page totals											
from page 1											
Grand total											

DATA SHEET FOR THE DESERT TORTOISE NATURALIST

Date _____
 Name _____

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 2003 from Visitor Survey Forms, Naturalist Data Sheets and the Recreation Area and Site Register.

Country	City	State	Number
Australia	Sydney		1
Canada	Ottawa		1
Canada	Vancouver		1
England	Reading		1
England	Tewkesbury		1
Germany	Bochum		1
Poland	Katowice		1
Sweden	Stockholm		1
USA	Haynes	AK	1
USA	Mount Lemmon	AZ	1
USA	Phoenix	AZ	1
USA	Bakersfield	CA	1
USA	Berkeley	CA	4
USA	Berkely	CA	1
USA	Boulder Creek	CA	3
USA	California City	CA	6
USA	Camarillo	CA	1
USA	Cantil	CA	1
USA	Canyon Country	CA	1
USA	Claremont	CA	1
USA	Covina	CA	1
USA	Dana Point	CA	1
USA	Diamond Bar	CA	1
USA	Dunsmuir	CA	1
USA	Edwards AFB	CA	2
USA	El Cerrito	CA	1
USA	El Monte	CA	1
USA	El Porto	CA	1
USA	Fair Oaks Ranch	CA	1
USA	Fairfax	CA	1
USA	Garden Grove	CA	1
USA	Gardena	CA	1
USA	Half Moon Bay	CA	1
USA	Lancaster	CA	2
USA	Livermore	CA	1
USA	Los Angeles	CA	2
USA	Los Osos	CA	1
USA	Mill Valley	CA	1
USA	Modesto	CA	1
USA	Monterey	CA	1
USA	Morengo Valley	CA	1
USA	Nevada City	CA	1
USA	North Hollywood	CA	1
USA	Norwalk	CA	1
USA	Pasadena	CA	2
USA	Quartz Hill	CA	1
USA	Redondo Beach	CA	1

Country	City	State	Number
USA	Ridgecrest	CA	2
USA	Rosamond	CA	2
USA	Roseville	CA	1
USA	Sacramento	CA	1
USA	San Diego	CA	1
USA	San Francisco	CA	3
USA	San Jose	CA	3
USA	San Mateo	CA	1
USA	Santa Barbara	CA	1
USA	Santa Cruz	CA	3
USA	Santa Monica	CA	1
USA	Santa Rosa	CA	2
USA	Santa Ynez	CA	1
USA	Santee	CA	1
USA	Simi Valley	CA	1
USA	Taft	CA	1
USA	Thousand oaks	CA	1
USA	Tulare	CA	1
USA	Tustin	CA	1
USA	Van Nuys	CA	1
USA	Ventura	CA	2
USA	Visalia	CA	1
USA	Weldon	CA	1
USA	West Covina	CA	1
USA	West Hollywood	CA	1
USA	Westlake Village	CA	1
USA	Woodland Hills	CA	1
USA	Wrightwood	CA	1
USA	Boulder	CO	1
USA	Durango	CO	1
USA	Greensburg	IN	1
USA		KY	2
USA	St. Albany	ME	1
USA	Red Lode	MT	1
USA	Reno	NV	1
USA	New York	NY	1
USA	Ashland	OR	1
USA	Richland	OR	1
USA	Stratton	OR	1
USA	Sweet Home	OR	1
USA	San Antonio	TX	1
USA		VA	1
USA	Seattle	WA	2

APPENDIX 4. Comments from visitor survey forms and register, Desert Tortoise Research Natural Area, spring of 2003.

Great area, appreciate the volunteers
Took an application form and will join
A wonderful way to spend a beautiful day
Thanks!
You guys are awesome. Please keep up the good work and dedication. We appreciate you and everything you are doing. P.S. Chuck is GREAT, knowledgeable, friendly and helpful.
Saw a wonderful tortoise
Nice walk
Good luck
The Naturalist showed us a tortoise - very nice of him
Thank you - the desert is beautiful this year
Absolutely marvelous!
Great flowers! Glad we came
Saw two large tortoises about 0.5 mile north of the visitor center
This was great! We loved seeing the tortoise.
This is a great place - I'm glad it's here.
Great reserve - thanks!
Nice trails, easy walking, overall good nature walk
Nice folks - every time
Thank you.
Saw desert tortoise between markers 15-16 Animal Loop
Dirt biking is fun. Lots of flowers
Saw tortoise 1/2 mile NW 15:20 hours
3rd visit
Saw baby rattlesnake 8:00 am
3rd visit - 2 whiptail lizards
Camping
Set aside more habitat!
Wonderful flowers. Saw one tortoise!
Flowers
Flowers and tortoise
Tortoise off main loop #10
Love it!
Saw 2 tortoises
Tortoise (599) near Animal Loop. This place is fantastic. We need more like it.
Trail maps don't match well to current plants.

Environmental Science Class for Tulare Western High observing tortoises
Member - cloudy and windy no tortoises
Saw desert tortoise between markers 15-16 Animal Loop
Girl scout project - no tortoises seen
Quad running - no tortoises sunny and windy
Saw 1 tortoise, did not see a number
No torts but beautiful plants and view
2 tortoises spotted on Animal Loop (1200)
Home away from home
Coachwhips slithered swiftly Saturday
Saw two tortoises 1/2 mile north
Plant/flower viewing
Greatest roadside rest hike!
Very cool! Had fun!
No torts, but nice hike - flowers, butterflies, lizards, birds, etc
No torts but very peaceful
Loved it. Friendly and informative host
Beautiful!
Beautiful and then some! No torts
Lots of lizards, lovely flowers, very peaceful.
Mojave rattlesnake near guide post #34 Discovery Loop
Saw tortoise between 14 - 15 Animal Loop.
Animal Loop post 25, less than 1/8 mile SW in wash, probable tortoise under hop bushes in island. Lizards. Wildflowers
Saw lizards only
Saw lizard, rattlesnake on Animal Trail, king snake on Discovery Loop
Horned lizard. Female tort by marker 8
Very nice. Good nature trail. Great host
Informative
Finally saw a tortoise after 5 visits
What a great place! Good work! And saw a tortoise!
Saw young tortoise near plant loop
Keep up the important work and keep out the ATVs!
Saw 2 lizards. Enjoyed the morning breeze and the solitude.
Plenty lizards, hares, but no turtles

APPENDIX 5. Vertebrate species observed in and around the Interpretive Center and within 0.5 mile of the visitor area between March 21 through June 19, 2003.

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

Gopher Snake

Pituophis melanoleucus

Long-nosed Snake

Rhinocheilus lecontei

Mojave Patch-nosed Snake

Salvadora hexalepis mojavensis

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 CICONIIFORMES

FAMILY ARDEIDAE

Snowy Egret

Egretta thula

ORDER COLUMBIFORMES

FAMILY COLUMBIDAE

Mourning Dove

Zenaida macroura

ORDER FALCONIFORMES

FAMILY ACCIPITRIDAE

Northern Harrier

Circus cyaneus

Red-tailed Hawk

Buteo jamaicensis

FAMILY CATHARTIDAE

Turkey Vulture

Cathartes aura

ORDER PASSERIFORMES

FAMILY ALAUDIDAE

Horned Lark

Eremophila alpestris

FAMILY CORVIDAE

Common Raven

Corvus corax

FAMILY EMBERIZIDAE

Sage Sparrow

Amphispiza belli

Lesser Goldfinch

Carduelis psaltria

House Finch

Carpodacus mexicanus

Bullock's Oriole

Icterus galbula

APPENDIX 5 (Cont.). Vertebrate species observed in and around the Interpretive Center and within 0.5 mile of the visitor areas from 21 March through 19 June, 2003.

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 HIRUNDINIDAE	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Violet Green Swallow	<i>Tachycineta thalassina</i>
FAMILY LANIIDAE	
Loggerhead Shrike	<i>Lanius ludovicianus</i>
FAMILY MIMIDAE	
LeConte's Thrasher	<i>Toxostoma lecontei</i>
FAMILY REMIZIDAE	
Verdin	<i>Auriparus flaviceps</i>
FAMILY STURNIDAE	
European Starling	<i>Sturnus vulgaris</i>
FAMILY TYRANNIDAE	
Western Wood Pewee	<i>Contopus sordidulus</i>
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Say's Phoebe	<i>Sayornis saya</i>
Western Kingbird	<i>Tyrannus verticalis</i>
ORDER STRIGIFORMES	
FAMILY STRIGIDAE	
Burrowing Owl	<i>Athene cunicularia</i>
CLASS MAMMALIA	
ORDER CARNIVORA	
FAMILY CANIDAE	
Kit Fox	<i>Vulpes macrotis arsipus</i>
ORDER LAGOMORPHA	
FAMILY LEPORIDAE	
Black-tailed Hare	<i>Lepus californicus</i>
ORDER RODENTIA	
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>

APPENDIX 6. Daily high and low temperatures from 21 March to 19 June 2003 at the Interpretive Center, Desert Tortoise Natural Area

Date	Daily high (°F)	Noon temp (°F)	Daily low (°F)	Precipitation
3/22/03	75	75	58	
3/23/03	77	76	60	
3/24/03	77	72	66	
3/25/03	81	78	52	
3/27/03	82	68	60	
3/28/03	65	63	39	
3/29/03	70	66	38	
3/30/03	83	76	45	
3/31/03	87	85	45	
4/1/03	73	72	44	
4/3/03	56	55	40	
4/4/03	61	59	40	
4/5/03	62	58	39	
4/6/03	64	61	40	
4/7/03	70	67	37	
4/8/03	77	73	41	
4/9/03	83	80	40	
4/10/03	83	76	41	
4/11/03	77	73	37	
4/12/03	68	65	40	
4/13/03	61	61	38	
4/14/03	53	53	42	0.1 in
4/15/03	63	60	37	
4/17/03	64	59	46	
4/18/03	62	61	42	
4/19/03	68	64	42	
4/20/03	77	70	41	
4/21/03	71	62	41	sprinkle
4/22/03	57	54	40	
4/24/03	74	68	46	
4/25/03	71	66	46	
4/26/03	74	67	49	
4/27/03	75	71	43	
4/28/03	69	64	46	
4/29/03	67	62	45	
5/1/03	75	67	46	
5/2/03	74	67	45	
5/3/03	65	60	47	.05 inch
5/4/03	68	63	48	
5/5/03	78	70	47	
5/7/03	68	63	49	
5/8/03	64	58	49	
5/9/03	64	58	42	
5/10/03	76	70	39	

Date	Daily high (°F)	Noon temp (°F)	Daily low (°F)	Precipitation
5/11/03	83	72	44	
5/12/03	89	80	49	
5/14/03	84	71	62	
5/15/03	90	82	57	
5/16/03	94	85	58	
5/17/03	85	79	64	
5/18/03	90	82	59	
5/19/03	91	85	54	
5/20/03	94	88	57	
5/22/03	100	93	70	
5/23/03	99	94	67	
5/24/03	96	91	64	
5/25/03	93	88	67	
5/26/03	95	85	65	
5/28/03	103	99	68	
5/29/03	106	99	71	
5/30/03	100	95	64	
5/31/03	99	94	63	
6/1/03	101	94	61	
6/2/03	103	97	66	
6/4/03	106	96	65	
6/5/03	104	99	65	
6/6/03	102	93	65	
6/7/03	104		64	
6/8/03	104	96	67	
6/9/03	102	96	67	
6/11/03	84	82	54	
6/12/03	93	83	55	
6/13/03	94	83	64	
6/14/03	98	89	68	
6/15/03	99	92	65	
6/16/03	100	94	63	
6/17/03		97	67	
mean	81.5	75.9	52.2	
SD	14.8	13.6	10.9	