

## **Effects of Childhood Location and Environmental Education on Wildlife Knowledge**

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**Abstract** Urban sprawl in the San Francisco Bay Area has increased dramatically in recent decades. As new housing and office developments reduce the amount of open space in the region, people begin to lose their connection to their environment and to the wildlife that lives in this open space. This study examines how growing up among areas of open space and being able to participate in formal environmental education programs and informal environmental activities in open space affects what people know about Bay Area wildlife. A self-administered survey of 307 visitors to Bay Area city, county, regional, and state parks was used to acquire the data. Survey participants were given knowledge scores based on their responses to five wildlife related questions. This study concludes that people who spent their childhood in a suburban area have the highest wildlife knowledge score compared to those from rural, small town, or city backgrounds. A significant relationship was found between knowledge score and past participation in formal environmental education programs in local, state, and national parks. Knowledge scores were also significantly higher with increased frequency of participation in informal environmental activities. This study concludes that people do learn more about wildlife when they are able to interact with open space. Therefore, urban sprawl needs to be managed so that open space, along with the wildlife living within it, is preserved for future generations to maintain a connection to Bay Area wildlife.

## **Introduction**

Many people come to the San Francisco Bay Area to live in a place of great ecological diversity, where the local wildlife is an important part of the environment (Rogers 2003). The population of the Bay Area is growing at a rate of about 600,000 people per year (Rogers 2003) and as more people come to the Bay Area to take advantage of all the opportunities that it presents, they need a place to live. As offices are being built farther towards the edges of major cities like San Jose, new residents must live in areas that were previously farming areas, open space, or land that was primarily used for recreation or environmental education programs (Scenic America 2001, elect. comm.).

As urban sprawl increases in the Bay Area, wildlife is being displaced or injured (Wildlife Center of Silicon Valley 2003, elect. comm.). While many people say that the presence of native wildlife is one of the attributes of the area that they hope to maintain in the future, they also say there is a lack of housing and that more land should be developed (Witt 2000). Housing and office developments have been built or are in the planning stages for many acres of open space (Boulton 2001). One of the most controversial examples of this is the office complex that is in the planning stages for the Coyote Valley in San Jose. If this complex is built, it will affect the range of many wildlife species in the area and will be very harmful to the health of the regional ecosystem (Boulton 2001). When this and many other new structures are built on or near open land in the Bay Area, wildlife is at an increased risk of injury or death because there are many more people, cars, and domestic animals around than there used to be (Wildlife Center of Silicon Valley 2003, elect. comm.).

In order to show the significance of preserving open space, this study will examine the relationship between the exposure people have had to open space and the knowledge that they possess about wildlife commonly found in this space. For the purposes of this study, contact with the natural environment can come in the form of living in an area surrounded by open space, participating in formal environmental education programs, or participating in environmentally related activities in various forms of open space.

A survey was conducted of visitors to five Bay Area parks: Alum Rock, Big Basin, Sanborn, Tilden, and Vasona. One intention of this study is to determine if growing up in a rural area, with more open space and wildlife present, increases one's knowledge. If living in the midst of open space does increase knowledge, open space needs to be preserved. To address this intention, this

study measures how much spending childhood years in an urban or rural location affects that person's knowledge of wildlife. The second intention of this study is to investigate the effect that participating in environmental education has on wildlife knowledge. The survey analyzes how either participating in formal environmental education programs through schools and other agencies, or participating in informal environmental education experiences through camping and other independent activities affects knowledge. These two questions are both related to the question of determining what kind of experiences people learn best from. They are both equally important questions since all of the factors studied could have played a part in determining a person's knowledge about wildlife.

One of the purposes of this research is to show that preserving open space is necessary because people can learn about wildlife from their presence in open space in their community. Previous studies have concluded that the more knowledge people have about wildlife, the more likely they are to support conservation efforts (Aipanjiguly *et al.* 2003). These conservation efforts in turn lead to environmental legislation being created (Vaske *et al.* 1999), which can save wildlife and create more open space for more people to learn in.

The second purpose of this study is to show that environmental education programs also help to increase knowledge about wildlife. One of the most important ways to save wildlife is to educate the public about the effects of urban sprawl through environmental outreach programs (Wildlife Center of Silicon Valley 2003, elect. comm.). It has been shown that the general public lacks the information needed to address wildlife conservation issues (Bleich *et al.* 2000). Even with non-profit wildlife centers like the Wildlife Center of Silicon Valley offering to educate the public about the effects of urban sprawl on wildlife, some groups still believe that environmental education in schools and in communities is an unnecessary waste of time and money (Ruben 1994).

While there has been previous research showing that people with the greatest knowledge about an issue care most about that issue (Bowman *et al.* 2001, Ericsson and Heberlein 2003) and that young, well-educated women are the people who care most about wildlife issues in particular (Lybecker *et al.* 2002), there has been very little research comparing knowledge of wildlife to spending childhood in a rural place or participating in environmental education programs or environmental activities. Also, no research has been done concerning San Francisco Bay Area park visitors specifically. Therefore, this study is new and it will show how important

preserving open space and environmental education is to actually increasing knowledge, whether it is through formal programs or informal exposure to the environment. This research is necessary because the results of my study can be used as encouragement for communities to organize environmental and wildlife education efforts and to preserve remaining open space in the community.

One of the hypotheses for this study is that people who spent most of their childhood in an area surrounded by open space will know more about wildlife because they have been exposed to the environment and the wildlife more than those who have lived in urban areas. I further hypothesize that people who have had either formal or informal environmental education experiences will score higher on the knowledge questions than those with no experiences, but the people who have independent environmental education experiences will score higher than those with formal experiences because they have made the effort to seek out the natural environment on their own.

## **Methods**

Questionnaires were collected from visitors to five different parks within the San Francisco Bay Area in order to get a representative sample of the population. The sites sampled were Alum Rock City Park in San Jose, Big Basin State Park in Boulder Creek, Sanborn County Park in Saratoga, Tilden Regional Park in Berkeley, and Vasona County Park in Los Gatos.

In order to survey visitors to these parks, every person over the age of eighteen walking on the trail by the survey location was asked if he or she would be willing to participate in the study. The survey distributor, and at some times a supervised, trained assistant, had a script of what to ask, so all of the visitors were approached in the same manner. If the visitor agreed, he or she was given a copy of the questionnaire on a clipboard with a pen and asked to answer the questions.

The questionnaire (Appendix A) consisted of eleven questions that were answered by the study participant. The survey distributor did not interpret any questions on the questionnaire for the survey participant. The eleven questions were designed to address the subject's childhood residential location, background in environmental education, and their knowledge of wildlife. Questions 1, 1A, and 2 asked for information pertaining to what areas the subject has spent time in. Each individual participant interpreted the terms rural, small town, suburb, and city for

themselves. Questions 3 and 3A allowed the participant to note their involvement in formal environmental programs. In Question 4, subjects rated their participation in environmental activities. The knowledge portion of the survey consisted of multiple-choice questions 5 through 9. These questions were all about wildlife that can be found in the Bay Area. The gender of the participant was determined and noted on the upper right hand corner of the questionnaire by the survey distributor after the participant had finished answering the questions.

Each questionnaire was numbered and coded and a knowledge score was calculated for each. Since there were five knowledge questions, the score was on a scale from zero to five, with a score of zero meaning the subject answered none of the questions correctly and a score of five meaning all of the questions were answered correctly.

The data was analyzed to determine if there was a statistical difference between knowledge scores and various aspects of the subjects' environmental background. ANOVA tests analyzed relationships between knowledge score and childhood location. ANOVA tests were also used to compare an individual's knowledge score with the various forms of environmental education and environmental activities he or she has participated in.

A pilot study was conducted on the afternoon of November 1, 2003 at Tilden Regional Park in Berkeley, California. Nineteen questionnaires were completed and this information was used to determine if there were any flaws in survey design. This pilot study was also used to gauge the length of time needed for each individual to complete the questionnaire (approximately two minutes) and the total time it took to gather the nineteen surveys (five hours). Since the sampling technique was changed throughout the pilot study and exemption approval had not yet been received from the Committee for the Protection of Human Subjects, this preliminary data was not included in the final data.

In total, 307 questionnaires were collected at the five parks. All surveying was done sometime between the hours of 10 AM and 3 PM on fifteen different weekend days between December 28, 2003 and March 14, 2004. It took approximately 40 hours in the parks to complete the data collection.

## **Results**

Most survey participants earned a knowledge score of two, three, or four out of a possible five points (Fig. 1).

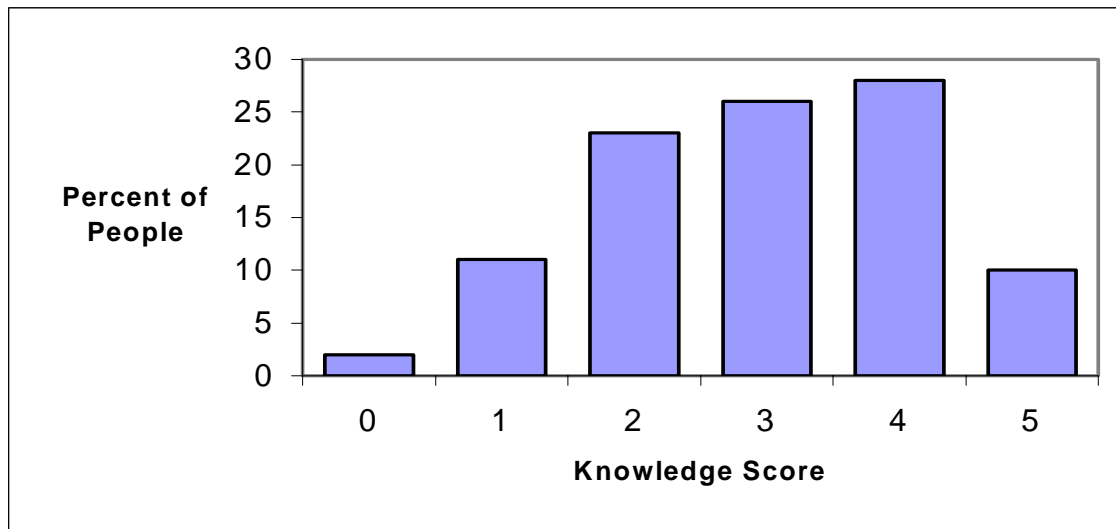


Figure 1. Percent of study participants earning each knowledge score (N=307)

Most people answered question 8 correctly (78.5%), while Question 5 was answered correctly by the fewest number of people (40.7%) (Fig. 2).

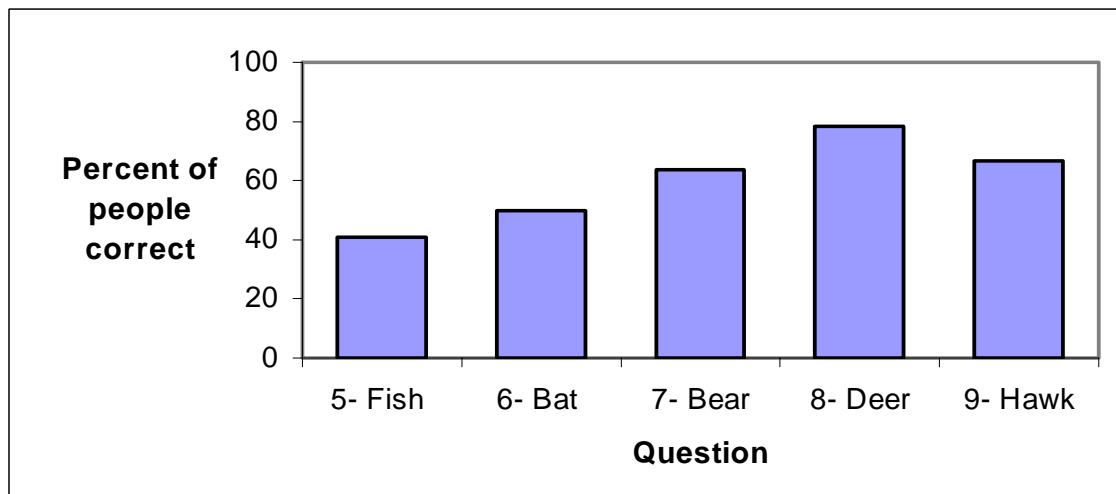


Figure 2. Percent of people answering each question correctly (N=307)

The data show that Question 5 was an indicator of how correctly people would answer the remaining questions. Those who answered Question 5 earned a significantly (ANOVA, N=307,  $p=0.005$ ) higher knowledge score for the remaining four questions (mean knowledge score=2.8

out of 4) than did those who did not answer Question 5 correctly (mean knowledge score=2.4 out of 4).

People who spent their childhood in a suburban area achieved the highest mean knowledge score of the four childhood location categories. An ANOVA test found that there was a significant relationship ( $p=0.03$ ) between the suburb category and the combined rural, small town, and city categories (Fig. 3).

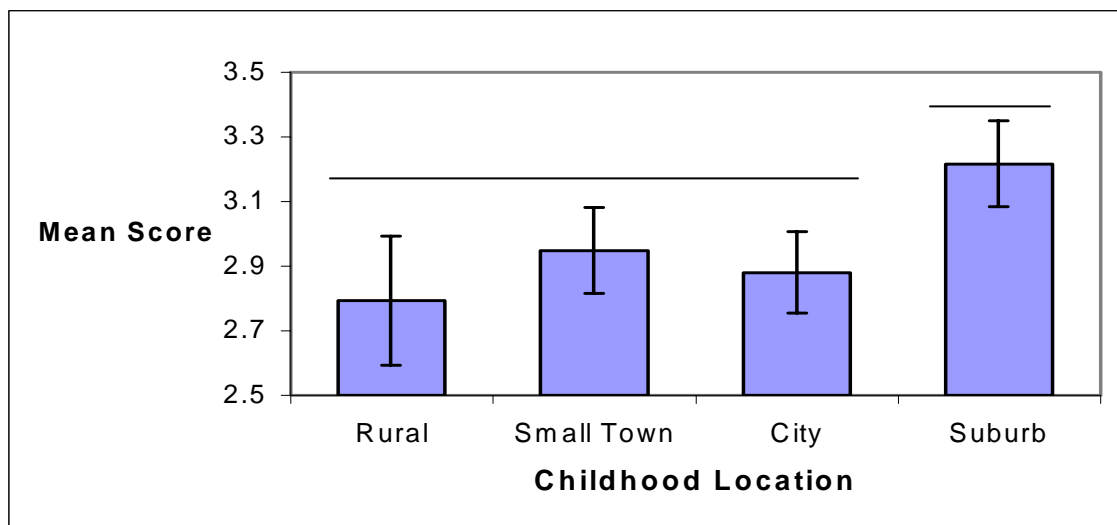


Figure 3. Mean knowledge score for participants from each category. Rural (N=29), Small Town (N=78), City (N=100), and Suburb (N=97). ANOVA,  $p=0.03$ .

An ANOVA test showed that there was no significant difference ( $N=307$ ,  $p=0.99$ ) between the mean knowledge score of men (2.992) and the mean knowledge score of women (2.994). Although, 58% of men answered Question 6 correctly, compared to 44% of women answering Question 6 correctly. An ANOVA test determined that this was a significant difference ( $N=307$ ,  $p=0.01$ ).

Having participated in formal environmental education programs was not a significant factor in increasing one's knowledge score (ANOVA,  $N=304$ ,  $p=0.13$ ). The mean knowledge score for those who indicated they had participated in formal programs or classes where they learned about the environment was 3.06. Those who indicated they had not had programs or classes had a mean knowledge score of 2.84.

However, people who had participated in formal environmental education answered Question 9 correctly more often. An ANOVA test showed that there was a significant difference ( $N=304$ ,  $p=0.01$ ) between people with environmental education answering Question 9 correctly (71%) and people without environmental education answering Question 9 correctly (57%).

Of people who indicated they participated in formal environmental education programs, those who participated in programs in local, state or national parks had a mean knowledge score of 3.24, whereas those who weren't in park programs scored an average of 2.90. An ANOVA test showed that this was a significant difference ( $N=207$ ,  $p=0.04$ ).

For the informal environmental activities portion of the questionnaire, people who visited parks at a higher frequency tended to answer more of the knowledge questions correctly (ANOVA,  $N=278$ ,  $p=0.02$ ). People who indicated that they hiked or biked at a frequency of one (never) through three (sometimes) on a scale of one to five earned a lower knowledge score than those who indicated they hiked or biked more often, with a four and five on the same scale (ANOVA,  $N=280$ ,  $p=0.04$ ).

## **Discussion**

Overall, this study shows that people who spend more time in open space know more about wildlife. Study participants who earned the highest knowledge scores spent most of their childhood in a suburban area. The suburban group's knowledge score was shown to be statistically higher than the scores of people from a rural, small town, or city childhood. Having participated in formal environmental education programs did not significantly raise a person's knowledge score, but among those who had formal environmental education, people who had taken classes in parks had statistically higher scores than those who had not. People who indicated on the questionnaire that they visited parks or hiked or biked frequently were shown to have significantly higher knowledge scores.

There was practically no difference between the knowledge scores of women and the knowledge scores of men. Lybecker *et al.* (2002) showed in their study that women care most about environmental issues. In this study, had the women received higher knowledge scores than the men, it could have been suggested that women know more about wildlife because they care more about environmental issues. Since the data show no difference between the knowledge scores of men and women, this cannot be suggested.



Looking at the percentages of people who answered individual questions correctly, it can be seen that some questions addressed more commonly known facts about wildlife, whereas other questions addressed more obscure information. The data show that most people know that deer eat green plants, but only 40% of the population know that winter-run Chinook salmon are endangered. It was also shown that people who answered the question about the endangered salmon correctly scored higher on the remaining knowledge questions. From this it may be concluded that people may have a certain level of basic knowledge about wildlife, but it requires extra education or additional exposure to the environment to be able to answer the more specific questions about a certain animal.

The results of how childhood location affects knowledge disproves the original hypothesis of this study that people from a rural background would score highest. The data actually show that people who grew up in the suburbs were able to answer more of the knowledge questions correctly. Increased access to educational resources and possible close proximity to open space are possible reasons for increased suburban knowledge. Further research is needed in this area because many factors can be suggested as reasons for suburban people knowing more, but none can be scientifically supported because of the little information available on the subject.

Having participated in a formal environmental education program or class did not increase one's knowledge score. People must not learn or retain this type of information about wildlife from classes in school. People with formal environmental education were able to answer Question 9 correctly more than those without formal environmental education, though. Question 9 addresses the definition of nocturnal, which is something that would most likely be raised in almost any type of environmental education program, so these results make sense.

The data show that wildlife knowledge increases as exposure to the environment where wildlife exist increases, through park classes, park visitation, and hiking or biking. This strongly supports the hypothesis of this study that exposure to open space affects knowledge. Since people who spend more time in open space and participating in environmental education programs in open space really do know more about wildlife issues, this is a strong reason to conserve remaining open space in the San Francisco Bay Area and question society's continuation of urban sprawl.

Bowman *et al.* (2001) and Ericsson and Heberlein (2003) showed that people who know more about an issue care most about that issue. Aipanjuguly *et al.* (2003) concluded that people

who care about wildlife issues support conservation efforts, which lead to environmental legislation being passed (Vaske *et al.* 1999). Knowledge, therefore, is the first step in stopping the detrimental effects that urban sprawl has on wildlife. This study shows that people gain knowledge about wildlife by being in open space, so it is suggested that open space needs to be conserved.

While being exposed to areas where wildlife live helps to increase knowledge, the possible implication of making open space more accessible is that people will have a harmful effect on the wildlife in open space. Creating more environmental programs and encouraging people to use open space as a recreation area should be done with the thought of sustaining livable wildlife habitat in mind.

The results of this study have shown that people from a suburban childhood could answer more of the knowledge questions correctly than could any other group. It is suggested that further research be conducted into why this is so. This study also showed that exposure to open space increases knowledge about wildlife. With increased knowledge about wildlife, more open space in the Bay Area can be preserved, so even more people can become knowledgeable and help wildlife.

### **Acknowledgements**

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### **References**

- Aipanjiguly, S., S. K. Jacobson and R. Flamm. 2003. Conserving manatees: Knowledge, attitudes, and intentions of boaters in Tampa Bay, Florida. *Conservation Biology* 17: 1098-1105.
- Bleich, V. C. and M. W. Oehler Sr. 2000. Wildlife education in the United States: Thoughts for agency biologists. *Wildlife Society Bulletin* 28: 542-545.
- Boulton, B. Is the future of Coyote Valley more San Jose sprawl? *The Loma Prietan* December 1999/January 2000.

Bowman, J. L., B. D. Leopold, F. J. Vilella, D. A. Gill and H. A. Jacobson. 2001. Attitudes of landowners toward American black bears compared between areas of high and low bear populations. *Ursus* (Knoxville) 12: 153-160.

Ericsson, G. and T. A. Heberlein. 2003. Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation* 111:149-159.

Lybecker, D., B. L. Lamb and P. D. Ponds. 2002. Public attitudes and knowledge of the black-tailed prairie dog: A common and controversial species. *Bioscience* 52: 607-613.

Rogers, P. October 3, 2003. In their own words. *San Jose Mercury News*.

Ruben, B. 1994. Reading and writing, but not recycling. *Environmental Action Spring* 1994: 19-22.

Scenic America. 2001. Coyote Valley, San Jose, California. [www.scenic.org](http://www.scenic.org), accessed October 11, 2003.

Vaske, J. J. and M. P. Donnelly. 1999. A value-attitude-behavior model predicting wildland preservation voting intentions. *Society and Natural Resources* 12: 523-537.

Wildlife Center of Silicon Valley. 2003. <http://www.wcsv.org>, accessed October 7, 2003.

Witt, B. May 4, 2000. Development in San Jose, California halted to protect endangered species. *San Jose Mercury News*.

## Appendix A.

1) How would you describe the place where you spent the greatest part of your childhood: (check ONE only)

- ☐ farm/ ranch/ other rural
- ☐ small town
- ☐ suburb
- ☐ city

1A) How many years did you spend in this place? \_\_\_\_\_

2) Other than your childhood, how long have you spent in rural areas?

- ☐ none
- ☐ between 1 and 6 months
- ☐ between 1 year and 5 years
- ☐ less than 1 month
- ☐ between 6 months and 1 year
- ☐ greater than 5 years

3) Have you ever participated in programs or classes where you have learned about the environment, such as in school or through other organizations?

- ☐ yes (CONTINUE TO QUESTION 3A)
- ☐ no (SKIP TO QUESTION 4)

3A) Where were those programs or classes? (check ALL THAT APPLY)

- ☐ elementary school
- ☐ college
- ☐ local, state, or national parks
- ☐ junior high or high school
- ☐ science camps
- ☐ other

4) Please rate how often you participate in each of the following environmentally related activities, using the following scale:

- | 1<br>never  | 2 | 3<br>sometimes       | 4 | 5<br>often                        |
|-------------|---|----------------------|---|-----------------------------------|
| ___ Fishing |   | ___ Hiking or Biking |   | ___ Reading about the environment |
| ___ Camping |   | ___ Hunting          |   | ___ Day visits to parks           |

5) Which of the following is considered an endangered species? (check ONE only)

- ☐ white sturgeon
- ☐ starry flounder
- ☐ Sacramento pikeminnow
- ☐ winter-run Chinook salmon

6) Which of the following is a FALSE statement about bats? (check ONE only)

- ☐ Bats can catch hundreds of insects in an hour.
- ☐ Bats are mammals.
- ☐ Bats can pollinate flowers.
- ☐ Bats' greatest enemy is the Peregrine Falcon.

7) If approached by a bear, you should: (check ONE only)

- ☐ run in the opposite direction
- ☐ back away slowly
- ☐ stand still
- ☐ run towards the bear

8) The most important part of the black-tailed deer's natural diet is: (check ONE only)

- ☐ nuts and seeds
- ☐ small rodents
- ☐ green plants
- ☐ insects

9) Which of the following animals is awake during the day: (check ONE only)

- ☐ mountain lion
- ☐ barn owl
- ☐ red-tailed hawk
- ☐ Virginia opossum