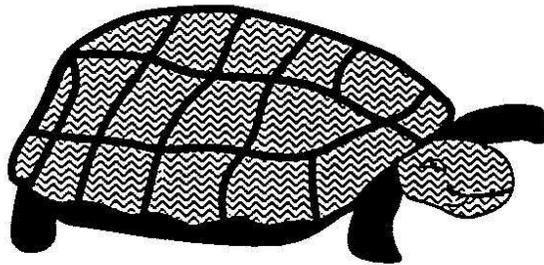

FINAL REPORT FOR
A PILOT STUDY OF OFF-HIGHWAY VEHICLE USERS' ATTITUDES, BELIEFS,
AND BEHAVIORS TOWARD DESERT TORTOISE CONSERVATION ON BUREAU OF
LAND MANAGEMENT AREAS IN SOUTHERN CALIFORNIA



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tortoise issue. Management of racing events is more restrictive than that focused on nonracers, and racers could potentially lose more recreation opportunities than nonracers after implementation of a tortoise recovery plan. Due to their importance and influence in OHV riding area allocation, racers were probably oversampled relative to their proportion in the overall OHV user population.

Visitors were sampled at four sites in the western Mojave Desert (Figure 1), all on BLM lands, and at a District 37 American Motorcycle Association (AMA) meeting. Data were collected on weekends during Fall and Winter 1991-92 from 9:00 am until 4:00 pm during each sampling day. Contacts were made in staging areas (where users unload their machines and equipment). Every group encountered was asked if they wanted to participate in a OHV survey about the desert tortoise. Individuals were not randomly selected from each group; all members of all groups contacted were asked if they would participate. This nonprobability sampling scheme was used to ensure that a minimum of 400 respondents were sampled during the data collection phase of the study.

Data Analysis

Data were analyzed using Systat version 5.0. Frequencies were computed for all variables in the questionnaire. Means were computed for education level, knowledge level, and the attitudinal statements about desert tortoise conservation. A general knowledge variable was created by summing the number of correct beliefs about tortoise conservation. This did include responses from questions 4f. and 4i. Chi-square and t-tests were computed to investigate possible differences between racers and nonracers, and males and females. Responses to questions that were analyzed for mean differences were not checked for normality. According to Hays (1981: 276) when sample sizes are large (as they were in this study) the distribution of t "approaches the standardized normal distribution."

Possible differences between racers and nonracers were investigated since it was assumed racers would have a higher level of involvement in OHV riding than nonracers. Nonracers were identified as those individuals who indicated they had "never" raced. Analyses were also conducted to see if there were differences between participants in the AMA meeting versus those contacted on-site. This was done since it was assumed that members of the AMA might have unusually strong opinions that could bias the overall study results. Possible differences between males and females were investigated on the basis of national surveys of Americans' attitudes conducted by Kellert (1980, 1982). His research revealed statistically significant differences between males and females. Females held stronger humanitarian and aesthetic attitudes than males. Generalizing from Kellert's research, it seemed plausible that females might demonstrate statistically different (more positive) attitudes towards tortoise conservation than males.

Ajzen (1991) described a communication model that indicates four essential factors to consider when developing information campaigns. In the model, the source conveys a message through a certain channel to a receiver. Any of the four factors can affect the efficacy of the information campaign. However, the current emphasis in persuasive communication research is on the receiver (or audience), since the type of audience influences selection of the appropriate source, message, and channel. Slater (1991) has suggested guidelines for determining source, message type, and channel based on the receivers' extent of involvement in the subject (e.g., desert tortoise issue) for which persuasion is desired. Similarly, Petty and Cacioppo (1986) have developed a framework for persuasive communication based on the audience's ability and motivation to elaborate on a message. They distinguish between audiences that are high in ability and motivation to process new information, versus those who are not, and suggest different methods of communication for each. These approaches converge on the same idea; that individuals will vary in their level of involvement and ability to process a message, and this will affect the type of source, channel, and message used in an information campaign.

Individuals become highly involved with an issue (e.g., tortoise conservation) when it is perceived to affect important outcomes (such as allocation of OHV riding areas), and when the issue is related to their values. In contrast, low involvement refers to those persons for whom the issue is not related to their values, and who do not perceive the issue to affect outcomes important to them. For example, individuals who believe that OHV riding is highly important to them are probably more involved in the desert tortoise issue than those who do not.

As a generalization, for those individuals who are highly involved in an issue, message content that is logical and rational works best, while for those who are not highly involved, messages which are vivid, easy to remember, and easy to comprehend work best. Low involvement subjects are also more prone to be influenced by factors other than the message itself, such as source credibility. Regarding channels, research has demonstrated that those who use printed information tend to be most highly involved with the issue and tend to be better educated (Etzel and Walters 1985, Slater 1991) than users of other media, such as television. A critical aspect of implementing an information campaign is determining the level of involvement of the audience, and identifying the appropriate source, message, and communication channel.

Study Purpose

This study focused on gathering information useful for addressing the message and channel components of the model. It was assumed that OHV recreationists would vary in their level of involvement with the desert tortoise issue, and that racers would be more highly involved than nonracers. The purpose of the study was to identify the knowledge, attitudes, and behaviors of OHV users regarding the desert

tortoise conservation (message related), and to determine the information sources used by OHV recreationists (channel related). The specific study objectives were to:

1. Identify the beliefs, attitudes, and behaviors that OHV users hold in regard to desert tortoise conservation.
2. Determine if beliefs, attitudes, and behaviors held by this group vary by racers and nonracers, and by gender.
3. Identify information sources used by OHV recreationists to learn about their sport.
4. Determine if information sources used by OHV recreationists to learn about their sport vary by racers and nonracers, and by gender.

METHODS

Study Approach

This study employed a survey research approach to collect data about OHV recreationists' attitudes, beliefs, and behaviors related to desert tortoise conservation issues. A survey research approach was chosen because it is an efficient means of collecting information that is salient to the respondent, and can be honestly elicited. Given the attention directed toward the desert tortoise issue by the BLM, USFWS, and environmental interest groups, it seems likely that this issue and the related beliefs and behaviors would be salient and honestly elicited by OHV recreationists.

Instrument Development

Questions collected information in five categories. A copy of the survey instrument is in Appendix A.

1. beliefs about the desert tortoise
2. attitudes towards desert tortoise conservation
3. information sources used, OHV club membership
4. OHV activities and frequency of participation
5. socio-demography information

Beliefs-Beliefs were considered users' expectations that statements were true or false. Information was collected on 11 salient beliefs to ascertain users' general knowledge about the desert tortoise ecology and conservation and to identify specific beliefs that were incorrect. Respondents could chose from three responses: "True," "False," or "Not Sure." This information addressed objectives 1 and 2.

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MANAGEMENT AREAS IN SOUTHERN CALIFORNIA

EXECUTIVE SUMMARY

The desert tortoise is in jeopardy in the western Mojave Desert of southern California. A variety of impacts threaten survival of the tortoise including urbanization, grazing, drought, raven predation on juveniles, respiratory disease, and off-highway vehicle (OHV) use of tortoise habitat. The latter was the focus of this study.

It is likely that many of the behaviors of OHV recreationists that are capable of negatively affecting the desert tortoise are carried out without knowledge of the consequences. This study was implemented under the premise that when given the appropriate information, some OHV recreationists would modify their behaviors that are potentially harmful to the tortoise. As a first step in developing an information campaign to change OHV recreationist behavior, this study collected information that could be used to develop messages about the plight of the desert tortoise and identify possible outlets for their dissemination.

During winter 1991-1992, data were collected from 425 OHV recreationists on-site at various locations in the western Mojave Desert. Information was collected on 1) OHV activity patterns, 2) beliefs about desert tortoise ecology and conservation, 3) attitudes towards desert tortoise conservation, 4) information sources regularly used by OHV recreationists, and 5) socio-demography of respondents.

Results indicated the sample participated in a variety of OHV activities with the most frequent being dirt bike riding, followed by dirt bike racing, dune buggy use, 3 or 4-wheel (quad) use, and jeep use. Respondents were fairly well educated, with 60% having attended at least one year of college. About 80% of the respondents were male, and about 90% identified themselves as Anglo American. The average general knowledge level about tortoise ecology and conservation was low (43% correct answers from a 9 question test). Support for conservation was moderate. Users were more supportive of undertaking actions (such as cleaning up litter) to help the tortoise (mean=3.89, on a scale of 1-5, where 5=strongly agree) than for having managers undertake actions to help the tortoise (mean=3.65). This difference was statistically significant ($p < 0.05$).

Dirt bike racers and nonracers were significantly different for most variables. Racers showed greater interest and commitment to OHV recreation than nonracers. Racers on the average had the same amount of information about tortoise ecology and conservation as do nonracers. However, the specific beliefs held by each subgroup differed markedly. Racers and nonracers also differed in their attitudes towards conservation of the tortoise, with nonracers exhibiting more supportive attitudes. Comparisons of male and female respondents revealed differences for only a few variables. These differences indicated males participated more in dirt bike racing,

read information sources about OHV recreation more often, and on the average knew slightly more about tortoise ecology and conservation than did females. Statistically significant differences were also found for those who had attended a District 37 American Motorcycle Meeting and all other respondents. Meeting attendees were more active participants in the sport, and showed greater readership of "Cycle News," "Dirt Rider," "District 37 Newsletter," and "CORVA Newsletter." They also were less supportive of desert tortoise conservation than all other respondents, but did not differ in their general knowledge of tortoise ecology and conservation.

The study results indicate a need for audience segmentation by racers and nonracers regarding message development. Regarding channel selection for racers "Cycle News" and "Dirt Rider" appear to be desirable outlets for disseminating information about the tortoise. For nonracers desirable outlets are unclear. Management recommendations are made on the basis of these results. Additional recommendations are made for future research to aid in development of an information campaign to change OHV recreationist behavior.

INTRODUCTION

Background

Desert tortoise (Gopherus agassizii) populations are in jeopardy throughout the western Mojave desert. Much of its' habitat in this area occurs on lands administered by the Bureau of Land Management (BLM). In 1990, the U.S. Fish and Wildlife Service (USFWS) listed the Mojave population of the desert tortoise as threatened. The BLM is legally required to manage desert tortoise habitat so as to maximize opportunities for survival of the species. However, research by Berry (1990) indicated several problems indicative of downward population trends such as high mortality rates among juveniles, high mortality rates among members of the breeding population, and deterioration of habitat. Because of numerous impacts to population numbers and habitat, the future of the desert tortoise on BLM lands in the western Mojave Desert is uncertain.

Urbanization and agricultural land use are major impacts since they remove land from the habitat base (Berry et al. 1984). These uses alter the land to the point where it is not suitable habitat for tortoises. Less pervasive and more difficult to quantify are impacts resulting from recreation use of the Mojave Desert. These impacts can be direct and indirect. Direct impacts occur when tortoises are mishandled or crushed in their burrows. If they are alarmed when picked up, tortoises can lose body fluids necessary for survival. They can be killed when their burrows are crushed by off-highway vehicles (OHV's). Tortoises also can be indirectly affected when recreationists leave litter at recreation areas. Litter can feed ravens, which also prey on tortoise eggs and juvenile tortoises. Abundance of annual vegetation can be negatively affected by OHV use, resulting in a diminished food supply for tortoises. As a result of these impacts, desert tortoise numbers and habitat have declined in the western Mojave Desert.

Developing an Information Campaign to Change Behavior

It is likely that many recreation impacts on desert tortoises are not intentional. To the extent that these behaviors are not malicious and purposeful they may be amenable to change using information campaigns (Slater 1991). The Bureau has conveyed information about the desert tortoise to desert recreationists through various media. Given that the array of impacts to the tortoise are complex, it is likely the public's awareness and knowledge of the effects of OHV use on the reptile are not high, and that some of their recreation behaviors are being engaged in without knowledge of their effects on the desert tortoise. For example, it is likely that some recreationists are not aware of the possible negative effects on survival of the species from littering or picking up a desert tortoise. Providing new information to these users may help reduce recreation impacts, by modifying their existing beliefs and behaviors. However, a detailed information campaign is needed to determine what kinds of information OHV users need, and how to convey it best.

Attitudes-Attitudes were considered users' feelings towards desert tortoise conservation. Information was collected on attitudes toward desert tortoise conservation. Two statements were asked, one about user responsibility, and one about manager responsibility toward conservation. A five point Likert Scale was used, with "1" for Strongly Disagree, and "5" for Strongly Agree. This information addressed objectives 1 and 2. Multi-dimensional measures (such as the attitude scales towards wildlife developed by Kellert) were not developed for attitudes. Reliability and validity of these measures were not assessed.

Information Sources-This information was collected to determine what communication channels could be used to target messages to users. Information was also collected on OHV club membership. Targeting certain OHV clubs may be an effective means of ensuring information is received by users. This information addressed objectives 3 and 4.

OHV activities-Information on activities engaged in and frequency of participation was collected to differentiate "highly involved" from those users "not highly involved." Conversations with OHV club leaders indicated different communication strategies may be needed to reach these differing user types, because their attitudes and beliefs about the tortoise may differ. This information addressed study objectives 1 and 2.

Socio-demography -This included the last four questions on the survey instrument and addressed objectives 3 and 4. It is useful for assisting with targeting communications, and determining message complexity for future communication efforts.

For brevity, questions such as group size, group composition, number of years of OHV riding experience, and whether or not the respondent had visited the site before were not included in the survey instrument.

After review by BLM and Forest Service staff, the survey was pretested with 20 OHV recreationists at the El Mirage recreation area, located within desert tortoise habitat. The area has an open play area and limited routes, so it was considered representative of the types of areas and users that would be sampled during the study. No changes were made to the instrument immediately after the pretest. However, later in the sampling period concerns were raised by OHV recreationists about the potential for bias for two questions (questions 4f. and 4i.) concerning knowledge about impacts to the desert tortoise. A discussion pertaining to their elimination from analysis is in Appendix C.

Sampling

Discussions with BLM staff suggested it was important to sample a variety of OHV users in open and limited use areas. Among users, it was considered crucial to obtain data from and compare racers and nonracers. These groups are subject to different management situations that could influence their responses about the desert

Table 9. Encounters with Desert Tortoises by Racers and Nonracers.

Behavior	Racers				Nonracers				Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	Yes	No	Don't Know	n	Yes	No	Don't Know	n				
Seen a desert tortoise*	75.9	24.1	0.0	145	58.3	41.7	0.0	144	10.1	10.1	1	0.17
Photographed tortoise*	18.2	79.0	2.8	143	9.7	89.6	0.7	144	6.5	6.6	2	0.11
Picked up a tortoise	24.1	75.2	0.7	145	19.7	80.3	0.0	142				
Injure or harass a tortoise	3.5	93.8	2.8	145	2.8	96.6	0.7	143				

*The chi-square statistic is significant at $p < 0.05$.

tortoise issue. Management of racing events is more restrictive than that focused on nonracers, and racers could potentially lose more recreation opportunities than nonracers after implementation of a tortoise recovery plan. Due to their importance and influence in OHV riding area allocation, racers were probably oversampled relative to their proportion in the overall OHV user population.

Visitors were sampled at four sites in the western Mojave Desert (Figure 1), all on BLM lands, and at a District 37 American Motorcycle Association (AMA) meeting. Data were collected on weekends during Fall and Winter 1991-92 from 9:00 am until 4:00 pm during each sampling day. Contacts were made in staging areas (where users unload their machines and equipment). Every group encountered was asked if they wanted to participate in a OHV survey about the desert tortoise. Individuals were not randomly selected from each group; all members of all groups contacted were asked if they would participate. This nonprobability sampling scheme was used to ensure that a minimum of 400 respondents were sampled during the data collection phase of the study.

Data Analysis

Data were analyzed using Systat version 5.0. Frequencies were computed for all variables in the questionnaire. Means were computed for education level, knowledge level, and the attitudinal statements about desert tortoise conservation. A general knowledge variable was created by summing the number of correct beliefs about tortoise conservation. This did include responses from questions 4f. and 4i. Chi-square and t-tests were computed to investigate possible differences between racers and nonracers, and males and females. Responses to questions that were analyzed for mean differences were not checked for normality. According to Hays (1981: 276) when sample sizes are large (as they were in this study) the distribution of t "approaches the standardized normal distribution."

Possible differences between racers and nonracers were investigated since it was assumed racers would have a higher level of involvement in OHV riding than nonracers. Nonracers were identified as those individuals who indicated they had "never" raced. Analyses were also conducted to see if there were differences between participants in the AMA meeting versus those contacted on-site. This was done since it was assumed that members of the AMA might have unusually strong opinions that could bias the overall study results. Possible differences between males and females were investigated on the basis of national surveys of Americans' attitudes conducted by Kellert (1980, 1982). His research revealed statistically significant differences between males and females. Females held stronger humanitarian and aesthetic attitudes than males. Generalizing from Kellert's research, it seemed plausible that females might demonstrate statistically different (more positive) attitudes towards tortoise conservation than males.

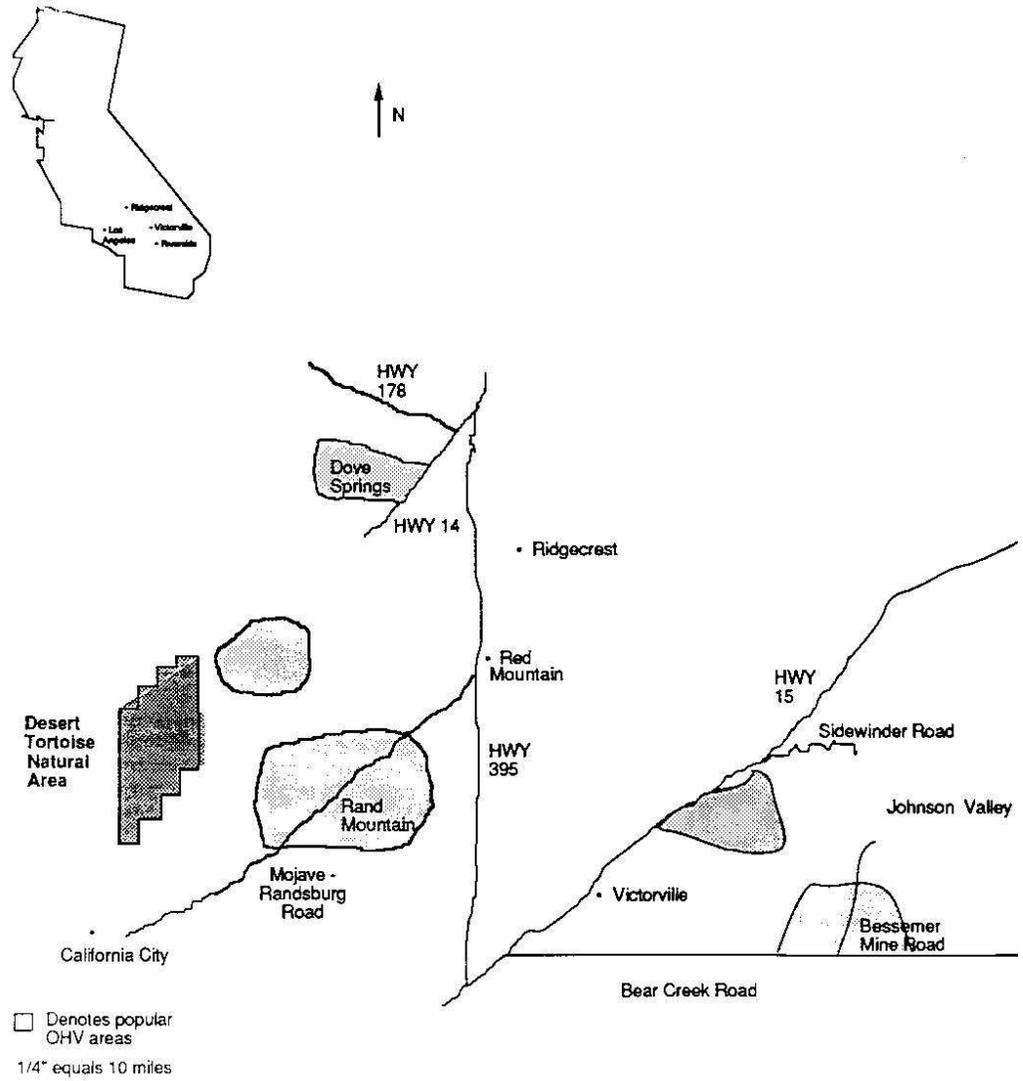


Figure One-Sampling Area Locations.

Data collection

Data collection began in November, 1991 and ended in February, 1992. A total of 426 surveys were completed, 376 on-site, and 50 at a District 37 American Motorcycle Association meeting. Table 1 displays the number of surveys completed by date and site location, Table 2 displays the number of racers and nonracers who completed surveys by location, and Figure one displays the sampling area locations.

During the data collection phase some hostile encounters occurred between OHV recreationists and the research team. In most cases these encounters were with individuals that had identified themselves as racers. Encounters were most hostile at a desert race held in Johnson Valley on November 10. After discussions with OHV group leaders and recreation staff at the California Desert District it was decided to contact racers through club meetings. An additional 50 individuals completed surveys at a District 37 AMA meeting on February 6, 1992 in Whittier, California.

Table 1. Number of Completed Surveys by Date and Location.

DATES	November '91		January '92		February '92		
LOCATIONS	10	23	18-20	25-26	1-2	6	Sub-totals
AMA Mtg.						50	50
Dove Spgs.			116				116
Johnson Valley	17			32	30		79
Rand Mtn.		38	18				56
Sidewinder Rd.				67	58		125
Sub-totals	17	38	134	99	88	50	426

Table 2. Number of Completed Surveys*by Location by Racers and Nonracers.

LOCATIONS	Racers	Nonracers	Sub-totals
AMA Mtg.	42	2	44
Dove Spgs.	26	50	76
Johnson Valley	41	21	62
Rand Mtn.	22	26	48
Sidewinder Rd.	17	46	63
Sub-totals	148	145	293

*Numbers represent the number of individuals who indicated they raced or did race. The total reported above does not sum to 426 due to missing values for the question about whether or not individuals had raced.

RESULTS

Respondent Description

Most of the sample participated in dirt bike riding (90%), followed by dirt bike racing (51%), dune buggy use (50%), ATV (3 or 4 wheel) riding (44%), and jeep or four wheel drive use (27%). Overall, respondents were fairly well educated, with 60% having attended at least one year in college. About 8 out of 10 respondents were male, and 9 out of ten were Anglo. Only about a third (32%) of the sample belonged to an OHV club, and more than two-thirds (70%) read Dirt Rider magazine at least four times a year. Despite the fact that knowledge about desert tortoise conservation was low (mean=43% correct answers), support for conservation efforts on the part of managers was moderate (mean=3.65 on a 5 point Likert Scale, where 5=strongly agree). Support for conservation on the part of OHV users was slightly higher (mean=3.89). These mean differences were statistically significant ($p<0.05$). A more detailed description of the overall sample is in Appendix B.

Racer and Nonracer Differences

Analyses of dirtbike racer and nonracer responses revealed statistically significant differences ($p<0.01$) for most variables. Tables 2 and 3 and 4 indicate racers participated more often in OHV activities in general, and this pattern was constant across seasons. Table 5 reveals racers show significantly ($p<0.01$) higher readership of a variety of OHV related publications including "Cycle News," "Dirt Rider," "Motocross Action," "American Motorcycle Association (AMA) District 37 Newsletter," "CORVA Newslines," and "Dirtbike Magazine" (Tables 4,5) than nonracers. Readership for racers ranged from 14.3% for "United Four Wheel Drive Association" to 93% for "Dirt Rider." For nonracers this figure ranged from 11% for "United Four Wheel Drive Association Newsletter" to 50.8% for "Dirt Rider."

Tables 6 indicates that club membership also was significantly higher ($p<0.01$) for racers than nonracers. Table 7 shows the level of participation in specific clubs, indicating a greater proportion of nonracers (10.5%) participated in CORVA than racers (1.2%). CORVA tends to attract nonracing enthusiasts interested in an advocacy role for OHV riding opportunities. Participation in District 37 of AMA, was slightly higher among racers (about 1 in 5) than nonracers (15%). Table 8 displays the amount of club participation among racers and nonracers. Differences in participation were statistically significant, and racers were 4 times as likely to participate in activities 3-4 times a year than nonracers. Table 9 indicates that racers also were more likely to have seen or photographed a desert tortoise ($p<0.05$) than nonracers. Racers were not more likely to pickup or harass a tortoise. In general encounters with the desert tortoise were low for both groups.

Table 10 displays the mean responses for general knowledge about desert tortoise ecology for racers and nonracers. Statistically significant differences ($p<0.05$) were not found. General knowledge levels were low for both groups, with an average of 4.8 for racers and an average of 4.7 for

nonracers. Table 11 displays the percentage of incorrect responses for each of the 9 beliefs about tortoise ecology and conservation for racers and nonracers. Statistically significant differences ($p < .05$) were found for 6 of the 9 statements. Racers were less knowledgeable about beliefs concerning: the need to reserve large tracts of habitat for survival of the tortoise, effects of OHV use on tortoise burrows, and effects of not riding on designated routes. Nonracers showed less knowledge ($p < .05$) that: tortoises have a home range, tortoise densities tend to be higher further away from roads, and that ravens prey on juvenile tortoises.

Table 12 displays the mean responses regarding conservation attitudes. Statistically significant differences were found for the statements about OHV user and manager responsibility to help conserve the desert tortoise, with nonracers exhibiting greater support for both statements. Both groups were more supportive of having users take some actions to help conserve the tortoise rather than having managers take all actions possible to help conserve the tortoise.

Differences between District 37 Meeting Respondents and Others

Analyses revealed numerous differences between those who completed surveys at the AMA meetings and those who did not. Table 13 shows that meeting attendees demonstrated greater participation ($p < .01$) in dirt bike riding and racing than the rest of the sample. Those at the meeting were also more likely to belong to OHV clubs other than District 37. They also demonstrated greater readership ($p < .01$) of "Cycle News", "Dirt Rider", "District 37 Newsletter", and "CORVA Newsletter."

Table 14 indicates the percentage of incorrect knowledge for the 9 beliefs for meeting attendees and others. Although overall average knowledge did not differ among these groups (Table 15), knowledge about specific statements did. Meeting attendees demonstrated less knowledge than other respondents about: 1) desert tortoises require large tracts of habitat for their survival, 2) the federal government is legally required to protect the tortoise, 3) OHV use sometimes damages tortoise burrows, and 4) OHV users who stay on designated roads and trails can increase the chances of survival for the tortoise. For the remaining statements meeting attendees demonstrated more knowledge. Table 16 shows statistically significant differences ($p < .01$) were found for average levels of agreement regarding land manager responsibility to help the tortoise. Those at the meeting were less supportive (mean=3.15, on a scale where 1=strongly disagree and 5=strongly agree) than other respondents (mean=3.68). Statistically significant differences were not found for the other attitudinal statement about OHV user responsibility to do things to help the tortoise.

The above differences indicate overall sample responses were influenced by responses from the District 37 subsample. The effect of responses of meeting attendees was manifested in several ways. It lowered overall support for tortoise conservation, it lowered knowledge of desert tortoise ecology for 4 beliefs, and it overestimated participation in OHV riding and club activities.

Gender Differences

Table 17 indicates that males demonstrated significantly greater levels of participation in dirt bike racing but equivalent levels of participation in other OHV activities. Statistically significant differences ($p < 0.05$) were not found for participation in other OHV activities. Table 18 reveals a similar pattern regarding season of OHV activity, indicating that males participate more frequently in dirt bike racing in Spring and Fall. Table 19 indicates statistically significant differences also were found for readership for several sources of information, including "Dirt Rider", "Motocross Action", and "District 37 Newsletter". For these sources of information, males demonstrated greater readership than females. Tables 20 through 22 indicate there are no statistically significant differences among males and females regarding club membership in general, membership in specific clubs, or frequency of participation in club activities. Table 23 shows that a greater proportion of males had seen desert tortoises than females ($p < 0.01$). Almost 70% of the males indicated they had seen tortoises, as compared to 50% of the female respondents.

Table 24 shows males exhibited higher ($p < 0.01$) mean levels of knowledge. However, Table 25 shows that differences in knowledge only apply to two specific belief statements. Males demonstrated greater knowledge of the idea that tortoises have a home range and that tortoise numbers tend to be lower close to rather than far away from roads. Table 26 reveals that attitudes towards tortoise conservation were not different ($p < 0.05$) among males and females. To summarize, for male and female respondents statistically significant differences were found for a few variables, including participation in dirt bike racing, information source readership, and general knowledge about the tortoise.

Summary of Responses to Question 11

Thirty-seven percent of the users had "open-ended" comments about the tortoise. Many users did not feel their sport negatively affected the tortoise. Many mentioned they had never seen a tortoise while riding or had not seen one "in years." Some users indicated that information dissemination about the plight of the tortoise was needed; a substantial proportion of these comments indicated information should be directed to nonracers. Some respondents expressed comments about being mistreated by the BLM and environmental interest groups. Some OHV users thought the survey was biased, and a proportion of these referred to questions 4f. and 4i. as being biased.

Table 3. Seasonal Participation in OHV Activities by Racers and Nonracers.

	Racers		Nonracers		Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	pct	pct	pct	pct				
Ride dirt bikes*	89.8	54.5			45.5	48.1	1	0.35
Race dirt bikes*	74.8	0.0			170.3	210.0	1	0.74
4WD or Jeep use	22.5	19.1						
Riding 3 wheelers/quads	19.7	27.6						
Dune buggy use	10.2	8.3						
	n=147	n=145						
SUMMER								
Ride dirt bikes*	77.6	42.8			36.9	37.9	1	0.35
Race dirt bikes*	69.4	0.7			150.9	186.1	1	0.68
4WD or Jeep use	21.1	17.2						
Riding 3 wheelers/quads	19.1	22.1						
Dune buggy use	6.8	9.7						
	n=147	n=145						
FALL								
Ride dirt bikes*	90.5	57.9			40.5	42.9	1	0.32
Race dirt bikes*	74.8	0.7			170.3	210.0	1	0.74
4WD or Jeep use	20.4	17.2						
Riding 3 wheelers/quads*	17.7	28.3			4.6	4.7	1	0.10
Dune buggy use	8.8	8.3						
	n=147	n=145						
WINTER								
Ride dirt bikes*	87.1	64.8			19.8	20.4	1	0.22
Race dirt bikes*	74.2	2.1			160.4	192.0	1	0.72
4WD or Jeep use	20.4	23.5						
Riding 3 wheelers/quads*	16.3	32.4			10.3	10.4	1	0.16
Dune buggy use	9.5	11.7						
	n=147	n=145						

*The chi-square statistic is significant at p<0.01.

TABLE 2. THE EFFECT OF SOURCE'S READERS' TYPE OF RACE ON THE LIKELIHOOD OF READING

Sources	Racers				Nonracers				Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	Read	Sample Size	Read	Sample Size	Read	Sample Size	Read	Sample Size				
	pct	n	pct	n								
Cycle News*	85.6	125	39.4	109	53.9	56.3	1	0.44				
Dirt Rider*	93.1	131	50.8	118	56.4	60.9	1	0.42				
Motocross Action*	74.2	97	33.3	102	33.4	34.5	1	.039				
In Gear	13.0	54	94.2	54								
District 37 News-letter-Off-Road*	75.0	104	15.1	93	70.9	76.5	1	0.57				
CORVA Newsline*	42.5	73	15.6	90	14.6	14.7	1	0.23				
United Four Wheel Drive Associations	14.3	56	11.1	90								
Other Sources:												
AMA-Newsletter	7.0	5	5.7	2								
Sahara-Newsletter	1.4	1	2.8	1								
Other	24.4	18	62.9	22								

* The chi-square statistic is significant at $p < 0.05$.

Table 5. Information Sources Read at Least Four Times a Year by Racers and Nonracers

Sources	Racers			Nonracers			Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	Read	Sample Size	Read pct	Read	Sample Size	Read pct				
Cycle News*	85.6	125	39.4	53.9	109	56.3	1	0.44		
Dirt Rider*	93.1	131	50.8	56.4	118	60.9	1	0.42		
Motocross Action*	74.2	97	33.3	33.4	102	34.5	1	.039		
In Gear	13.0	54	94.2		54					
District 37 News-letter-Off-Road*	75.0	104	15.1	70.9	93	76.5	1	0.57		
CORVA Newslines*	42.5	73	15.6	14.6	90	14.7	1	0.23		
United Four Wheel Drive Associations	14.3	56	11.1		90					
Other Sources:										
AMA-Newsletter	7.0	5	5.7		2					
Sahara-Newsletter	1.4	1	2.8		1					
Other	24.4	18	62.9		22					

* The chi-square statistic is significant at $p < 0.05$.

Table 6. OHV Club Membership by Racers and Nonracers.

Question	Racers	Nonracers
Are you a member of an OHV club?*		
	pct	pct
Yes	54.9	15.1
No	45.1	84.9
	n=142	n=139

* Chi-square statistic is significant at $p < 0.01$. Pearson chi-square is 15.5, Likelihood ratio is 16.1, degrees of freedom is 4, and Lambda is 0.11.

Table 7. Membership in Specific Clubs by Racers and Nonracers.

Club Name	Racers	Nonracers
	pct	pct
Corva	1.2	10.5
District 37 AMA	20.5	15.8
Sahara	1.2	5.3
Other Clubs	77.1	68.4
	n=83	n=19

Table 8. Frequency of Participation in Club Activities by Racers and Nonracers.*

Frequency	Racers	Nonracers
	pct	pct
Once a week	28.9	6.5
Once a month	40.4	21.7
3-4 times a yr.	17.3	17.4
Once a year	13.4	54.3
	n=104	n=46

*-the chi-square statistic is significant at $p < 0.01$. Pearson chi-square = 30.9, Likelihood ratio = 30.9, Degrees of Freedom = 3, Lambda = 0.24.

name for themselves by "pecking" on who ever they can "peck" on. I know he will probably never be seen at Lucerne or Johnson Valley anyway, so what the heck does he care anyway? Neither will the average people. I don't like my rights as an American citizen being stopped on by special interest group.

I feel that the survival of the desert tortoise is not as important as Alan Cranston and the Sierra Club try to have everybody believe the endangered species act is the biggest scam ever pushed on the American Public.

I have raced desert for about seven years and have never seen tortoise.

Sharing the desert in both a right and a priviledge all users need to be responsible. We need to leave the desert open for everyone.

I've seen two and never seen one harmed in 20 years of desert riding.

For the most part I've been coming out here every other weekend for the past ten years and we and all around us have always been very conscientious about the tortoise. The thing that makes me feel the most sick is where we drive down Beer Valley and see all the trash litters in the fields. We always clean up our trash and hold regular desert clean-up days. The more people who move into this area, I think they should take a bigger role in keeping their home town cleaner.

I believe many of the tortoises have probably been stolen by people for pets. The majority of people I know also race desert are concerned about losing our right to ride and race. I think most desert racers take care and don't leave a lot of litter behind when they leave. I also think that it really stinks the way the media will air on the news how irresponsible racers are. How we will come out to the desert in one weekend of family fun will leave ruined for many years. This is unfair. I think that closing the land off to build shopping centers and malls are a lot worse. We really love motorcycle riding to racing.

I think the desert tortoises are sitting in their burrows and laughing at us.

Table 9. Encounters with Desert Tortoises by Racers and Nonracers.

Behavior	Racers				Nonracers				Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	Yes	No	Don't Know	n	Yes	No	Don't Know	n				
Seen a desert tortoise*	75.9	24.1	0.0	145	58.3	41.7	0.0	144	10.1	10.1	1	0.17
Photographed tortoise*	18.2	79.0	2.8	143	9.7	89.6	0.7	144	6.5	6.6	2	0.11
Picked up a tortoise	24.1	75.2	0.7	145	19.7	80.3	0.0	142				
Injure or harass a tortoise	3.5	93.8	2.8	145	2.8	96.6	0.7	143				

*The chi-square statistic is significant at $p < 0.05$.

Table 10. Mean Scores*for knowledge about Desert Tortoise Conservation by Racers and Nonracers.

Knowledge Level	Racers			Nonracers		
	Mean	SD	n	Mean	SD	n
	4.80	1.83	147	4.73	2.09	145

*-Means were computed by summing the number of correct responses for nine statements and then dividing by the number of respondents in each group. Scores ranged from 0 for no correct knowledge to 9 for complete, correct knowledge.

Table 11. Beliefs about Desert Tortoise Ecology and Conservation by Racers and Nonracers.

BELIEFS	% OF INCORRECT RESPONSES		Chi-square	Likelihood ratio	Degrees of Freedom	Lambda		
	Racers	Nonracers						
	pct	n	pct	n				
a. The survival of the desert tortoise as a species in the western Mojave Desert requires that large tracts of land are reserved as habitat (TRUE)*	74.0	142	54.0	142	53.3	55.8	2	0.41
b. The federal government is not legally required to protect and increase numbers of desert tortoises (FALSE)	48.8	144	51.2	143				
c. Desert tortoises have an area known as "home range" where they spend most of their time (TRUE)*	38.9	144	53.9	141	8.5	9.0	2	0.16
d. There are more desert tortoises close to roads than there are further away from roads in the western Mojave Desert (FALSE)*	55.0	141	77.0	143	15.5	15.7	2	0.21
e. Ravens sometimes eat young desert tortoises (TRUE)*	29.0	144	55.0	142	19.5	19.8	2	0.25
f. OHV use sometimes damages desert tortoise burrows (TRUE)*	57.3	138	44.8	143	37.6	39.5	2	0.30
g. Littering can help increase the chances of survival for desert tortoise populations (FALSE)	21.8	142	28.9	142				
h. Riding OHV's only on roads and trails can help increase the chances of survival for the desert tortoise (TRUE)*	58.0	138	34.7	143	30.4	31.6	2	0.28
i. It is illegal to remove a desert tortoise from its' burrow (TRUE)	11.1	144	14.1	142				

*-The chi-square statistic is significant at p < 0.05.

Table 12. Mean Responses to Statements about Desert Tortoise Conservation by Racers and Nonracers.

Statements	Racers			Nonracers		
	Mean	SD	n	Mean	SD	n
OHV users should do things to help conserve the desert tortoise*	3.80	0.88	137	4.00	0.80	142
Natural resource managers should do all they can to help conserve the desert tortoise*	3.47	1.05	134	3.84	0.86	139

* The t-statistic is significant at $p < 0.05$.

Table 13. Comparison of Responses for District 37 Subsample and All Other Respondents for OHV Participation and Magazine Readership Variables.

Question	District 37 %	Others %	Chi square	Likelihood ratio	Degrees of Freedom	Lambda
How often do you ride dirtbikes?						
Never	0.0	11.1				
Once a year	6.7	11.6				
Once a month	35.6	54.7				
Daily/Weekly	57.7 n=45	22.6 n=327	29.5	29.4	4	0.00
How often do you race dirtbikes?						
Never	4.5	57.7				
Once a year	6.8	14.5				
Once a month	43.2	19.3				
Daily/Weekly	45.5 n=44	8.5 n=248	72.5	71.4	4	0.02
Do you belong to an OHV club?						
	%-yes 94.0 n=50	%-yes 22.8 n=359	102.9	101.4	1	0.00
Do you read:						
Cycle News	91.7 n=48	56.0 n=266	21.8	26.2	1	0.00
Dirt Rider	93.5 n=46	65.8 n=295	14.4	18.1	1	0.00
Dist. 37 Newsletter	91.5 n=47	32.4 n=204	54.4	59.4	1	0.00
CORVA Newsletter	50.0 n=32	26.5 n=189	7.2	6.7	1	0.00

Table 14 Beliefs about Desert Tortoise Ecology and Conservation by District 37 Meeting Attendees and

BELIEFS	% OF INCORRECT RESPONSES		Chi-square	Likelihood ratio	Degrees of Freedom	Lambda		
	Distr. 37	Others						
	pct	n						
a. The survival of the desert tortoise as a species in the western Mojave Desert requires that large tracts of land are reserved as habitat (TRUE)*	83.0	47	30.0	367	50.8	50.0	2	0.00
b. The federal government is not legally required to protect and increase numbers of desert tortoises (FALSE)	36.20	47	24.3	370				
c. Desert tortoises have an area known as "home range" where they spend most of their time (TRUE)*	8.3	48	6.01	366	11.4	12.5	2	0.00
d. There are more desert tortoises close to roads than there are further away from roads in the western Mojave Desert (FALSE)*	2.2	46	9.3	364	18.2	17.8	2	0.00
e. Ravens sometimes eat young desert tortoises (TRUE)*	0.0	48	4.4	365	39.3	51.6	2	0.00
f. OHV use sometimes damages desert tortoise burrows (TRUE)*	59.1	44	20.2	362	34.0	31.0	2	0.00
g. Littering can help increase the chances of survival for desert tortoise populations (FALSE)	4.4	45	10.6	367				
h. Riding OHV's only on roads and trails can help increase the chances of survival for the desert tortoise (TRUE)*	74.4	39	17.6	369	64.3	53.2	2	0.00
i. It is illegal to remove a desert tortoise from its' burrow (TRUE)	0.0	49	4.9	367				

*The chi-square statistic is significant at $p < 0.05$.

Table 15. Means* for General Knowledge about Tortoise Conservation by District 37 Meeting Attendees and Others.

Knowledge Level	District 37			Others		
	Mean	SD	n	Mean	SD	n
	4.86	1.86	43	4.62	2.04	374

*-Means were computed by summing the number of correct responses for nine statements and then dividing by the number of respondents in each group. Scores ranged from 0 for no correct knowledge to 9 for total correct knowledge.

Table 16. Mean Responses to Statements about Desert Tortoise Conservation by District 37 Meeting Attendees and Others.

Statements	District 37			Others		
	Mean	SD	n	Mean	SD	n
OHV users should do things to help conserve the desert tortoise	3.73	0.79	44	3.90	0.86	363
Natural resource managers should do all they can to help conserve the desert tortoise*	3.15	0.96	41	3.70	0.96	360

* The t-statistic is significant at $p < 0.05$.

Table 17. Frequency of Participation in OHV Activities by Gender

FREQUENCY	ACTIVITY	
	Males	Females
	Ride Dirt Bikes	
	pct	pct
Never	9.0	11.7
Once a year	11.5	10.4
Once a month	52.1	53.2
Once a week	24.3	24.7
Daily	3.1	0.0
	n=228	n= 77
	Race Dirt Bikes*	
	Males	Females
Never	46.2	66.0
Once a year	15.4	3.4
Once a month	25.1	13.6
Once a week	12.3	17.0
Daily	1.0	0.0
	n=147	n=145
	4WD or Jeep use	
	Males	Females
Never	57.5	66.4
Once a year	15.1	15.4
Once a month	17.0	11.9
Once a week	9.4	4.2
Daily	0.9	2.1
	n=106	n=143
	3 or 4 wheelers	
	Males	Females
Never	59.4	59.4
Once a year	15.3	9.8
Once a month	17.1	21.7
Once a week	6.3	7.7
Daily	1.8	1.4
	n=111	n=143
	Dune Buggy Use	
	Males	Females
Never	80.9	81.7
Once a year	8.6	8.4
Once a month	7.6	8.4
Once a week	2.9	1.4
Daily	0.0	0.0
	n=105	n=142

*-The chi-square statistic is significant at $p < 0.01$.

Pearson chi-square = 12.9, Likelihood ratio = 15.1, Degrees of Freedom = 4, Lambda = 0.00.

Table 18. Seasonal Participation in OHV Activities by Gender.

ACTIVITY	SPRING		Chi-square	Likelihood ratio	Degrees of Freedom	Lambda
	Males	Females				
	pct	pct				
Ride dirt bikes.....	68.5	60.9	5.4	5.8	1	0.0
Race dirt bikes*.....	30.8	18.5				
4WD or Jeep use.....	20.9	19.6				
Riding 3 wheelers/quads.....	25.9	27.2				
Dune buggy use.....	11.7	9.8				
	n=324	n=92				
	SUMMER					
	Males	Females				
	pct	pct				
Ride dirt bikes.....	56.2	52.2				
Race dirt bikes.....	28.7	19.6				
4WD or Jeep use.....	18.5	19.6				
Riding 3 wheelers/quads.....	21.3	19.6				
Dune buggy use.....	8.3	12.0				
	n=324	n=92				
	FALL					
	Males	Females				
	pct	pct				
Ride dirt bikes.....	68.3	31.2	3.1	3.2	1	0.0
Race dirt bikes*.....	30.9	18.5				
4WD or Jeep use.....	18.8	19.6				
Riding 3 wheelers/quads.....	24.7	27.2				
Dune buggy use.....	10.8	12.0				
	n=324	n=92				
	WINTER					
	Males	Females				
	pct	pct				
Ride dirt bikes.....	72.0	63.0				
Race dirt bikes.....	30.3	20.7				
4WD or Jeep use.....	20.7	21.7				
Riding 3 wheelers/quads.....	25.3	28.3				
Dune buggy use.....	11.1	15.2				
	n=324	n=92				

*the chi-square statistic is significant at $p < 0.05$.