A teacher's guide and study kit on the Santa Rosa Plateau Ecological Reserve for middle school students

Katharine Marie Havert

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A TEACHER'S GUIDE AND STUDY KIT ON THE SANTA ROSA PLATEAU ECOLOGICAL RESERVE FOR MIDDLE SCHOOL STUDENTS

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Masters of Arts
in Education:
Environmental Education Option

by
Katharine Marie Havert
June 1998
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Approved by:

Darleen Stoner, Ph.D.,
First Reader

Bonnie Trusler, M.A., San Bernardino City Unified School District,
Second Reader
ABSTRACT

The need for a study kit with activity-based lessons for before, during, and after a visit to the Santa Rosa Plateau Ecological Reserve is the basis for this project. The reserve's personnel have expressed the need for a curriculum that addresses the issues of stewardship, ecosystems, habitat management, and methods preservation and restoration of specific species that are endangered within the reserve. Thus, this kit has been developed to aid the classroom teacher to prepare for a visit to the Santa Rosa Plateau Ecological Reserve, to inform the teacher on the habitats and regulations for visits to the Santa Rosa Plateau Ecological Reserve, and to provide follow-up lessons that will provide the students with a basic understanding of the issues and needs for the preservation of natural habitats. The study kit contains a videotaped narrative describing the reserve, student lessons for the teacher, background information about the reserve, and plant samples from the reserve.
ACKNOWLEDGEMENTS

I would like to thank many people for their contribution to this project without whom it would not have been completed.

First, I thank Dr. Darleen Stoner for her time, support, and patience throughout the several years of effort. Secondly, I thank all of the people at the Santa Rosa Plateau Ecological Reserve for their hours of conversation, support, and advice. Thanks to Carol Bell and The Nature Conservancy for permission to use materials and gather samples. Thanks goes to Robin Wills for opening up his resources to use on the Reserve. Thanks to all the volunteers who spent hours in discussion helping me decide on a course of action. Thanks especially to Rob Hicks for his advice and guidance. A special thanks goes to Robert Dlouhy for his beautiful still photography without which I could not have made the video presentation. I thank Jan Young for her initial guidance in getting the project started and introducing me to the personnel at the Santa Rosa Ecological Plateau Reserve. I thank Anderson Seed Company, Escondido, California for their donation of seeds to the study kit. I thank the California Native Plant Society for the poster of wildflowers. I thank Gina Glock for her advice and guidance. I thank Bonnie Trusler for being a second reader.

I thank the Associated Student, Incorporated Research and Travel Fund Committee, California State University, San Bernardino, California for providing part of the funding to produce the project.

Lastly, thanks and love go to my family, Ben, Lucas, and Darcy who have seen me through the long hours of writing and research and supported me throughout my graduate education and Master's project.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>v</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>DEFINITION OF TERMS</td>
<td>3</td>
</tr>
<tr>
<td>REVIEW OF RELATED LITERATURE</td>
<td>5</td>
</tr>
<tr>
<td>Changing Teaching Methods in Environmental Education</td>
<td>6</td>
</tr>
<tr>
<td>Constructivist Theory and Environmental Education</td>
<td>7</td>
</tr>
<tr>
<td>The Environmental Study Kit and Learning Experience</td>
<td>9</td>
</tr>
<tr>
<td>Justification for the Development of a Study Kit for the Santa Rosa</td>
<td>10</td>
</tr>
<tr>
<td>Plateau Ecological Reserve</td>
<td></td>
</tr>
<tr>
<td>STATEMENT OF GOALS AND OBJECTIVES</td>
<td>12</td>
</tr>
<tr>
<td>PROJECT DESIGN AND STRATEGIES</td>
<td>13</td>
</tr>
<tr>
<td>RESULTS AND DISCUSSION</td>
<td>17</td>
</tr>
<tr>
<td>IMPLICATIONS FOR EDUCATORS</td>
<td>19</td>
</tr>
<tr>
<td>APPENDIX A: A Teacher's Guide and Study Kit on the Santa Rosa Plateau</td>
<td>20</td>
</tr>
<tr>
<td>Ecological Reserve for Middle School Students</td>
<td></td>
</tr>
<tr>
<td>APPENDIX B: Questionaire Robin Wills, Reserve Manager June 1993</td>
<td>67</td>
</tr>
<tr>
<td>APPENDIX C: Interviews</td>
<td>70</td>
</tr>
<tr>
<td>APPENDIX D: Plant Specimen Labels</td>
<td>78</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>80</td>
</tr>
</tbody>
</table>
INTRODUCTION

"Human history is a race between education and catastrophe."

H. G. Wells

“We have to put a stop to the idea that nature is scary...
It kills me to see children afraid of nature---and when children are afraid of insects, they are afraid of nature, because 90% of multicellular organisms are insects.”

David Suzuki

The teaching of science, especially in environmental education, has become an uphill struggle in the past few decades largely because students now live primarily in concrete and asphalt urban areas with little exposure to the natural world. Many children today view the natural environment as the enemy, dirty, dangerous, and disgusting. To change this attitude we must expose children to the wonders, beauty, and benefits we derive from nature. We must instill in students a sense of how humans are a part of nature by teaching them about the few remaining pristine natural environments remaining outside the urban areas of Southern California.

To preserve the few remaining natural environments of Southern California, organizations such as the Nature Conservancy have teamed with local, state, and federal agencies to set aside certain sensitive areas to be kept in their natural state. These areas not only preserve the natural environment, but must be used by environmental educators to teach their students about ecology and our natural environment and the vital link humans have to it. The Santa Rosa Plateau Ecological Reserve (the Reserve) in Murrieta, California is just such a natural environment.

Educational research shows that a student must be presented with materials and activities that help him/her to integrate experiences for
meaningful generalizations rather than isolated experiences and activities (Henderson, 1992). The Santa Rosa Plateau Ecological Reserve needed a specific study kit that could be utilized by middle school teachers in conjunction with a visit to the Reserve. Therefore, a comprehensive curriculum was developed for middle school students in a kit for teachers to checkout through the Reserve. The kit was developed with hands-on materials, labs, worksheets, stretching exercises, and simulations which provide the students with an understanding of the economic, political, environmental and social significance of the habitats of the Ecological Reserve. It includes pre-visit activities on the environment, on-site labs, activities and hikes, and post-visit activities.

This project was designed to provide a site-based curriculum for middle school students to aid them in developing responsible environmental behavior, acquiring a knowledge of the environment, achieving understanding of strategies to solve problems, motivating them to work toward solutions of environmental problems, and developing a commitment to act on one's environmental concerns.
DEFINITION OF TERMS

For this project, the following definitions apply...

1. **Hands-on materials** are objects and artifacts that provide a tactile experience of the flora and fauna of the Reserve.

2. **Labs** are directions for activities that give the students background in the proper use of stereoscopes to be used at the Reserve.

3. **A descriptive narrative** is a narrative that explains the habitats, flora, and fauna of the Reserve.

4. **Stretching exercises** are an individual or class activity that allows the student to apply information about the Reserve in a creative manner to other situations.

5. **A simulation** is a group or class activity that allows the students to develop their own methods, techniques, and ideas about the environment of the Reserve and apply that information to an imaginary or actual situation dealing with habitat preservation.

6. **Stewardship** refers to the management of a natural area and the goals and uses for which the area is intended in the future.

7. **Edge effect** refers to the movement of animals into and out of a habitat from surrounding areas to take advantage of the food supply during a certain time of year.

8. A **migration corridor** is a trail followed on a yearly basis by animals to move from one area to another for food or reproduction purposes.

9. An **indigenous species** is an organism that has adapted to and thrived in a particular natural area for generations.

10. An **exotic species** is an organism that has been recently transplanted by human means into a natural area.

11. A **WordStar** is a graphic organizer that utilizes a star to separate and
explain various components of a concept or terminology.

12. A **Magiscope** is a scientific instrument used to magnify objects for observations much like a microscope.

13. A plant is a **perennial** if it has underground parts that live more than a year.

14. A plant is an **annual** if it live only a year and needs reseeding yearly.
REVIEW OF RELATED LITERATURE

Educators have endeavored for more than 20 years to establish a well defined standard of teaching and for an integrated definition of environmental education. A first step was an integrated definition of the nature of environmental education: Environmental education enables students to develop "values related to the environment, promotes respect for the environment, and encourages environmentally responsible behavior" (Hewitt, 1997, p. 35). Furthermore, environmental education teaches empirical information important to the understanding of natural processes, human-built environments, technologies, economics, politics, culture, and aesthetics. The goal of environmental education is to "help students become environmentally knowledgeable, skilled, and dedicated citizens who are willing to work, individually and collectively, toward achieving and maintaining a dynamic equilibrium between the quality of life and the quality of the environment" (Hungerford & Peyton, 1976, p. 2).

The curriculum of the middle school science classroom has been found to lend itself well to the teaching of environmental education (EE) (Vance, Miller, & Hand, 1995, p. 244). The students at this age level are receptive to the influences of the activities designed for natural habitats; teachers have the benefits of a group of students that can read accurately; teachers have a greater degree of curricular flexibility at this age-level than in high school; and students can be grouped easily into learning groups (Heller, 1997). The Science Framework for California Public Schools: Kindergarten Through Grade Twelve (California Department of Education, 1990, p. 3) stated that "teachers should employ a variety of instructional techniques to help students achieve conceptual understanding and include all students in discussions and
cooperative learning situations." Nowhere in the educational curriculum can this directive be better used than in the middle school science classroom with environmental education study kits (or travel kits) in conjunction with a field trip to a natural environment (Roy, Petty, & Durgin, 1997).

**Changing Teaching Methods in Environmental Education**

Initially, the EE curriculum emphasized values/attitude education (Ballantyne & Packer, 1996) and nature study. However, in more recent years educators have realized that knowledge and behavior learning are just as important. Students need to be sensitized to the issues we face concerning the destruction of natural areas. Students need to have a concrete understanding of the ecological processes that govern natural environments. They also need to know how to go about promoting environmentally safe behaviors within their communities. According to Ballantyne and Packer (1996) the values-education approach has certain benefits and problems associated with it. Three factors figure in the widespread use of values/attitude education:

1. Many teachers view values/attitude education as more important than teaching about the facts and knowledge important to ecological processes.
2. The values/attitude education is easier and sounds good.
3. The emphasis is on process rather than content or outcome.

Teachers feels that the rapidly changing factual information in sciences makes it more difficult to teach empirical information. However, certain problems have been observed in using only the attitude/value process:

1. Perhaps the most important drawback deals with the lack of basic ecological knowledge. We may be producing citizens concerned about the environment that lack a real understanding of just what needs to be
done and why.

2. Secondly, a values/attitude education may serve as a way to present a personal agenda by the educator presenting the information. Too often educators may not be the neutral instructors necessary for the subject.

3. Thirdly, the absence of content learning of the subject simply leaves the learner at a severe disadvantage. Without content, the learner cannot distinguish the difference between their misconceptions and factual information.

Therefore, many environmental educators believe that the constructivist learning method is the most appropriate method to the teaching of EE (Robertson, 1994).

**Constructivist Theory and Environmental Education**

Constructivism refers to "both individuals and groups of individuals constructing ideas about how the world works. It is also recognized that individuals vary widely in how they make sense out of the world and that both individual and collective views about the world undergo change over time" (Novak, 1987, p. 349). By recognizing the individual's conceptual framework the teacher can provide an educational setting with learning outcomes that draw from the students own concepts and attempt to correct any preconceptions. The teaching of natural processes can be done easily within this context. Firsthand experiences within the natural setting can be used to transform or reshape student's misconceptions. By recognizing the students' preconception and assessing the errors in their preconception, through group discussion and direct experience, students can be helped "to become aware of their own and alternative conceptions, selectively confront them with new information or learning experiences designed to challenge inaccurate or
The constructivist method, like activity-based methods, enables the student to learn through hands-on activities that reinforce previous knowledge or to learn through experience. Research suggests that activity learning improves children's environmental attitudes, knowledge, or both (Lemming, Porter, Dwyer, Cobern, & Oliver, 1997, p. 34). In their research with the Caretaker Classroom Program in a major southern town, Lemming, et. al., found that student responses to the environment were more positive when involved in EE activities in comparison to those students in the study not in an EE activity program. Interestingly, they found that the parents of the students involved in the program were more aware and responsive to environmental issues even though the parents were not directly involved in the program. In a follow-up questionnaire, parents reported their children had a greater awareness of environmental issues during the program duration and they had an increase in the parent-child discussion of environmental topics.

The constructivist method is also supported by Estes (1993, p. K3). Through her research she found that “for most people, environmental sensitivity springs from direct experiences with nature, not from lectures or textbooks.” Furthermore, much of our problem in environmental education could be eliminated if we had more environmentally sensitive teachers as role models. Thus, students would have the exposure to someone with a personal investment in the environment and able to provide in-depth knowledge about environmental issues.

The use of group work in the constructivist method has been shown to result in greater enjoyment by both the teacher and students involved (Vance, Miller, & Hand, 1995). These researchers found four factors aided in the
increased enjoyment:

1. Teachers feel more “challenged to think on their feet” and prepare more for changes in the lesson as student’s ideas develop;
2. Students take more direct responsibility for the lessons;
3. Girls show a “greater enjoyment of science as a subject”; and
4. “Quieter students are more willing to become involved” (Vance, et al., 1995, p.248).

The Environmental Study Kit and Learning Experience

The renowned science educator David Suzuki (Estes, 1993) suggested that a field trip into the wilderness is important but impractical for most teachers. Even though we have few wilderness areas there is a wealth of natural reserves and parks in and around the Southern California area to which students can go and learn firsthand about natural processes. Unfortunately, many teachers do not have information to direct them to and within these valuable settings. Simmons (1993, p. 8) found that most teachers use “built” settings more than more natural areas. In order to involve teachers in the use of the natural settings EE educators must understand this fact, how teachers view nature, and most importantly present teachers with the educational opportunity associated with nature. The environmental study kit can be a treasure of activities and teaching tools for both the experienced and novice teacher interested in environmental studies.

Researchers see four basic barriers that inhibit a teacher’s use of natural areas: “conceptual, logistical, educational and attitudinal” (Roy, et al., 1997, p. 9). The environmental study kit (traveling box, discovery kits, or resource trunks) is a convenient and handy way of eliminating most of these barriers. The kit usually contains curriculum guides, reference materials, worksheets,
extension exercises, information on issues concerning the habitat, and, in many cases, specimens and pictures of the natural habitats. They can be used alone or in conjunction with a visit to the habitat described. Such kits help foster responsible environmental citizenship and behavior and provide a sound knowledge-based curriculum. Research has found the use of study kits has increased in North American (Roy, et al, 1997, p. 10). These kits help to eliminate some of the barriers to EE, provide teachers not trained in EE with meaningful information, motivate young teachers to get involved in EE, provide a cheap resource for those teachers operating within a limited budget, and can be used with or without the natural habitat visitation.

Justification for the Development of a Study Kit for the Santa Rosa Plateau Ecological Reserve

Research suggests that when students view nature in positive terms they are likely to internalize the importance of its preservation. Therefore, the study kit provided at the Santa Rosa Plateau Ecological Reserve (the Reserve) must emphasize positive feelings and experiences. Water environments, such as the tenajas and riparian habitats at Santa Rosa, commonly bring very positive reactions, according to research. The oak woodland (woodland) and grassland habitats (open fields) evoke feelings of openness, relaxation, peacefulness and seclusion. Interpretive paths, many of which are accessible to the daytime hiker at the Reserve, are viewed as highly educational, comfortable, safe, organized, and accessible (Simmons, 1993, p. 9-10). Therefore, each habitat of the Reserve can provide not only a educational experience but a highly pleasurable experience to the student visitor.

Simmons (1993) also suggested that teachers expressed the need to be provided with a wide range of teaching tools and activities. Several tools are
suggested for development of a successful study kit:

1. science equipment;
2. a naturalist;
3. background information;
4. detailed lesson plans about animals, plants and ecosystem interactions;
5. exploration, and hikes.

Very importantly, teachers need training and information about natural settings to avoid their use of preconceptions, or stereotyped ideas of what can be done in a natural setting.
STATEMENT OF GOALS AND OBJECTIVES

The goal of this project is to provide a curriculum for middle school students in grades six, seven, and eight, and their teachers within a study kit for the Santa Rosa Plateau Ecological Reserve.

Objectives for the student learning through use of the study kit in the classroom and in conjunction with a guided trip to the Santa Rosa Plateau Ecological Reserve include:

1. Learning outdoor etiquette, rules of the preserve, and good stewardship of the environment.
2. Learning to apply the scientific method by use of observational skills, comparing and contrasting skills, categorizing skills, analysis, and information gathering.
3. Understanding the role and use of fire in plant communities management.
4. Developing a realistic view of what animals and plants live in the preserve and their interactions within their habitat and the ecosystem.
5. Learning environmental ethics.
6. Understanding the dynamic nature of ecosystems based on the Santa Rosa Plateau Ecological Reserve ecosystem.
PROJECT DESIGN AND STRATEGIES

The object of this project was to develop a curriculum for middle school students that visit the Ecological Reserve during the school year. Thus, sixth through eighth grade students would have hands-on materials, labs, worksheets, stretching exercises, and simulations that provide them with an understanding of the economic, political, environmental, and social significance of the habitats of the Reserve.

Research Procedure:
1. Interview Reserve docents to determine the main emphasis of the nature walk narratives. See Appendix C.
2. Research local sources (newspapers, magazines, environmental organizations, etc.) to establish a historical perspective on the creation of the Reserve and the lands in and around it.
3. Access the Natural Heritage computer base to get information on the indigenous species of the Reserve.
4. Interview the Reserve ecologist and manager to determine the main emphasis to be placed in the curriculum.
5. Interview the Reserve Interpreter for Educational needs of the Visitor Center.

This project is designed to provide a site-based curriculum for the Santa Rosa Plateau Ecological Reserve that will aid students in developing responsible environmental behavior. Responsible environmental behavior involves a development of knowledge of the environment, the understanding of strategies to solve problems, the motivation to work toward solutions of environmental problems, and a terminal commitment to act on one's environmental concerns.
Educational Study Kit:

A. Topics of importance emphasized:
   1. Outdoor manners
   2. Follow-up lessons
   3. Information about the Reserve
   4. Observational skills
   5. Realistic view of what animals live in the Reserve
   6. Hands-on activities
   7. Reserve rules and regulations
   8. Simple ecology, survival instincts, and stress put on organisms by change
   9. Environmental ethics
   10. Good stewardship
   11. Role and use of fire in plant communities management
   12. Understanding of ecosystem functions and conservation methods
   13. Exotic species control
   14. Instilling in students an understanding of the dynamic nature of ecosystems

B. Contents:
   1. Outdoor manners
   2. Teacher and Chaperone Protocol
   3. Pre-visititation lessons
   4. Teacher information---Background information for lessons
   5. Post-visititation lessons and assessments
   6. Information pamphlets and brochures
   7. Plant specimens
8. Storyline—Daybreak at the Santa Rosa Plateau Ecological Reserve
9. Video with narrative
10. Animal Tracks of Southern California, by Chris Stall
11. Poster—Animal Tracks of Southern California
12. Poster—Spring Wildflowers, California Native Plants Society
13. Seeds packets—Sisyrinchium bellum, Eschscholzia californica, and Dodecatheon clevelandii

C. Pre-visititation lessons—use of Educational Study Kit

1. Observational skills development
   a. Differences between living and non living things
   b. Differences between plants and animals
   c. What is a habitat?
      1. Characteristics
      2. Diversity of animal homes
      3. Importance of water and fire
      4. Living and nonliving things necessary to make a habitat.
   d. What is an ecosystem?
      1. Resources relationships
      2. Importance of conservation to survival
      3. Edge effect of vernal pools

2. Comparing, Contrasting, and Categorizing skills development
   a. Diversity of plants and animals
   b. Categorizing of plants and animals
   c. Relationships of plants and animals

3. Storyline—Daybreak at the Santa Rosa Plateau: a Description of the Reserve through the eyes of a Mountain Lion
D. Post-visititation lessons

1. Identification, comparing, contrasting, categorizing, and observational skills

2. Local involvement

3. Observational skills assessment
   a. Grow wildflowers from seed and observe in the local area
   b. Complete an oral presentation about a habitat within the Reserve

4. Comparing, Contrasting and Categorizing skills assessment
   a. Common Footprints
   b. Native plant seed germination and growth

5. Assessment activities
   a. Develop a panorama/diorama picture
   b. Develop a display
   c. Develop a game
RESULTS AND DISCUSSION

When originally undertaken this project was much larger and more ambitious than the final product for four main reasons. First, I had unrealistically thought that my time would not become as limiting, since I had begun the project during a two-year break from teaching. When I returned to teaching my responsibilities became so great that I had to curtail my project completely for three years. Upon return to the project in 1998 I had to reassess my expectations of myself and the need for an extensive curriculum for the Santa Rosa Plateau Ecological Reserve. Secondly, the Santa Rosa Plateau Ecological Reserve had also undergone some management changes in my absence. The need for an extensive curriculum was no longer there. There had been a lower elementary curriculum developed by the Metropolitan Water District. The need for a limited upper elementary and middle school curriculum was evident. Thirdly, the nature of visitations to the reserve are basically limited to one day with pre- and post-visitation lessons needed for only a few days rather than full units of study, as I had originally thought. Fourth, to accomplish the rather extensive project I had originally undertaken I would have had to devote a tremendous amount of time and money which I did not have. Therefore, the curriculum was developed with more restrictions and more specifically directed lessons, about the ecosystem at the Reserve, and to upper elementary and middle school students.

The project does reflect the needs and directions of the interpreter and other personnel at the reserve (see Appendix B). It is concise and specific to the Reserves habitats and its organisms, and reflects the learning outcomes the interpreter, manager, docents, and county management have expressed to me as necessary for students to understand the unique environment that exists on
In conclusion, this study kit developed for the Santa Rosa Plateau Ecological Reserve is an activity-based group of lessons for the middle school teacher interested in bringing students to a unique California environment. It incorporates hands-on lessons, simulations, a videotape activity, and plant samples from the reserve. These activities are intended to help the students and their teachers to understand the issues and need for the preservation of natural habitats.
IMPLICATIONS FOR EDUCATORS

The curriculum described within this project and developed for the Santa Rosa Plateau Ecological Reserve is intended to provide basic information and lessons to help students and their teachers better understand the functions and role the Reserve plays in the stewardship and preservation of natural ecosystems in Southern California. Educators can utilize this study kit to help expose their students to the wide range of organisms within this natural area and how they interact within the physical world around them. Hopefully, the students and their teachers will become more aware of the fragility of these systems in consideration of a growing human population that threatens to urbanize over very beautiful and vital areas. Educators can not only utilize this study kit directly with the visitations to the Santa Rosa Plateau Ecological Reserve, but also use it separately to address similar natural reserves within their areas.

It is my hope that such kits be developed for many of the natural reserves within the state of California to assist educators and middle school students in their understanding and recognition of the importance of such natural areas. Due to the growing urban populations and the increasing isolation of such natural areas from children today kits such as this are necessary to educate students about their role and influence on such areas.
APPENDIX A

A Teacher's Guide and Study Kit on the Santa Rosa Plateau Ecological Reserve for Middle School Students
Table of Contents

1. Introduction
2. Acknowledgements
3. Outdoor Manners
4. Teacher and Chaperone Protocol
5. Pre-Visitaton lessons
   a. ACTIVITY #1---Living or Nonliving?
   b. ACTIVITY #2---Energy Needs
   c. ACTIVITY #3,4,5 AND 6---What's in a word?
   d. ACTIVITY #7---Magiscope and model
   e. Videotape narrative
6. Lessons during the visitation
   a. Magiscope use during visit conducted by the interpreter
   b. ACTIVITY #8---Common Footprints
7. Post-Visitaton lessons and Assessments
   a. ACTIVITY #8---Common Footprints
   b. ACTIVITY #9---Native Plant Seed Germination and Growth
   c. ACTIVITY #10---Local Involvement
   d. ACTIVITY #11---Assessment Activity
8. Storyline---Daybreak at the Santa Rosa Plateau Ecological Reserve
9. Videotape
10. Animal Tracks of Southern California, by Chris Stall
11. Poster---Animal Tracks of Southern California
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INTRODUCTION

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The teaching of science, especially in environmental education, has become an uphill struggle in the past few decades largely because students now live primarily in concrete and asphalt urban areas with little exposure to the natural world. Children today view the natural environment as the enemy, dirty, dangerous, and disgusting. To change this attitude we must expose children to the wonders, beauty, and benefits we derive from natural areas like the Santa Rosa Plateau Ecological Reserve (the Reserve). We must instill in students a sense of how humans are a part of nature by teaching them about the few remaining pristine natural environments remaining outside the urban areas of Southern California. We have in Southern California, thanks to organizations such as the Nature Conservancy, and local, state, and federal agencies, set aside certain sensitive areas to be kept in their natural state. The Santa Rosa Plateau Ecological Reserve in Murrieta, California is just such a natural environment.

Educational research shows that a student must be presented with materials and activities that help him/her to integrate experiences for meaningful generalizations rather than isolated experiences and activities. The Santa Rosa Plateau Ecological Reserve Study Kit can be utilized by middle
school teachers in conjunction with a visit to the Reserve. This comprehensive curriculum was developed for middle school students in a kit for teachers to checkout through the Reserve Visitor Center. The study kit contains hands-on materials, labs, worksheets, stretching exercises, and simulations which provide the students with an understanding of the economic, political, environmental and social significance of the habitats of the Reserve. It includes pre-visit activities on the environment, on-site labs, activities and hikes, and post-visit activities with lists of materials needed.
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Riverside County Parks and Open Space District
California State Fish and Game Department
Metropolitan Water District
Santa Rosa Plateau Ecological Reserve docents
THE FOLLOWING MANNERS SHOULD BE OBSERVED ANYTIME A PERSON ENTERS A NATURAL AREA.

1. REMAIN ON MARKED TRAILS.

2. THINK OF SAFETY—FOR YOURSELF AND OTHERS. SOME SHRUBS MAY BE POISONOUS TO TOUCH. ROCKS AND TREES ARE FUN TO CLIMB, BUT PAINFUL TO FALL OFF.

3. DONOTLITTER. ANIMALSDONOTEATWHATHUMANS EAT. PLANTS CAN BE POISONED BY OUR LITTER.

4. DISPOSE OF ANY LITTER LEFT BY OTHERS. BE A GOOD NATURALIST. TAKE RESPONSIBILITY FOR KEEPING THE ENVIRONMENT CLEAN, EVEN THOUGH OTHERS DO NOT.

5. DON’T DRAW OR CARVE ON ANYTHING WITHOUT PERMISSION. TREES ARE SENSITIVE TO INFECTION. ROCKS ARE HOMES FOR ANIMALS. PROPERTY BELONGS TO SOMEONE ELSE.

6. SHOW RESPECT FOR ALL LIVING THINGS. YOU EXPECT THE SAME RESPECT FROM OTHERS, DON’T YOU?

7. BE RESPONSIBLE WITH FIRE. FIRE CAN BE HELPFUL ONLY IF USED PROPERLY, NOT CARELESSLY.

8. LEAVE AN AREA IN THE SAME CONDITION OR BETTER THAN WHEN YOU ARRIVED. BE PROUD OF THE NATURAL AREA YOU HAVE LEFT BEHIND.

9. IF YOU PICK UP A PIECE OF NATURE, PUT IT BACK WHERE YOU FOUND IT. THERE IS A REASON FOR ALL THINGS TO BE WHERE THEY ARE.
**Santa Rosa Ecological Plateau**

**Teacher and Chaperone Protocol**

The experiences of the students and their learning at the Santa Rosa Plateau Ecological Reserve are dependent to a large extent on the involvement of the teachers and chaperones that accompany the students. The Reserve needs to have the full cooperation of the teachers and chaperones in the discipline and education of students visiting the Reserve. The following rules of protocol, therefore, must be followed:

1. Teachers and chaperones must accompany students at all times.

2. There must be a teacher or chaperone provided for every ten students.

3. Teachers must review the rules and regulations of the Reserve with the students and chaperones before their visit to the Reserve. Teachers and chaperones must carry with them the list of rules and regulations at all times.

4. Reserve staff’s decisions are final when a decision is made that a student’s behavior is not appropriate. Students must not continue with the visitation, but stay with a chaperone at a designated location.

5. Any disciplinary action by the Reserve staff must be enforced by the teachers and chaperones.

6. It is the sole responsibility of the teachers and chaperones to remove students from situations that might be injurious to students and/or the native species on the Reserve.

7. All chaperones must stay with the students and avoid any distracting conversations and/or behavior during the visit.

8. No teachers or chaperones will be permitted to leave the Reserve before all the students depart at the end of the visit.

9. It is the sole responsibility of the teachers and chaperones to administer any medications and first aid to students.

10. It is recommended that chaperones not accompany those groups that contain their own children. Instead, they should be responsible for students other than their own children.
ACTIVITY #1

Living or Nonliving?

Objective: To identify natural objects as living or nonliving and recognize the characteristics that determine the difference.

Materials needed: Six color pictures of a natural habitat (in kit), Identification Key, Worksheet #1 (duplicate one for each student)

Vocabulary:
habitat
photosynthesis

Educator background:

All natural occurring objects can be classified into two basic categories; either they are alive or they are not alive. Children typically know most things that are alive because they share certain characteristics with each other. However, some objects need closer observation to determine whether they are alive or not. It is the object of this lesson to help students learn to recognize the obvious and the not so obvious characteristics of objects in a natural setting.

The identification key provided can be used or added to, or you can develop your own identification key. Make sure that you have an open discussion with the students concerning the key and its use.

Activity:

1. Students are to work in groups of 4-6, each with a picture to observe.
2. Give a different picture to each group. It should take about 10 minutes for each group to examine their picture. If time permits, have the students circulate the pictures.
3. Student groups are to complete the Worksheet by using the
Identification Key.

Discussion: Go over the results of each group, making a chart on the board to show the results. Discuss any disagreements in outcomes.

Questions:

1. Which characteristics are best to determine whether an object is living or not living?
2. Which characteristics may be for both living or nonliving things?
3. Describe more characteristics that are different in living and nonliving objects.

IDENTIFICATION KEY

Use the following key to identify the characteristics of the numbered objects in the picture. Remember that not all characteristics are obvious. Make sure you look carefully and discuss the characteristics with the rest of the group.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Living</th>
<th>Nonliving</th>
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<tbody>
<tr>
<td>HARD</td>
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<td>SHINY</td>
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<td>MOVES (ON OWN)</td>
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<td>BREATHES</td>
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<td>PHOTOSYNTHESIS</td>
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<td>LEGS, ARMS</td>
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<td>EATS</td>
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<td>REPRODUCES</td>
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Worksheet #1

GROUP MEMBERS: ____________________________________________
________________________________________________________________
________________________________________________________________
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DATE: ______________ PERIOD ___ PICTURE NO. ___

RECORD ALL OF YOUR OBSERVATIONS BELOW ABOUT THE NUMBERED
OBJECTS IN THE PICTURE.

<table>
<thead>
<tr>
<th>OBJECT NO.</th>
<th>CHARACTERISTICS</th>
<th>LIVING OR NONLIVING</th>
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ACTIVITY #2

Energy Needs

Objective: To track the flow of energy through the energy cycle.

Materials: story “Daybreak on the Santa Rosa Plateau Ecological Reserve"

Worksheet #2 (duplicate one for each student)

Vocabulary:

energy
heat
producer
consumer
decomposer
organisms

Educator background:

Life on Earth relies on the energy from the Sun. The Sun provides the energy to run all the processes of life from the tiniest micro-organism, plants to the largest of animals. The way in which this energy is used and reused in natural processes is called the Energy Cycle. The Sun provides the energy to start the processes and the living things, or organisms, and minerals of the Earth provide the materials needed to keep life going. Each organism is an important link in the cycle. Without all the organisms interacting the cycle breaks down.

Plants are considered the producers in the energy cycle. By a process called photosynthesis they capture and use sun energy to change carbon dioxide in the air, water, and minerals from the soil into sugars and starches as food for themselves and those organisms that eat them. Animals are considered the consumers. There are those that eat the plants that are the
producers. They are called primary consumers. There are those that eat the animals that eat the plants. They are called secondary consumers. The last organisms in the energy cycle are the decomposers; some insects and microorganisms. They eat the dead and dying plants and animals. There are billions more decomposers in the environment that any other organism. They break down the plants and animals into the minerals and basic nutrients needed by plants to start the energy cycle over again, with the help of sunlight for energy.

Activity:

1. Distribute Worksheet #2 and read aloud the background information with the students. Discuss the energy cycle on the worksheet.

2. Students are to listen carefully to the story, “Daybreak on the Santa Rosa Plateau Ecological Reserve” read by the teacher.

3. While the story is being read the students are to list all the organisms that interact or are described. Read the story slowly, but not too slowly. Students needn’t list all the organisms.

4. After the story is completely read the students are to work in pairs as partners to place the organisms into the energy cycle provided.

5. After the worksheet is completed, have two or three students share their energy cycles with the class by drawing them on the board.

Discussion:

1. Discuss each energy cycle. Make any corrections the students suggest.

2. Discuss the possible organisms that directly interact in the energy cycle.

Questions:

1. Which organisms were the producers?
2. Why are decomposers important?

3. What would happen to the cycle if there weren't decomposers?

FOR THOUGHT:

4. When there is a smog alert, how might it affect the energy cycle at the Santa Rosa Plateau Ecological Reserve?
Sleek and tan the mountain lion raises his head from the carcass of the small mule deer he had killed and eaten during the night. The mist from the early morning fog gently touches his body with dew drops giving his fur a glistening sheen in the sunlight. He slowly rises to survey the pool stretching out across the mesa. Rings of blue and yellow wildflowers are the distinctive markings of a vernal pool slowly drying out into the summer. This area had been teeming with wildlife from the surrounding habitats during the night. Turtles poked their head out of the murky, dark green waters to feed on masses of water bugs and beetles. Predators came to feast on the mice, deer, squirrels, and other small creatures that visit the vernal pools for that all important drink of water. A few migratory geese and ducks still glide across the surface of the pool. Greater Yellowlegs and Sandpipers wade slowly along the edges of the pools in search of food.

The grass beneath his feet feels soft and lush. It will be changing soon either into a dormant mat of brown or the blackened remains after fires sweep the area before the spring turns into the hot, dry summer. Stephens Kangaroo rats and deer mice quickly scamper about nibbling the nutritious tufts of grass before making their way back into the safety of their burrows. On any other day the lion might have attempted to nibble on one or two mice, but on this morning he was satisfied with a full tummy of deer. Coyotes, foxes, and the reclusive bobcat now have less competition for their favorite morning snacks.

Unlike the human visitors to the plateau, the lion takes his route over the
hills, not on the beaten trails of the reserve. Although he has never been
threatened by the humans he keeps a safe distance from their huge adobes in
the center of the Reserve. Little does the lion know or care that humans living
so near to him now are protecting him from extinction in the most highly
populated region of Southern California.

Leisurely he scales the ridge of foothills overlooking the riparian habitat
of the Cole Creek that harbors many endangered aquatic organisms. He steers
clear of the small bushes, poison oak, that may poison his exposed skin
causing an irritating rash for days. This winter had been a dry one in
comparison to others. The vernal pools and tenajas have already dried more
quickly than usual. The feast of winter rains will soon give way to the drought
and famine of the summer so common in the desert climate of the plateau.

Along the creek the duckweed still floats casually, the green mat of algae
coats the edges, and an occasional red-legged frog leaps into action in pursuit
of one of many insects that mat the edges of the creek. Few of the frogs still
exist within this tiny habitat. Exotic bullfrogs, introduced by Easterners in the
nineteenth century, have taken over the habitat and muscled their way into the
ecosystem the frog had occupied. The lion playfully leaps at the frog in its haste
to find a morsel of breakfast.

The lion turns and pushes his way through the underbrush of willow and
sycamore saplings to emerge into the open. The prairie grassland stretches
ahead of him. Thanks to the reintroduction of fire to the grasslands many native
bunch grasses are replacing the opportunistic species of annual grass
introduced by European livestock. Native grassland inhabitants like ants,
crickets, and grasshoppers, meadow larks, horned larks, rodents, coyotes,
badgers, snakes, and gopher can now continue their dance of interdependence
in the Plateau ecosystem.

Englemann oak trees are scattered majestically about the open spaces. The oak trees are quite fire adapted and readily stump-sprout after spring burning. These large, dark, crooked-branched trees serve as shade and habitat to a variety of creatures on the plateau. Insects, deer, ground squirrels, woodpeckers, and jays regularly feed on the acorns. A red-tailed hawk, nesting in the tree, has begun its daily soaring routine in search of breakfast. Catching the morning breeze it has very little need of flapping its wings. Soaring saves much needed energy in this hot, dry climate. Not too far away another bird, the kite, is dancing and twirling in the morning sun. Its distinctive method of flight reminds one of the way human kites twirl and spin in the wind.

As he nears the ancient oak the lion is struck by the odor of a very vicious and rarely seen competitor, the badger. The badger, in its black and white uniform, is someone the sleepy lion wants to avoid. Fortunately, the badger is busy sniffing out grubs and doesn't notice the stealthy lion make a wide detour around the tree base. On another day the lion might have rested on a low-hanging branch knobbed with insect galls. The insect that produces the gall is a fascinating parasite. Even though the galls do not destroy the tree they provide food for the growing insect larvae. In turn, the larvae are food for wasps, bees, woodpeckers and ants, which in turn combine in other networks of symbiotic associations centered around the majestic oak.

By now the sun has heated the whole plateau, the fog has burned off, the rattlesnakes and alligator lizards have begun their basking routines on the sun-drenched rocks. On one rocky outcropping a fence lizard is doing its daily pushups. Within the taller grasses the Kingsnakes and Gopher snakes go in search of field mice or pocket gophers. Wildflowers have speckled the
landscape since early spring with such species as lupine, checkerbloom, and shooting stars.

The lion hurries himself along in spite of his exhaustion from a night of hunting. In his hurry he nearly tumbles into a cluster of cactus high on the driest ridge of Monument Hill. Though full of prickly thorns the cactus now has its delicious pear-shaped fruit bursting from the edges of the leaves. Many rodents and larger mammals brave the thorns to take advantage of the nutrition they can find within the cactus pears. Insects of all kinds swarm beneath the cactus to drink of the juices the prickly pear produce.

Not far ahead lies the outcropping the mountain lion calls home deep within the protected area of the reserve called Mesa de Burro. Several more vernal pools, sitting on ancient lava flows, can be seen in the distance. Within the canyon walls only a few humans are allowed to venture. The mountain lion climbs into his solitary crevice, circles around, and lays down in the cool soil to sleep until the night. Then he will once again be awakened by the screech of an owl or the yipping of the coyotes running down the trails once again to the abundant food sources within the Santa Rosa Plateau Ecological Reserve.
THE ENERGY CYCLE

Life on Earth relies on the energy from the Sun. The Sun provides the
energy to run all the processes of life from the tiniest micro-organisms, to plants,
to the largest of animals. The way in which this energy is used and reused in
natural processes is called the Energy Cycle. The Sun provides the energy to
start the processes and the living things, or organisms, and resources of the
Earth provide the materials needed to keep life going. Each organism is an
important link in the cycle. Without all the organisms interacting the cycle
breaks down.

Plants are considered the producers in the energy cycle. By the process
called photosynthesis they capture and use sun energy to change carbon
dioxide in the air, water, and minerals from the soil into sugars and starches as
food for themselves and those organisms that eat them. Animals, including
insects, are considered the consumers. There are those that eat the plants that
are the producers. They are called primary consumers. There are those that
eat the animals that eat the plants. They are called secondary consumers. The
last organisms in the energy cycle are the decomposers: some insects and
micro-organisms. They eat the dead and dying plants and animals. There are
billions more decomposers in the environment that any other organism. They
breakdown the plants and animals into the minerals and basic nutrients (carbon
dioxide and water) needed by plants to start the energy cycle over again, with
the help of sunlight for energy.
Instructions: On this page list all the organisms you hear and/or read about in the story your teacher reads in class. Then place them in the energy cycle that follows.

List of organisms:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Energy Cycle

Sun

minerals

energy

decomposers → carbon dioxide → producers

water

2nd consumer ← 1st consumer
ACTIVITY #3, 4, 5 and 6

What's in a Word?

Objective: to understand and apply the concept of stewardship as it applies to ecosystem management.

Materials: Videotape of the Santa Rosa Plateau Ecological Reserve (SRPER), large construction paper, pencils, markers, Worksheet #3 (duplicate one for each student)

Vocabulary:

- stewardship
- community
- interaction
- habitat
- migration corridors
- species
- edge effect
- indigenous species
- management
- diversity
- exotic
- ecosystem

Educator background:

Intelligent design of reserves in ecologically sensitive areas is extremely important to the survival of rare and endangered species within vanishing ecosystems. The Santa Rosa Plateau Ecological Reserve was designed specifically to address this need and assure the long-term survival of many of its populations of rare plants and animals. Stewardship of this Reserve involves the active management of these populations, based on scientific information, with a full understanding of the impact of human activities in and around the Reserve.

Note: The following activities are designed to be completed together. However, if time does not permit, any of the activities can be done separately (except Activity 6) along with the videotape.

WordStar: A WordStar is a graphic organizer that uses a star design to develop terms and concepts in an organized fashion. Students learn that these concepts
are related in a very simple manner. Each spire of the star describes something about the term that is placed in the center of the star.

Example: term---environment

concepts---definition, location, illustration, examples, antonym

**ACTIVITY 3: DAY ONE**

1. Students will work in groups of five.

2. Each group of students will develop a WordStar diagram for two of the vocabulary words important to the activity. The teacher may assign the words to the groups or the groups may choose their own. The teacher must make sure all the vocabulary words are used.

3. The teacher will present the videotape provided in the study kit. It describes the different habitats within the Reserve with examples of each of the vocabulary words.

4. Students will take the following type of notes on Worksheet #3 while viewing the video:
   
   a. definition of word
   
   b. examples of word
   
   c. habitat in which word applies
   
   d. importance of word
   
   e. related concepts
**ACTIVITY 4: DAY TWO**

1. After the video presentation students will work in groups to develop their WordStar on a large sheet of construction paper. Each student must contribute to the activity by doing one spire of each star.

2. Class presentations of WordStar by each group.

3. Discussion of vocabulary. Make corrections to WordStar at this time.

**ACTIVITY 5: DAY THREE**

Groups will choose from the following and develop a poster to complete based on the videotape. Make sure that each type of poster is used. It may be necessary to assign groups to the particular posters to avoid too much duplication of one type.

1. **Illustrated Fishbone Line Poster:** tell the relationships of the words to the animals and plants described. Example:

   - animals: gopher, badger
   - interaction: habitat
   - plants: lily, oak

2. **Movie Poster:** Illustrate how these words define management of the reserve.

3. **Comic Strip Poster:** Create a 6-paneled comic strip to illustrate the importance of the words to the ecosystem of the reserve.

4. **Image and Definition Poster:** Choose 6 words from the vocabulary that you feel are most important and illustrate them.

**ACTIVITY 6: DAY FOUR**

Students in each group will write about their experience in creating one of the posters on DAY THREE. The essay must include all of the following
components.

a. State your role in the project.

b. State what you liked best about your work.

c. State the relationship of the vocabulary words you used to each other.

d. State how "Stewardship" relates to the ecosystem in terms of the words you used in the poster.
Worksheet #3
What's in a Word?

Name__________________________ Period____ Date________

Directions:
1. In the space below write the notes required from the video presentation.
2. Complete your WordStar.

Vocabulary:
1.

2.
ACTIVITY #7

MAGISCOPE

Objective: to familiarize the student with the optical instrument being used at the Santa Rosa Plateau Ecological Reserve (SRPER).

Materials: scissors, markers, crayons, glue, tape,

Worksheet #4 (duplicate one for each student)

Vocabulary:
- optical tube
- objective
- stage
- specimen
- arm
- lens
- eyepiece
- microscope
- slide

Background:

The interpreter at the Reserve will be allowing students to view examples of insects, animals, rocks, and plants through the MAGISCOPE, a type of microscope. In order for students to best make use of these scopes it is important for the teacher to familiarize students with its parts and use. The scope works basically like those used in school science laboratories. Since many students have very little access to such instruments this may be their first experience with their use. It is extremely important that students understand the function, proper use of, and the sensitivity of the MAGISCOPE before coming to the Santa Rosa Plateau Ecological Reserve.

Activity:

1. Students work individually or with partners on the worksheet provided.
2. The worksheet is a diagram of the MAGISCOPE, steps to proper use, and the description and function of each of the parts.
3. Along with the worksheet is a cut-and-assemble scale diagram.
Worksheet #4

MAGISCOPE

NAME____________________________________PERIOD_______DATE__________

Vocabulary:

optical tube---long tube that connects the eyepiece with the objective
objective---the part of the microscope that focuses and magnifies the
object to be viewed
stage---the part of the microscope that holds the object (on a slide) to be
viewed specimen---the object that is viewed in the microscope
arm---the part of the microscope that connects the optical tube to the
base
lens---the glass part of the objective and eyepiece that bends the light
entering the microscope for focusing and magnifies the object
eyepiece---the part of the microscope at the top that you look through to
view the specimen and magnifies the object
microscope---a scientific instrument used to view objects or parts of
objects that are too small to be seen with the naked eye
slide---a glass or plastic on which objects are mounted to view under a
microscope

Label the parts of the Magiscope:
MAGISCOPE DIAGRAM

Cut-and-assemble instructions

1. Cut out each part along the outside dark lines. Make sure to keep lines straight.

2. Fold Arm along fold lines.

3. Insert Tab 1 into Cut 1. Tape securely.

4. Roll optical tube into a cylinder. Tape securely.

5. Insert Tab 2 into Cut 2. Tape inside Arm.

6. Insert Tab 3 into Cut 3. Tape securely. Tape outside flap of Arm to Arm.

7. Fold base as if you are making it into a box, making sure drawn Base is on outside.

8. Insert Tab 4 into Cut 4 and Tab 5 into Cut 5.

9. Fold Base, insert Tab 6 into Cut 6, and insert Tab 7 into Cut 7.

10. Attach Tab 10 to opposite edge of box. Tape edge securely.

11. Attach top of arm to hole on top of arm so that the optical tube is held in a vertical position.
The Santa Rosa Plateau Ecological Reserve is a natural haven for the preservation of many plants and animals that once covered the Southern California landscape. Established between the years of 1983 and 1991 as a cooperative effort between Riverside County, the State of California, the Metropolitan Water District, the United States Fish and Wildlife Service, and The Nature Conservancy the plants and animals of the plateau are being sheltered from the encroaching human population around it. Today it retains its breathtaking view of the San Bernardino mountains and yearly has a profuse growth of wildflowers, such as these tidy tips.

A walk through the reserve will expose you to five distinct and overlapping communities of plant life. The Riparian habitat with its yearling water supply is lush and green with large pools called tenajas, a Spanish name meaning tanks. The cottonwood and oak trees adorn the banks of the clear water. Trees shade the rocks and pools making a perfect setting for the growth of arrowhead and lacy ferns. In the fall, the colors of the deciduous trees, such as sycamore, bring on the changing season and mark the start of the rainy season.

The winter rains fill the tenajas allowing the growth of spring flowers such as the scarlet monkeyflower and snapdragons. Newts and frogs are plentiful when the waters are high. A common inhabitant of the riparian habitat is the two-striped garter snake. It takes advantage of the large population of newts and frogs for food.

The deep tenajas of spring harbor the growth of such semi-aquatic and aquatic plants as Miner’s lettuce, cattails, watercress and nasturtium. The parasitic plant called Mistletoe takes advantage of the abundant water supply in a sycamore tree. A non-native species, the bullfrog from Southeastern United States has almost eliminated the native population of frogs. Introduced many years ago this bullfrog has become an ecological disaster in all the aquatic habitats on the plateau. As spring changes into summer the riparian habitat dries to a rocky and grass-covered area supplied by a stream found just under the surface of the creek bed.

A second aquatic habitat is the vernal pools. Created by the collection of rainwater on top of impervious volcanic rock, these pools slowly dry and create rings of colored wildflowers that bloom throughout the spring and early summer. At one time hundreds of vernal pools spotted the landscape of California. Agriculture and urban growth have eliminated most of them. There are thirteen such pools preserved at plateau on the Mesa de Colorado and Mesa de Burro, as well as vernal streams.

As the pools dry in the summer a bright display of wildflowers mark the boundaries of the pools. Buttercups, meadowfoam, Brodiaea, Downingia and blue-eyed grass form the circles of color. Insect life is abundant in this
springtime pool. Very common is the dragonfly. Dragonflies lay their eggs in the still waters where the larvae hatch and feast on other insect eggs, small vertebrate eggs, and small insects. Migratory birds visit the plateau during the wettest part of the spring to take advantage of the abundance of food.

Personnel at the reserve are working to preserve many rare and endangered species from extinction. Once widespread, the Mariposa lily, Chocolate lily, Owl’s clover, and Orcutts grass are making a comeback. Unfortunately, non-native species such as the Broadleaf Plantain have maintained a strong foothold since livestock were first introduced to the plateau. In time, with good management, the vernal pools will host the diversity of native plants it once had before non-native species were introduced.

Aside from the almost purely aquatic habitats are the three others that blend all the habitats into an interactive ecosystem, Oak woodland, chaparral, and grassland. Poison oak canyon is one blended community of riparian and oak woodland. Named for its predominant plant species, poison oak, the canyon shelters an array of plants common in moist riparian habitats. Common in sparse woodlands is the tick. These tiny parasitic spiders attach themselves to warm-blooded animals and feed on blood. Draped majestically throughout wooded areas one can find spider webs of all shapes and sizes. The spiny spider weaves a delicate trap for its prey.

The most distinctive oak woodland is created by the Englemann oak. Named after a German physician, the Englemann Oak was on the verge of extinction before a concerted effort was made at the plateau to preserve it in one of its last natural habitats. The gnarly bark of the old Englemann can serve as home to a variety of insects. On occasion, a fungus with its fruiting body, the mushroom, takes advantage of the cool, moist shelter beneath the bark. Other fungus set up residence in the nutrient-rich ground cover just beneath these huge trees. There are actually three distinct species of oak growing on the plateau: the Englemann oak, the coast live oak and the scrub oak. Each of these oaks has a definite leaf pattern that distinguishes them apart. Of course, there is no escaping Poison oak, which is not really a true oak. This one is in full flower in early spring. Note the three leaves attached together—a sure sign of this very poisonous plant that causes severe skin rashes on many people. The Englemann Oak, seen on the left and the Coast Live Oak seen on the right have actually begun to interbreed forming a hybrid, in the middle. In time perhaps a new species will emerge. Seeking the cool shade and moisture of the woodland, the Woodland star can be spotted in spring flower throughout oak woodlands.

Another transitional but distinctly different habitat is the open grassland. The natural grassland plays host to a variety of native and non-native plant species at the plateau. Cow clover is food for deer and other large herbivores on the plateau. Fiddleneck or Forget-me-nots blanket the edges of the grasslands bordering rocky and woodland areas. Run-off from the rocks allows more water for these plants. A beautiful and splendid flower is the Shooting
star. Its vibrant color and peculiar petal shape make this flower a must to see in early spring. This plant can also be bought for backyard use to reestablish as native. Look closely within the bunch grass and you will spot the delicate pink Mariposa lily. Beware the Bull thistle. Its spines are tough and attach themselves to any moving body to help disperse the seeds.

Grasslands are a wonderful hunting ground for predatory birds such as this immature golden eagle. Red-tailed hawks also take advantage of grassland openness to spot and attack their prey. Birds are not the only creatures in flight over the abundant wildflowers. Butterflies are bountiful in early spring. Watch out ground squirrel. Butterflies won't eat you, but the hawks will.

Grassland transition into the most dominant of the habitats, the Coastal Sage and Chaparral. The dry, hot climate of summer months in Southern California are perfect for chaparral habitats and the organisms that inhabit them. They are uniquely adapted to the lack of water during the summers by going dormant to preserve energy. Although you might think the cactus is only found in desert habitats, Prickly pear cactus can be found over the entire landscape of the Santa Rosa Plateau. More common is manzanita, a large bushy tree with dark red bark. Juniper and chamise in bloom are also abundant. White sage, with its strong distinctive aroma, proliferates. Native Indian tribes used sage as a medicine to treat asthma and colds and in ceremonial rites. Edible fruits are common. While walking the Adobe Loop currants, elderberries, gooseberries, and Himalayan blackberries, a non-native plant are found within thickets.

The wildflowers of the grassland are no comparison to those in chaparral. The Mexican pink desert flower bursts open on tall stalks. A small flower, the Johnny-Jump-Up is a relative of the violets we grow in backyard gardens. Look close to the ground. There, vining around grasses and herbs is the wild pea. This legume is a popular source of protein for rodents and large herbivores. Although this mule deer is curious about the human inhabitants of the plateau, its preferred trails weave through chaparral, grassland and woodlands.

Buckwheat, fringed spineflowers and pentstemon reach for the sun on the Punta trail. A non-native plant introduced by European settlers, the horehound mint, was also used as medicine.

The reptiles and insects found in both Chaparral and Grassland habitats are uniquely adapted by coloration, behavior, and abilities. The Diamondback rattlesnake, camouflaged by blending into the ground cover, is not easily recognized until its rattle cautions you to stay away. The Alligator lizard, a fierce predator and master of camouflage, is one of the the few creatures that feasts on black widow spiders. Watch out for this predator. The scorpion is swift and deadly.

A large bird called a Thrasher rests high on a favorite perch.

Adapted to any habitat, including human, this coyote surveys the chaparral. A little understood predator, the coyote is vital to the ecosystem of
the plateau.

The ever present Southern California fires have forced native species of plants to develop some unique adaptations to intense heat. Therefore, the plateau management uses fire every year to help reestablish the native plants and eliminate non-natives. The native vegetation responds to intense heat from fires by germinating. Engelmann Oak seeds burst open and begin to grow after intense heat from fire. Although the grasslands and chaparral appear destroyed immediately following a fire, the grass respond by crown-sprouting and growing more vigorously. Many wildflowers, such as this Bleeding heart, require fire to grow. Because of this fire management strategy, many native plants are replacing the introduced non-natives and returning the plateau to its natural diversity and appearance before European settlers.

One cannot ignore the affects of European settlers to the area. Most attempted to farm and raise cattle. Californians of Spanish descent, the Machado family, built the adobe houses still standing today. The settlers led a very hard life with a meager amount of furniture for daily life.

The native plants today have almost replaced the corrals of yesterday at the Santa Rosa Plateau. Cattle still roamed the grassland up until very recently. Their affects on the native habitats are questionable. However, 1989 marked the end of free-roaming cattle on the plateau.

The absence of cattle and the ruderal way of life has dramatically affected the restoration of diverse habitats and the resurgence of native plants such as the Mariposa lily and the California peony. In a relatively short period of time the Santa Rosa Plateau Ecological Reserve has emerged as one of the most beautiful examples of native Southern California landscaping.
ACTIVITY #8

Common Footprints

Objectives: 1) to familiarize the students with commonly found animals and the prints they leave in the soil
2) to teach students observational skills and classification skills.

Materials needed: plaster of Paris or footprint mold plaster, water, small containers to stir plaster, stirring tools, small paint brushes, newspaper Animal Tracks of Southern California by Chris Stall, and Animal Tracks of Southern California poster, and Worksheet #5 (duplicate one for each student)

Vocabulary:
  track
  imprint

Educator background:

Often evidence of animals can be found right under your feet. This activity is set up to help students learn to be observant of things on the ground and to learn to classify organisms. The book enclosed in the study kit by Chris Stall, Animal Tracks of Southern California, can be used to help identify the footprints the students find during their visit to the Reserve.

Activity: DAY ONE at the Reserve

Students will work in groups of four. Each group is to find two or three different prints.

1. During the trip to the Reserve students are to search for footprints in the soil while walking the grounds. The teacher will bring the needed materials for the print-making. Therefore, students must carry the plaster of Paris, water, containers and stirring tools to make the casts.
2. When a good footprint is found carefully mix the plaster and pour into the print. Mark the print with a pile of rocks to identify when you return.

3. Allow the plaster to dry, about 20 minutes, before removing the cast. Students will continue trail hike in area until cast is dry.

4. Carefully lift the cast from the print and brush off any extra dirt and debris.

5. Carefully wrap the cast in newspaper to take back to the classroom. Place print in a backpack to carry back to school.

   DAY TWO back at school

1. Students remove the casts from the newspaper.

2. Students clean off the casts again with the paint brush and a damp cloth.

3. Students draw the shape and size of the print on the worksheet.

4. Students compare the print to those in the book by Chris Stall and identify the animal that made the print.

Optional:

5. Students may paint the prints and varnish them. Print displays make an excellent addition to the classroom.
Worksheet #5

Common Footprints

Name__________________________________________ Period____ Date__________

You will be identifying the animals that have left footprints at the Santa Rosa Plateau Ecological Reserve. During your visit to the Reserve you made casts of each of two or three different animals.

Using the guide, draw and label the prints that you made at the plateau below:

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Questions: Answer on a separate sheet of paper.
1. Are your prints from an animal that is a mammal, reptile, bird, amphibian, or fish?
2. How large do you think the organisms are?
3. Did your print match the print in the guide book? What was different?
4. In what habitat were the prints found?
5. What are the distinguishing features of the prints?
ACTIVITY #9

Native Plant Seed Germination and Growth

Objective: to grow and learn to identify native plants in the wild at different stages of growth.

Materials needed: small planters for students, potting soil or seed starter cubes, water, open window sill or cupboard, native plant seeds (Dodcatheon clevelandii, Sisyrinchium bellum, and Eschscholzia californica) worksheet #6 (duplicate one for each student)

Vocabulary:
- sprout
- perennial
- seed
- annual
- nutrients
- dormant

Educator background:

You have experienced with the videotape presentation and your visit to the Reserve a wide variety of native plants growing and being nurtured into growth by the management practices of the Reserve. These native plants, when naturalized, can become a beautiful addition to a school environment. The study kit provides three types of native seeds that grow at the Reserve and can grow at other locations throughout Southern California.

Seed packets of plants that grow naturally on the Reserve are provided in the study kit. Use only one packet for your classes. Materials for the activity can be found easily at any nursery or you can utilize emptied and cleaned plastic yogurt containers provided in the kit as the pots, with holes placed in the bottoms. Potting soil is the best material to use for seed starter.

Since native plants have a shorter growing season than commonly found
nursery plants, you should be able to see the full life cycle of the plants during the school year.

Activity:

You will be growing plants in the classroom and observing them throughout their growing season. This activity may take several weeks to complete. It works well when integrated with a botany or other environmental unit.

1. Prepare containers for planting seed by thoroughly washing, scrubbing, and rinsing with warm water. Dry overnight.

2. Fill pots with soil to within 1/2 inch of edge. Sprinkle four or five seeds per inch of surface soil. Lightly cover with soil. Seeds are tiny. Do not cover too deeply.

3. Place pots in a sunny location until the seeds begin to sprout. Make sure you keep the soil damp, but not wet or soaked. (Note: If you choose to seed the flowers directly outside, simply scatter seeds in a sunny location, water, and follow the directions below.)

4. Observe the seeds daily and draw the new sprout when it appears. Make sure you pay particular attention to the leaves.

5. After the seedlings have begun to grow, water only enough to dampen soil. Do not overwater.

6. When seedlings have produced several leaves, but no flowers, make another sketch. Continue watering periodically to avoid wilting.

7. When plants have begun to produce flowers/fruits/seed, make another sketch of the adult plant. Again, pay particular attention the leaf shapes and sizes. Draw the flowers and seeds accurately. Plants can be transplanted into a garden spot before the fruits/seeds appear.
Be especially careful; wildflowers are sensitive to transplant.
**Worksheet #6**

**Native Plant Seed Germination and Growth**

Name_________________________________________ Period______ Date________________

You will be planting and observing the growth of native California flowers that you have the opportunity to observe at the Santa Rosa Plateau Ecological Reserve.

Day 1: Preparing for the seeds. Wash pots.

Day 2: Fill pots with soils to 1/2 inch of edge. Sprinkle four or five seeds in the soil. Lightly cover with soil. Do not cover too deeply. Place pots in sunny location. Make sure to keep the soil damp, not soaked.

Daily: Observe seeds daily and water when necessary. When first sprout comes up draw it below. From now on, water only when soils dries out on surface.

Make another sketch of plant when there are several leaves present.

Make another sketch of plant when flowers/seeds begin to grow.

Transplanting should be done before flowers appear.

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Sprout Diagram, with leaf

Sprout, with several leaves Diagram

Plant, with flowers/seeds Diagram
Question

1. How long did it take for the seeds to sprout?
2. How did the shape of the leaves change from sprout to adult plant?
3. How many of the seeds grew that were planted?
4. What was the percentage of seeds germinating?
5. Why is it beneficial to plant native plants in Southern California?

Optional

Take a walk around your school and neighborhood and look for these native plants growing. Where are they growing?
Activity #10

**Local Involvement**

Objective: 1) to make students aware of the local organizations and public agencies that regulate the natural environmental
2) to familiarize students with the reporting of environmentally important issues in the local newspapers.

Materials needed: local newspapers, magazines, and telephone books

Vocabulary: none

Background:

Now that the students have visited the Santa Rosa Plateau Ecological Reserve and learned about the sensitivity of the organisms living there, it is important for them to be aware of the political processes and agencies that have a direct influence on the Reserve as well as other local, state, national, and global natural areas. Students can find a wide range of information in their local newspaper about the most recent political action and topics of interest in regards to preservation of natural habitats. They can also find the names of agencies, names of people, names of organizations, and their locations in the local telephone book.

Activity:

1. Have students bring in recent newspapers and magazines. You may want to have your school librarian save several weeks of newspapers.
   Sometimes the local newspapers will provided free copies for school activities.

2. Collect several local telephone books, such as the Los Angeles telephone book that have several pages of government agencies listed.

3. Students should browse through the newspapers to get an idea of the local,
state, national, and global environmental issues.

4. Have students choose an issue from the news, preferably a local issue, that concerns them. Avoid letting students choose issues that have been debated for long periods of time, such as whale hunting or dolphin-free fishing nets.

5. Students should list the government agencies and public officials that would have an influence on the decisions about their issue.

6. Students will
   a) write a letter for information,
   b) make a phone call for information,
   c) visit an agency or public official to ask for information, or
   d) appear before a city council or other government body to seek information on an environmental issue being discussed

In each case the students need to request a written answer, if possible, concerning their environmental issue.

Discussion: Students will discuss their results and list questions for future information to be received.

The benefits:

If there is a local issue that students have become involved in during the course of these lessons they can continue to research and pursue the information they need. This involvement provides a personal and up-close experience for students in our governmental system, in different sides of an issue, and in how decisions are made about environmental issues.
ACTIVITY #11

Assessment Activity

Objective: To present a student-directed summary of the important information they learned about the Santa Rosa Plateau Ecological Reserve

Materials needed: shoe boxes, construction paper, scissors, markers, plant materials, soil, rocks, poster board

Vocabulary: to be derived from all previous information

Background: none

Activity: Students are to develop one of the following assessment demonstrations.

1. In a group of six students develop a diorama or panorama picture and commentary on their favorite habitat and make an oral presentation.
2. In a partnership students develop a display of the major organisms that interact in a food web within one of the habitats and make an oral presentation.
3. In a group of six students develop a game, matching the animals and plants to their habitats and make an oral presentation.
4. In a partnership students develop a display showing the edge effect on the vernal pools habitat and make an oral presentation.

Discussion: Students make their oral presentation while the class critiques their effort for content, content accuracy, and creativity.
APPENDIX B

Questionnaire: Robin Wills, Reserve Manager June 1993

1. Describe the format of the docent narrative that you would like to hear?

   Opening: Simple history of the plateau and explanation of why it exists.
   Narrative: Discussion focused on process and not objects. Narrative should be structured around plant community types and appropriate for sites all over the reserve. Interpretation should concentrate on ecosystem function and environmental processes.
   Closing: Collate concepts with the plateau as a focus. Emphasis should be placed on the reserve as part of a larger biological network, explaining how individuals, populations, and landscapes function together in a working system.

2. What conservation methods would you like to emphasize in the narrative?

   Prescribed fire management
   Exotic species control
   Ecological restoration

3. What ecological theories and ideas would you like to emphasize in the narrative?

   Disturbance ecology
   Population dynamics: predator-prey relationships
   Earth processes: flooding, drought, fire
   Biodiversity: biological fabric

4. What conservation methods and concepts would you like to see explained in a classroom learning kit for elementary age students?

   Role and use of fire in plant communities management
   Exotic species control: why is it important

5. What conservation methods and concepts would you like to see explained in learning kits for secondary age students?

   Ecolgocal monitoring and experimental design
   Biogeography: how the size, shape and location of reserves effect their success.

6. What specific information about the management of the Santa Rosa Plateau would you like to see explained in the classroom learning kits?
A detailed explanation of fire effects in several plant communities would go a long way to developing a strong understanding of ecosystem function and conservation methods in the students. There is a tremendous need to instill in the students an understanding of the dynamic nature of ecosystems. The landscapes that we value are the result of a process and maintenance of that process is essential to successful conservation. There is much specific information available on fire effects (I would be happy to provide to you). Following the progression from individual plant impacts to the larger community level role of disturbance will be quite effective in relating difficult ecological concepts.

7. Describe what your duties are at the Plateau?

My main function on the plateau revolves around protecting the biological integrity of the reserve. I conduct all the biological monitoring and specific experimentation. I then develop the management plans that detail how to appropriately protect the biological resources of the reserve. I function as a scientist, then a manager, though I still have the responsibility of paying the bills and signing time sheets.

8. What makes your job unique and challenging?

My job combines a unique combination of specific research and direct management. I not only try to answer research questions, but in addition develop the technologies to implement results. My job is additionally, complicated and enriched by the huge number of rare and endangered species on the reserve.

9. What state, local, and federal agencies are involved in the running of the Santa Rosa Plateau?

The Nature Conservancy
The U.S. Fish and Wildlife Service
The California Department of Fish and Game
The Riverside County Parks and Open Space District
The Metropolitan Water District

10. Who makes the final decisions about the use of the Santa Rosa Plateau?

The reserve management committee which has representation from all of the above mentioned organizations and agencies.

11. Are there any plans to expand the Santa Rosa Plateau Reserve?

Yes, acquisitions of adjoining properties are hoped for. Also a larger bio-
reserve connecting the Plateau with the Cleveland National Forest and Camp Pendleton has been initiated.

12. What do you consider the most important concept we need to teach students about the management of the Santa Rosa Plateau? How would this concept apply on a global scale?

The dynamic nature of ecosystem. The critical importance of maintaining ecosystem function on a large landscape level.
APPENDIX C

Interviews

Santa Rosa Plateau Ecological Reserve  June 27, 1994

Name: Robert Tissell, docent

1. When did you get involved with the Reserve?
   1982 began

2. Where did you grow up?
   Raised in Seattle

3. What are some of the things students don't know much about?
   No answer

4. Are there any particular behaviors noticed?
   Students are not well versed in how to behave out of doors, i.e staying on the trails, outdoor etiquette, picking up the frogs and snakes, don't think about going up to water and throwing rocks in the water.

5. Is there a need to teach outdoor etiquette?
   Can be taught at plateau

6. Do you see many older students?
   Junior high and senior high don't come much with family.

7. What age were you first interested in the environment?
   Age of nine. Went for first hike with father, a special studies, nature club at grade school where stayed at school and used microscopes. Pacific Science center built for world's fair was an influence. Learned about science in a fun kind of way.

8. Did you maintain interest during teens?
   Yes

9. Anything more to add?
   Worked at nature camps. First job in CA worked at youth camp at Lake Arrowhead. That was a major change in outdoor. Added a whole new aspect.

10. Any particular way you relate to kids?
I like to present them with questions and situations. Try and involve them in the sensory experience. Taste the plants and feel stems and smell the smells.

**Name: Charlie Au, docent**

1. When did you get involved with the Reserve?

   I've been a docent for two years. I came to visit, to bicycle through the plateau.

2. How often do you do your narratives?

   During the spring we go three times a week.

3. Any particular behavior or questions by kids that surprise you?

   They seem to relate the plateau to the things they are studying at school. Like to share information.

4. Do teachers only provide one-day excursion?

   Yes. But only about one-third of teachers have prepared students.

5. Is there a need to provide information on proper behavior?

   Yes, can reinforce our teaching

6. Any specific behaviors?

   All are fascinated at squirrels and the ponds. They may have read about them but haven't taken the time to observe them.

7. Would it be a good idea for student docents?

   Yes. Some older children could pair with older and younger children. Some children have a lot to share with younger students. Can help the helper students. Can use community hours.

8. When did you get involved in the environment?

   We were always going on walks in upper New York state. Never lost interest, sometimes didn't have time.

9. Anything to add?

   Special Education classes can get something out of the plateau. There are physical restrictions.
Name: Leo Au, docent
husband to Charlie

1. How long have you been involved with the Reserve?
   Two years as docent

2. What kinds of guides do you do?
   Conducts only grade school kids

3. Anything that surprises you about students that they don't know about nature?
   I am surprised they know so much.

4. Any behavior problems?
   They behave very well. Even non-speaking English students enjoy the area and are well behaved.

5. Anything you would like kids taught before coming?
   NO. They can learn more and enjoy it more. A follow up would be better.

6. When did you first get interested in environment?
   In college in Montana, Bozeman. Living up there it was so easy to become interested in nature. I have built on that and am painting. Had interest in hiking when a kid. Went backpacking in Sierras.

7. Anything you would like to teach kids in the classroom?
   I think I'd have the children write briefly about the visit and describe what they have seen. It will help them improve their memory. That will also help us improve our techniques.

8. Do you notice kids don't have good observational skills?
   Undoubtedly.

9. Do classes come back more than once a year?
   Yes, there are several teachers that bring the kids in the fall and the spring. It is a good idea because they can see different things each time they come.
Name: Carol Scott, docent

1. When did you first get involved with the Reserve?
   Started in 1982

2. How often do you give tours?
   At least 2 to 3 times a week

3. When were you first interested in environment?
   In high school, biology class. I had a good teacher. Interest grew from there.

4. Do you get your own kids involved?
   Yes.

5. What do you find kids don't know about?
   They have unrealistic idea of kinds of animals, like bears, and lions, found in the Reserve.

6. Any behaviors noticed?
   Depends on the teacher.

7. Do teachers prepare kids?
   Most of them do.

8. Is there anything you would like kids learn before coming?
   A little more patience, more etiquette. They are really anxious. Their observational skills are lacking.

9. What would you like them to do afterwards?
   Being interested in writing would be good. Describe a life cycle.

10. Is there anything else?
    I shared the experience of the plateau with a blind girl. She came and was helped by other students, she was very vocal and very willing. She adapted so well to the environment.
Name: Deborah McGowen, docent

1. How long have you been a docent?

   Eight years

2. How long have you been interested in the environment?

   From school when nature movement started in high school. My father was a forest ranger. He had a little influence.

3. What do you get surprised about in behavior or questions by kids?

   Every group is different. Only one or two obnoxious in any group. They are here to learn. It takes them about an hour before they loose their attention span. I let them run back to the bus.

4. Have you found few observational skills?

   I have been fortunate. Their teachers have prepared them.

5. Do most teachers prepare their kids?

   Most do.

6. What do you think would be helpful?

   The dangers are usually the problem. Make them aware of the dangers like poison oak and snakes. Rules and regulations are the first thing we go through.

7. Is there any thing you would like kids to learn after going back to school?

   Simple ecology, learning about the basic survival instincts. Learn that changing the location is very hard on an animal.

8. Anything that you would like to see in the study kit?

   Great little games that teachers can do with kids.---educational games like in Project Learning Tree.

Name: Gordon House, docent

1. When did you become involved with the plateau?
Since day one—since 1984 them years ago. I lived in the area since 1945 and visited Vail Ranch manager.

2. How often do you speak with students?

I do a narrative 3 to 4 times a week with Carol Scott.

3. Is there anything in children that surprises you about their knowledge of nature?

They totally depend on the teacher. The younger children have more enthusiasm. Some kids in older age group think it is neat.

4. Do they have good observational skills?

Some have very good skills.

5. Would it be useful to learn skills before coming to the plateau?

Yes, some teachers would find it useful. Some don't want to spend their time preparing. We haven't had very many students beyond fourth grade. It would be useful to speak in general terms about biology.

6. Do you cover geology?

Yes, Nancy (Backstrand) and I do.

7. Anything in particular you would like taught before the students arrive?

What is the purpose of a preserve? This is not a park. This is a place to preserve animals. People are allowed out here so long as they don't endanger the animals. My son teaches fourth grade and he does a good job of educating the kids.

8. Anything else you would like to say?

Must teach that this is not like home. Kids are uncomfortable at first. Kids will ask if I am sure I know where I am. Kids want to see an animal. They must come early in the morning. Mountain lions are still around.

Name: Nancy Backstrand, Docent Coordinator, July 6, 1993

1. Could you give me some history of your involvement and the reserve?

I began running the program since 1984, under the management of Tom
Griggs. Gary Bell cam after Tom Griggs. He was a botanist, and Tom was a biologist.
The Nature Conservancy lost interest in the plateau when the new piece of land was added in 1989. The county took over the interpretive program when Robin Wills became the next manager. All the trails have to be okayed by him.

2. Do you find it rewarding?

The rewards for the docents is knowledge. Teaching people to understand the environment the docents are environmental educators. Docent mean to teach.

3. How does a docent differ from an interpreter?

An interpreter puts a slant on what you are teaching. You are not just giving the facts.

4. What is the relationship of the adobes to the reserve?

The historic area is very important to understand the relationship of man to nature. The restoration of the adobes or a picnic areas for classes is very important. The little adobe is very likely the first one built by Juan Moreno in 1848 who receieved the land in 1846 by Pio Pico. Juan Moreno was the son of a couple that came from Mexico to be the first settlers of Los Angeles. His mother was the first survivor. The Juan Moreno family was promised 40,00 acres to use for farming. Soldiers were the largest land owners in the area---Ortegas, Yorabas, and the Machados---became the wealthy land owners.

Name: Jan Young, Riverside County Parks and Recreation, July 23, 1993

1. What is the educational process of the plateau?

Usually a docent is a guide or museum guide in a formal structured museum and carries over into outside environment. Basically a docent leads a tour and interprets. The most obvious difference is a docent is a volunteer and an interpreter is apaid position. Both use basic interpretive skills and techniques. Docents do ultimately what is an interpretive activity. Interpretation basically leads to provocation, and ultimately to action. You want people to learn more and to investigate for themselves and take action, move them off their comfort zone of listening into doing.
An environmental educator is not necessarily an interpreter, but an interpreter is an environmental educator. The interpreter is a broader description. The interpreter is a naturalist, environmental educator, and historic narrator. We basically speak the language of nature and interpret what we are seeing and what is happening to the putting in words so that the public can understand it. And, thereby appreciate it and hopefully develop an ethic with our slant of being a “good steward” of our environment.
APPENDIX D

Plant Specimen Labels

Plant Specimen #1

Johnny-jump-up

Viola Pedunculate

This small, delicate flower blooms in grassy areas of the Santa Rosa Plateau throughout February to April of each year. It can be found along several of the reserve trails including the Granite Loop, Trans-Preserve Trail, Vernal Pool Trail, Vista Grande Trail, Punta Mesa Trail, and Adobe Loop Trail.

Plant Specimen #2

Shooting Star

Dodecatheon clevelandii

This unique flower that looks much like a rocket can be found blooming in grassy, damp areas throughout February to April. Because of its requirement for damp soils it usually is found around the Vernal Pools and along the Adobe Loop Trail.

Plant Specimen #3

California Poppy

Eschscholzia californica

Recognized as the state flower this bright orange flower can be found in bloom throughout most of the year during February to September on grassy slopes and float dry areas. This flower responds to fire with a profuse display the following season. It is easily recognized at night when its petal close tightly.
Plant Specimen #4

**White sage**

*Salvia apiana*

This shrub is one of the most common in the Chaparral, Coastal Sage, and Oak woodland. It blooms from April to June with blossoms made to attract the bees.

Plant Specimen #5

**Chamise, Greasewood**

*Adenostoma fusculatum*

This rather large and abundant shrub with its evergreen needle-like leaves is a dominant plant of the Chaparral and Coastal Sage. It can be found blooming from April to June.

Plant Specimen #6

**Baby Blue Eyes**

*Nemophila mensiesii*

This small blue flower can be found blooming from February to June in grassy areas of the Oak Woodland and Chaparral.

Plant Specimen #7

**Harvest Brodiaea**

*Brodiaea jolonensis*

This rare and tiny blue flower blooms throughout February to May in dry clay soils in grassy slopes and on the fringes of the Vernal Pool as they dry up in late springtime.
BIBLIOGRAPHY


