



Birds, People and the Santa Cruz River



A Seventh Grade Teacher's Guide

P.A.R.K.S.

Parks as Resources for Knowledge in Science

Birds, People and the Santa Cruz River

A Seventh Grade Teacher's Guide

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U.S. Fish and Wildlife Service

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Note about this Guide

This teachers' guide is available to schools, and for extended loan to all teachers in the following districts: District 35, Nogales Unified Schools, Little Red School, Patagonia, Sonoita, Sahuarita, and Continental Schools. Educators outside of this area may borrow the book at any time and photocopy all or part. Copies will also be distributed by Tumacácori National Historical Park for the cost of copying. For more information, please contact:

Tumacácori National Historical Park

P.O. Box 67,

Tumacácori, AZ 85640

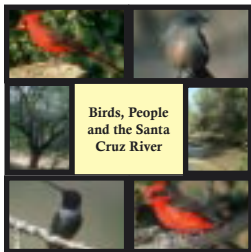
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BIRDS AND CULTURE

Students will analyze how historic cultures recognized and were influenced by birds through examining ancient art forms and creating their own motifs.

Page 1.1



TWELVE BIRDS OF TUMACÁCORI

Students will analyze bird species of the Santa Cruz River Valley classifying attributes of their habitats and physical characteristics of each species in activities that enable them to identify native bird species.

Page 2.1



FIELD TRIP TO THE MISSION AND RIVER

Students will analyze three historic cultures in Tumacácori National Park. They will discover how past and present cultures affect and impact bird habitat and local ecosystems, and how protection of the Santa Cruz river will ensure a healthy environment.

Page 3.1



RIVER ISSUES

Students will learn about specific issues relating to the Santa Cruz River, assert their opinion about each, and participate in a debate using knowledge gained.

Page 4.1



STUDENT JOURNAL

Students will complete this journal as part of the field trip to Tumacácori National Historical Park and the adjacent Santa Cruz River.

Appendix

Foreword

Tumacácori National Historical Park and the adjacent Santa Cruz River are historically, culturally and environmentally rich. While the area's history dates back to the prehistoric Hohokam people, present archeological evidence reveals O'odham and Spanish mission communities spanning over three hundred years. Apart from human habitation, the park and its environment provide an oasis for wildlife, particularly birds, in an otherwise inhospitable desert. The river and its associated Southwest Cottonwood-Willow Riparian Area is one of the most endangered ecosystems in the United States at this time. It hosts over 200 species of birds, and serves as an important corridor for neotropical migrants including the Lazuli Bunting, Yellow-billed Cuckoo and the Southwest-Willow Flycatcher.

When first defining goals and objectives for the 7th grade curriculum, we discussed ways in which students could learn about and appreciate the historical/cultural site and environment. Essentially, how could we marry culture and environment with the ultimate goal of stimulating the students' appreciation of and eventual stewardship of the area. After numerous meetings and field tests, we developed the current program and teachers' guide.

Although many lessons from this guide and field trip can be used as stand alone activities, completion of pre- and post-classroom activities is essential to integrating science, history and social science standards, goals and objectives.

In lesson 1 classroom activities, students learn about how different cultures have interacted with their environment. How did they view and utilize the land, wildlife and, specifically, birds? How has the environment influenced their culture to become what it is today? How is the environment integrated into art and ceremony?

Lesson 2 classroom activities instruct students in birding basics, including identification techniques, beginning ornithology, and common species identification.

Once prepared in the classroom, students visit the park and adjacent river area as described in lesson 3. During the field trip they learn to use binoculars and identify first-hand many of the birds they learned about in the classroom. In an Indian house or "*Ki*" they explore O'odham and Apache cultures and complete a journal activity from the point of view of a Native American. They then tour the mission and repeat a similar exercise from the viewpoint of a missionary while sitting in the Franciscan church. After lunch, students walk to the river, observing and learning about how American culture interacted with the environment. The field trip ends at the river with students individually sitting along the shady banks and completing an exploratory journaling exercise entitled "Journey to the heart of the Santa Cruz River."

The last unit of the study, lesson 4, looks at student viewpoints and current issues affecting the river. Students explore contemporary attitudes about the area from their own perspectives as well as those of diverse user groups such as environmentalists, developers, all terrain vehicle riders, picnickers and hikers. Each user group's position is then role played as students attempt to come up with a win-win management plan for the river and its surroundings.

The ultimate goal of this guide and program is to get our local students to take notice of and experience their rich heritage and environment. Instead of going to Tucson or further destinations north, they discover the National Park, the river and the local beauty in their backyard. Hopefully, by learning about and visiting these rich sites, they will learn to appreciate and even love the area. Once they love it, they are sure to protect it!

HOW TO USE THIS GUIDE

LESSON OVERVIEW

A brief outline of the general theme and concepts as well as a description to help accomplish the lesson. It is useful for scanning different lessons.

Subjects

Lessons are primarily science or social studies related, though other disciplines may be covered (art, etc.).

Standards

National Standards will be listed here, while Arizona State Standards will be listed on Page iii

Objectives

Measurable student outcomes.

Preparation

Includes a list of materials and steps needed to prepare for the lesson.

Time

The estimated amount of time it will take to complete the lesson.

Vocabulary

A list of key or foreign words.

LESSON TITLE

TEACHER BACKGROUND INFORMATION

Useful background information to be read by the teacher prior to the lesson. It is not intended to be read by students.



Enrichment

1. Step by step instructions.
 2. Numbered and clearly written.
 3. Augmented by graphics and other useful information.
- Suggestions or other activities appropriate to further study lesson concepts or themes.
 - Located at the end of the activity instructions.

MASTER PAGES

Master Pages contain activities that are essential to complete the lesson. In most cases, they are student worksheets and will need to be photocopied. Sometimes a teacher copy is sufficient.

LESSON # - LESSON TITLE - MASTER PAGE #

STATE OF ARIZONA - SCIENCE STANDARDS

ACTIVITY	AZ State # 1 N.S.T.A. A SCIENCE AS INQUIRY	AZ State # 2 N.S.T.A. G HISTORY AND NATURE OF SCIENCE	AZ State # 3 N.S.T.A. F SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES	AZ State # 4 N.S.T.A. C LIFE SCIENCE	AZ State #6 N.S.T.A. C. EARTH SCIENCE
1. Birds and Cultures	1SC - E3, PO2			4SC - E1, PO3	
2. Twelve Birds of Tumacácori				4SC - E1, PO1/2/3 4SC - E7, PO1	
3. Field Trip to the Mission and River			3SC - E2, PO1 3SC - E4, PO1		
4. Santa Cruz River Issues			3SC - E1, PO1 3SC - E2, PO1 3SC - E3, PO1 3SC - E4, PO1	4SC - E1, PO1	6SC - E6, PO1/2

RESOURCES AND REFERENCES

BIRDS AND CULTURE

The Encounters Box, Teachers' Resource Box,
Tumacácori National Historical Park.

Indian Rock Art of the Southwest, Polly Schaafsma,
School of American Research, Univ. of New
Mexico Press, Albuquerque, 1980.

*Resource Utilization and Food Taboos of Sonoran Desert
Peoples*, Amadeo M. Rea, Journal of Ethnobiology,
Vol. 1, No. 1, University of Washington, Seattle,
1981.

Rock Art of the American Indian, Grant Campbell,
Promontory Press, NY, 1967.

O'ODHAM

A Pima Remembers, George Webb, University of
Arizona Press, Tucson, 1959.

Hohokam Arts and Crafts, Barbara Gronemann,
Southwest Learning Sources, 6440 Presidio Road.,
Scottsdale AZ 85254, 1994.

Of Earth & Little Rain, Bernard Fontana, University
of Arizona Press, Tucson, 1989.

Papago and Pima Indians of Arizona, Ruth Underhill,
The Filter Press, P.O. Box 5, Palmer Lake, CO
80133, reprinted 1979.

Pima Indian Legends, Anna Moore Shaw, University
of Arizona Press, Tucson, 1968.

Pima and Papago Indian Agriculture, Edward
F. Castetter & Willis H. Bell, Inter-American
Studies, Vol. 1, University of New Mexico Press,
Albuquerque, 1942.

The Pima Indians, Frank Russell, University of
Arizona Press, Tucson, reprinted 1975.

The Upper Pima of San Cayetano del Tumacacori,
Charles C. Dipeso, The Amerind Foundation,
Dragoon AZ, 1956.

APACHE

Indeh: An Apache Odyssey, Eve Ball, University of
Oklahoma Press, 1980.

The Apaches: Eagles of the Southwest, Donald E.
Worcester, University of Oklahoma Press, 1979.

The Apache Indians, Nicole Claro, Chelsea House
Publishers, NY, 1992.

The People Called Apache, Thomas E. Mails, BDD
Books, NY, 1974.

Western Apache Material Cultural, Alan Ferg,
University of Arizona Press, Tucson, 1987.

When The Earth Was New, Chesley Goseyun
Wilson, World Music Press, PO Box 2565,
Danbury, CT 06813, 1994.

TWELVE BIRDS OF TUMACÁCORI

Field Guide to the Birds of North America, National
Geographic Society, 1987.

Birds of North America, Golden Field Guides, St.
Martins Press, New York, 2001.

A New Focus on the Field Birds of North America,
Kaufman Focus Guides, Ken Kaufman, Houghton
Mifflin Company, New York, 2000.

Birds of the American Southwest, Lynn Hassler
Kaufman, Rio Nuevo Publishers, Tucson, AZ,
2000.

Field guide to Western Birds, Roger Tory Peterson,
Houghton Mifflin Co., Boston, 1990.

A Natural History of the Sonoran Desert, Arizona-
Sonora Desert Museum, University of California
Press, Berkeley, Los Angeles, London, 2000.

Watchable Birds of the Southwest, Mary Taylor Gray,
Mountain Press Publishing Co., Missoula, MT,
1995.

Easy Field Guide to Common Desert Birds, Richard
and Sharon Nelson, Primer Pubs., Phoenix, AZ,
1996.

*A Field Guide to Little-Known & Seldom-Seen Birds
of North America*, Ben, Cathryn and John Sill,
Peachtree Publishers, Inc., Atlanta, GA, 1988.

FIELD TRIP TO THE MISSION AND RIVER

A History of the Southwest and Arizona: A History,
Thomas E. Sheridan, University of Arizona Press,
1995.

Arizona's Changing River; How People Have Affected the

Rivers, Barbara Tellman, Richard Yarde & Mary G. Wallace, Water Resources Research Center, College of Agriculture, University of Arizona, 1977.

"*Human Ecology of the Sonoran Desert*," pages 105-117, *A Natural History of the Sonoran Desert*, Arizona-Sonora Desert Museum, University of California Press, Berkeley, Los Angeles and London, 2000.

Journey to the Heart of Nature, Joseph Cornell, Dawn Pubs, Nevada City, CA, 1994.

Seeds of Change, The Story of Cultural Exchange after 1492, Sharryl Davis Hawke and James E. Davis, Addison Wesley Pubs., 1992.

SPANISH

Kino A Legacy, Charles Polzer, Jesuit Fathers of Southern Arizona, Tucson, AZ 1998.

A Kino Keepsake, Friends of the University of Arizona Library, Tucson, 1991.

"CHANT," Gregorian Chant tape by the monks of Santa Domingo, Angel Records, 1993.

Entrada; The Legacy of Spain & Mexico in the United States, Bernard L. Fontana, Southwest Parks & Monuments Association, Tucson, 1994.

Sonora, Ignaz Pfeffercorn (translated by Theodore Treutline), University of Arizona Press, Tucson, 1989.

Friar Bringas Reports to the King, Daniel Matson and Bernard Fontana, University of Arizona Press, 1977.

Rules and Precepts of the Jesuit Missions of Northwestern New Spain, Charles Polzer, University of Arizona Press, 1976.

AMERICAN

Arizona: A History, Thomas E. Sheridan, University of Arizona Press, 1995.

Hispanic Arizona: 1536 - 1856, James E. Officer, University of Arizona Press, 1987.

They Lived in Tubac, Elizabeth R. Brownell, Westernlore Press, Tucson, 1986.

Tubac, Richard Wormser, The Tubac Historical Society, 1981.

RIVER ISSUES

A Sanitary Code, Rules and Regulations, Solid Waste, Chapter VII, pg. 140-143, Santa Cruz County Health Department, Nogales, AZ 85621, (520) 761-7800.

Divided Waters, Helen Ingram, Nancy K. Laney and David M. Gillilan, University of Arizona Press, Tucson, 1995.

Sonora; Its Geographical Personality, Robert C. West, University of Texas Press, Austin, 1993.

Water in the Hispanic Southwest, Michael C. Meyer, University of Arizona Press, Tucson, 1996.

Field Manual for Water Quality Monitoring, Mark K. Mitchell & William B. Stapp, Kendall/Hunt Publishing Co., Dubuque, Iowa, 1997.

OTHER USEFUL RESOURCES

Arizona Association of Environmental Educators (AAEE), (602) 786-9969.

Arizona Department of Agriculture, (520) 287-7887.

Arizona Department of Environmental Quality, (800) 234-5677.

Arizona Department of Health Services, (800) 221-9968.

Arizona State Government Water Resources, (520) 761-1814.

Arizona State Parks, Tubac Presidio State Historic Park, (520) 398-2252.

Friends of the Santa Cruz River, P.O. Box 4275, Tubac, AZ 85646, (520) 398-8269.

Household Hazardous Waste Program, Office of Public Works, Santa Cruz County, Nogales, AZ 85621, (520) 761-7800.

National Park Service, Tumacácori National Historical Park, P.O. Box 67, Tumacácori, AZ, 85640, (520) 398-2341.

Nogales Chamber of Commerce, Nogales, AZ 85621 (520) 287-6570.

Nogales Wastewater Treatment Project, 777 N. Grand Ave., Nogales, AZ 85621, (520) 287-6571.

LESSON 1

BIRDS AND CULTURE



Students will analyze how historic cultures recognized and were influenced by birds through examining ancient art forms and creating their own motifs.



1

LESSON OVERVIEW

Students will analyze how historic cultures recognized and were influenced by birds through examining ancient art forms and creating their own motifs.

Subjects

Science, Art History

Standards

Science as Inquiry

Life Science

Objectives

Students will:

1. Observe and trace bird motifs in various pictures of artifacts.
2. Theorize how cultures were influenced by birds by examining their symbolism.
3. Listen to bird stories.
4. Draw or create a model of a bird motif.
5. Discuss the influence and symbolism of birds on indigenous cultures.

Preparation

Make copies of bird motifs on **Master Page 1.5 - 1.8**; have available paper, drawing instruments, modeling clay (optional) and a teacher copy of historic bird stories on **Master Page 1.4**.

Time

Two 50 minute sessions

Vocabulary

archaeology, artifact, beak, claw, culture, motif, symbolism

BIRDS AND CULTURE

TEACHER BACKGROUND INFORMATION

Historically, humans have inhabited the Santa Cruz River Valley since the fourth century. Inhabitants of three recent cultures, the O'odham, Spanish-Mexican and American, have created impacts on nature that have been preserved and recorded. Each culture utilized the natural resources of the habitat in distinct ways and left evidence of their everyday lifestyles in the form of art, tools, burial grounds, village buildings and through altering the natural landscape.

As a result of human settlement on and near the banks of the Santa Cruz River, the habitats needed by resident and migratory birds have been altered, in many cases severely. Therefore, we ask the question: What impact has this had on resident and migratory bird species?

By looking at historic records and art we are able to discern which species of birds lived or visited the Santa Cruz River Valley. By observing birds

today, we can compare which species have persisted over time.

It would be speculation to say that past cultures appreciated and enjoyed birds the way we do today. However, archeological sites world-wide reveal a variety of bird motifs, in such forms as petroglyphs and birds etched or painted on functional tools.

In what ways were ancient cultures influenced or affected by natural bird populations, the number of species, their migration patterns, their songs, colors and flight? And in what ways have human cultures affected bird species?

Evidence of the influence that birds have had on humans is revealed in ancient Native American designs in which bird motifs reflect the importance of this magical creature which soared between man's world and the realm of the spirits. Bird species we continue to observe today are represented on Anazazi and

LESSON 1 -BIRDS AND CULTURE

Mimbres pottery, Navaho rugs, cave art and rock etchings throughout Arizona. These species include the Red-winged Blackbird, eagle, Great Blue Heron, Greater Roadrunner, Northern Cardinal, Vermilion Flycatcher, curlew and Turkey Vulture.

Other art forms such as stories, songs, dances and clothing also incorporate birds and demonstrate the effect and influence of birds on past cultures.

The Santa Cruz River valley is a long, narrow oasis in a otherwise dry, hot and inhospitable desert. Both humans and birds have sought refuge along the rivers edge where there is shade, water, food and shelter. The humans and the birds, who used the same environment, were bound to impact each others lives.



Part 1

Introduction to Bird Artifacts

1. Make copies of *Bird Motifs* on **Master Pages 1.5 - 1.8**, enough for one page per workgroup .
2. Use the examples of the copied bird motifs to discuss with your class how birds influenced people and how different cultures viewed birds. Augment the pictures with examples from other cultures and artwork. (See Resources)
3. Divide your class into workgroups and give each group one page, varied, from **Master Pages 1.5 - 1.8**.
4. Encourage students to make casual obser-

ventions of the bird motifs, just having fun looking at the different pictures.

5. Hand out tracing paper and allow time for each student to trace over a bird motif of their choice.



Part 2

Cultures' Relationship to Birds

1. Copy on the board or make an overhead of the following chart:

COMPARING BIRD MOTIFS

Species	Bird Parts	Symbolism

2. While looking at bird motifs on **Master Pages 1.5 -1.8**, brainstorm and list any recognizable bird species or parts of a bird in the appropriate columns. Then, write symbolism or meanings generated from your lists.

LESSON 1 -BIRDS AND CULTURE

3. Using the teacher key below, augment information already listed by students.

(teacher key)

Species	Bird Parts	Symbolism
<i>Crow</i>	<i>Feather</i>	<i>Tombstone</i>
<i>Raven</i>	<i>Claw</i>	<i>Wisdom</i>
<i>Comorant</i>	<i>Head</i>	<i>Truth</i>
<i>Eagle</i>	<i>Wings</i>	<i>Mystery</i>
<i>Hawk</i>	<i>Feet</i>	<i>Good/ Evil</i>
<i>Pigeon</i>	<i>Beak</i>	<i>Nature</i>
<i>Quail</i>		<i>Intelligence</i>
<i>Cuckoo</i>		<i>Angels</i>
<i>Falcon</i>		<i>Flight</i>
<i>Duck</i>		<i>Food</i>
<i>Owl</i>		<i>Adornments</i>
<i>Geese</i>		<i>Hieroglyphic</i>
<i>Vulture</i>		<i>National Icon</i>
<i>Ibis</i>		<i>Alphabet</i>
<i>Parrot</i>		<i>Legends</i>
		<i>Beauty</i>
		<i>Bravery</i>
		<i>Bad Luck</i>
		<i>Hunting</i>
		<i>Peace/ War</i>

Part 3

Creating Bird Motifs

1. Collect the handouts, (Master Pages 1.5 - 1.8).
2. Read stories related to birds (see Master Page 1.4), whenever possible integrating storytelling techniques.
3. Discuss and revisit symbolism as it pertains to the story.
4. Hand out colored pencils and paper, or modeling clay and ask students to create their own, original bird motif different from those on the handouts. Ask the students to keep in mind the symbolism of the motif they created.



*7th Grade Student Art
Calabasas Middle School*

4. Revisit the discussion (Part 1, #2) about cultures and birds. Can students augment information already discussed?

Enrichment

- Use replicas of artifacts instead of, or in addition to, photocopied motifs.
- Ask students to do a library/magazine search for prehistoric motifs. Utilize these in their drawings.
- Discuss current art objects, icons, advertisements, etc. that may function in a similar way to prehistoric motifs.

The O'odham Story of Ca Kai Choo and Bun As passed down to Nathan Allen

Tohono is the home of Ca Kai Choo (quail) and Bun (coyote). Ca Kai Choo often played tricks on Bun. One time they took some of his body fat while he slept. Bun awoke and was angry! He chased the Ca Kai Choo, but they flew to safety, into their little holes along the akimel (river). Bun went to the first hole and reached in. He grabbed the first Ca Kai Choo and growled, "Are you the one who did this to me?" A tiny peep, "No! try the next hole," was heard. And so Bun went from hole to hole until he came to the last one. "Was it you?" Again a tiny peep, "No! try the next hole." Bun stuck his paw into the next hole full of hanum (cholla)! Bun howled with pain as the Ca Kai Choo ran away with glee and laughter. Again Ca Kai Choo had gotten the best of Bun, their worst enemy!



How the People got Fire - An Apache Story (From Goddard 1918)

"There were people living here on the earth. Coyote, birds, or hawks were all people. There was no fire and the only ones who had fire would not give it away. The others, many people, were without fire. Martens, living in the tops of tall pine trees were the only ones who had fire but they would not give any of it away. Those who were living below them [asked] how they should get fire. They decided to play hide the ball and sent out invitations for everybody to come to the game. They gathered under the trees and shouted to the martens to come down and bring some fire [so they could] play hide the ball. They came down bringing the fire with them. They put wood on the fire at the camping place and stood around it in four lines so that there was no way anyone could run off with the fire. None of the people who didn't have fire were in the center of the circle."

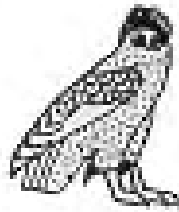
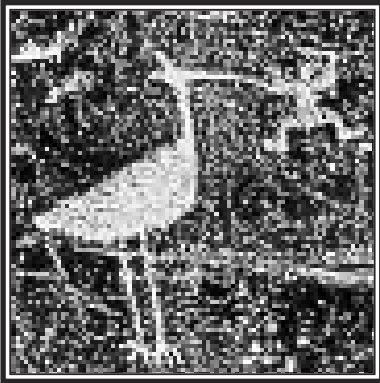
"Coyote, who was lying down some way off, said he would get the fire and run off with it. They were playing and having a good time. Those who owned the fire were winning and they began to dance. Coyote had a torch prepared by tying bark under his tail. He got up and came to those who were dancing. 'Have a good time my cousins,' he said. 'My foot pains me. Dance for me. Separate and let me through to the fire.' They were dancing and having a good time [and ignored him]. When it was nearly daylight, Coyote said that he was going to dance. He told the others to dance vigorously, bending their knees. He urged them to do this repeatedly. Finally, he danced and switched his tail into the fire. They called to him that his tail was likely to catch on fire. He assured them that it would not."

"Then day broke. He stuck his tail in the fire again and it took fire. 'Your tail is burning cousin.' He jumped over four lines of dancers who were in circles around the fire and ran off. The people who were stingy of their fire ran after him. Coyote passed the fire to Night Hawk who jumped on it and went with it. . . Night Hawk kept flying and jumping. Those who had the fire nearly caught him for he was exhausted. . . He gave the fire to Roadrunner who ran away with it. . ."

"Roadrunner ran on carrying the fire [and] those who were pursuing him nearly overtook him. He was exhausted. When they caught him, he gave the fire to Buzzard who flew away with it. [They chased Buzzard] until he was worn out. He gave the fire to Hummingbird."

"They saw the smoke of a fire arising in the distance from the top of a mountain. It was Hummingbird who had set the fire. There was a fire too on the top of another mountain. Everywhere, fires were burning. It was Hummingbird who had accomplished all this. Those who had owned the fire turned back saying it was now impossible to recover the fire."

"The People who had been without fire were now all supplied with it. They were happy about it and expressed their thanks to Coyote."



Narmer
(Menes)



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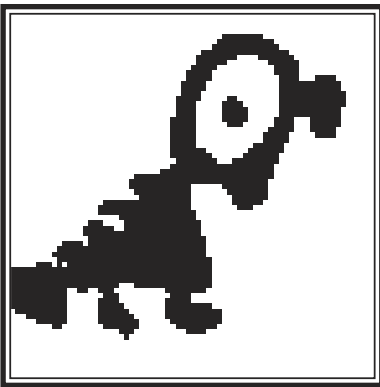
Khufu (Cheops)

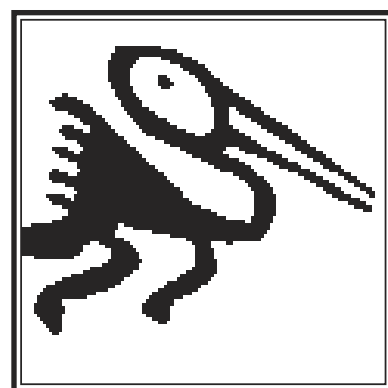
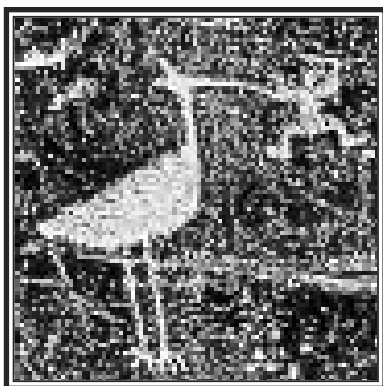


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(Menes)



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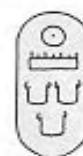
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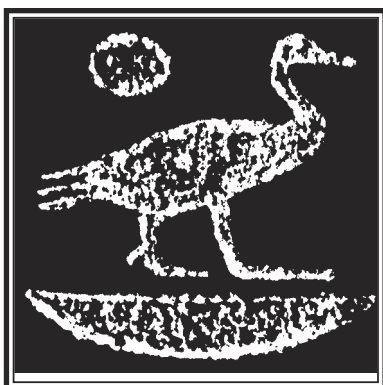
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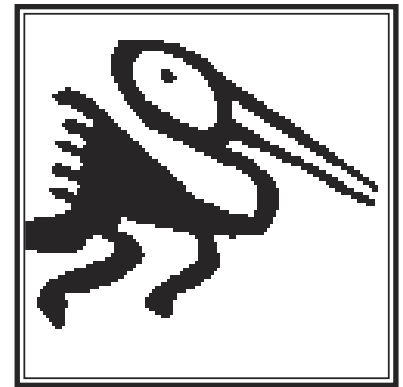
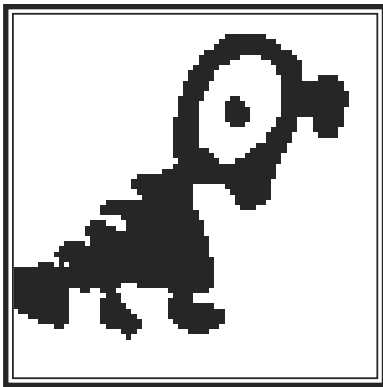
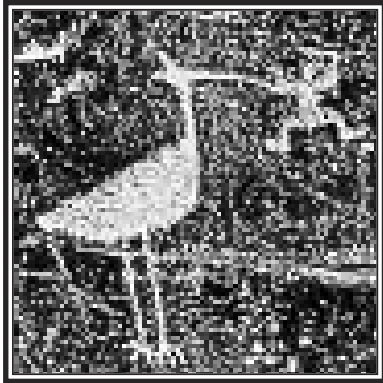


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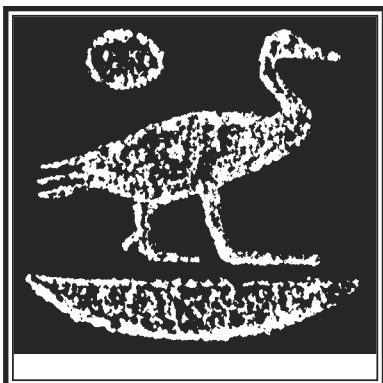
Hatshepsut

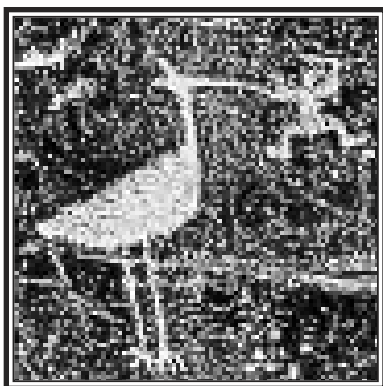


Thutmose III

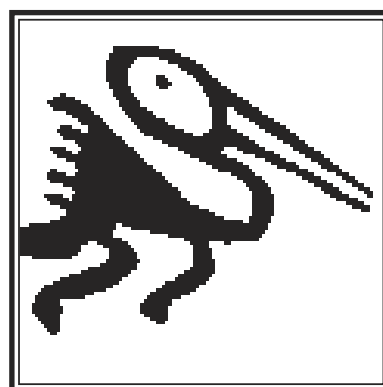
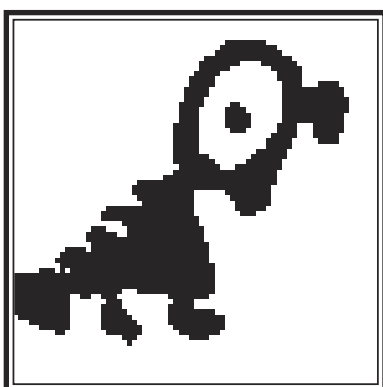
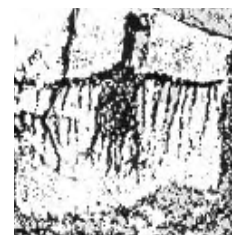


Amenhotep III





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Ramses II



Ramses III



Ptolemy I



Ptolemy



LESSON 2

TWELVE BIRDS OF TUMACÁCORI



Students will analyze bird species of the Santa Cruz River Valley by classifying their physical features, identifying each species, and recording attributes of their habitats.



LESSON OVERVIEW

Students will analyze bird species of the Santa Cruz River Valley by classifying their physical features, identifying each species, and recording attributes of their habitats.

Subjects

Science

Standards

Science as Inquiry

Life Science

Objectives

Students will:

1. Identify and describe habitat for 12 bird species.
2. Construct a physical attributes chart of local bird species.
3. Identify local birds by their calls and songs.

Preparation

Copy **Master Page 2.4**, (one per student), 12 sets of **Master Pages 2.8 and 2.10**, and one copy (teacher's) of **Master Pages 2.11 - 2.14**; Have available pictures of birds (provided in guidebook), bird reference guide-books, bird song CD (provided) and CD player.

Time

Two 50 minute sessions.

Vocabulary

Archaeology, habitat, indigenous, mesquite bosque, migration, neotropical, prey, riparian.

TWELVE BIRDS OF TUMACÁCORI

TEACHER BACKGROUND INFORMATION

The Santa Cruz River starts in the San Rafael Valley south of Patagonia, flows into Mexico for twenty- five miles, then northward through Santa Cruz and Pima Counties. The River terminates into the Gila River (normally underground).

Natural areas of the river corridor referred to as riparian areas have become fragmented by public and private holdings such as cattle ranches, agricultural fields, housing developments, roads, national and state parklands. These habitats once served a large population of bird species migrating from tropical climates of Latin America to the temperate climates of Arizona and northward to Alaska. The migratory movements of hundreds of neotropical bird species continue to occur twice yearly in spite of the dwindling food supplies and safe resting and nesting places within the riparian corridor.

The Southwest Cottonwood-Willow riparian corridor of the Santa Cruz Valley is a rare and critical habitat for the survival of migratory birds traveling long, arduous journeys. It is world renown for birdwatching and considered a national treasure. It is one of the most endangered ecosystems in the United States at this time.

Birds have been migrating through the Santa Cruz Valley for thousands of years. One form of evidence for this is observed in the artifacts found at archeological sites which record the existence of bird species through indigenous art forms.



LESSON 2 - TWELVE BIRDS OF TUMACÁCORI

Today, birds continue to travel the corridor just as they have always done and are appreciated by thousands of visitors who come to the valley to observe the migration of over two-hundred fifty species of birds.

The presence of certain types of birds coming and going year after year is predictable, so it is relatively easy to discern with a little training the difference among birds species. Appearance is perhaps the most reliable way to identify birds, but identification alone is but a fraction of the knowledge needed. To begin to understand the world of birds and why they come to the Santa Cruz Valley one must look at which riparian habitat is used by each species, how, when, and why they call or sing to each other, and where they build nests, find food, and raise offspring. Observing birds with the aid of binoculars can be a rewarding educational experience. The number and kinds of birds found can indirectly indicate the health of the habitat they seek. Because records show which species have been here in the past, comparison of present day species will help us identify immediate management issues and conservation needs.

Activity 1

Part 1 - Habitat Attributes

1. On the board, reconstruct the chart below, leaving answer spaces blank.

2. Present to your class the color photos provided of Mesquite-Bosque and Southwest Cottonwood-Willow Riparian habitats.

3. Complete the chart with the entire class, encouraging student input, response and discussion. Note that in many cases, attributes are overlapping for both habitats. (See answers in the chart below.)

Part 2 - Species Attributes

1. Make twelve copies of *Bird Species Attributes Chart*, **Master Page 2.4** and *Bird Species Cards*, **Master Pages 2.7 - 2.10**.

Copy the chart onto the board or make an overhead.

2. Present to the class bird pictures from **Master Pages 2.7 - 2.10**, or alternatively use the provided color photos. Discuss each species and its attributes.

3. Divide the class into twelve work groups, hand out Master Pages and assign each group a species. Ask each group to complete the *Species Attribute Chart* for their given species using the information provided on **Master Pages 2.7 - 2.10** in addition to various bird reference books.

4. Upon completion of the individual species attribute charts, have students write their information onto the larger chart on the board. Have students complete the *Chart* with the exception of the habitat column.

HABITAT ATTRIBUTES CHART

Habitat	Tree Species	Bird Foods	Nesting Sites	Cover Available	Places to Forge	Bird Species
Mesquite Bosque	Mesquite, Mexican Elder, Hackberry	Mesquite Pods, Elderberries, Hackberries, Nectar, Seeds,	Trees, Shrubs, Ground, River Banks	Tree Canopy, Leaves, Shrubs, Grass	Under leaves, In the air, On the ground, Tree Bark	All species listed are found
Riparian	Cottonwood, Willow, Ash	Insects, Small Mammals				

LESSON 2 - TWELVE BIRDS OF TUMACÁCORI

Part 3 - *Identifying suitable bird habitat*

1. Based on the two attributes charts generated in Activities 1 and 2, ask students, working in new groups, to identify the habitat, (either Mesquite-Bosque or Southwest Riparian), that corresponds to each species. Ask them to write their answer in the Habitat column on the **Species Attributes Chart - Master, Page 2.4**.

2. Review and discuss answers with the class.



Activity 2 - *Identifying Bird song*

1. Play the provided CD of all bird songs, one at a time, to the students and try to have them guess the species, writing the name down.

2. Write all possible answers on the board and play the songs again, one at a time, this time with the teacher circling the correct answers and correlating each song with the species pictures provided.

3. Repeat step 2 and ask students to try to mimic the sounds.

4. As an assessment, erase all bird species names from the board and replay the songbird CD asking students to correctly identify the bird species.

Activity 3 - *Clue Cards*

1. As a review, divide the class into twelve workgroups and give each one a photograph of a bird species. Ask them to summarize the information provided on the back of the photo, presenting their information to the rest of the class.

2. Refer to the clues for individual birds on **Clue Cards - Master Pages 2.11 - 2.12**.

Consider photocopying and laminating cards to make a working teacher copy.

3. If you have not previously played the game, explain to your students that you will be reading clues about a certain type of bird and they are to try to guess its name. They must ask at least six questions before guessing.

4. Read the clues to the students.

5. When all the clues are read, have students say or write down their guess.

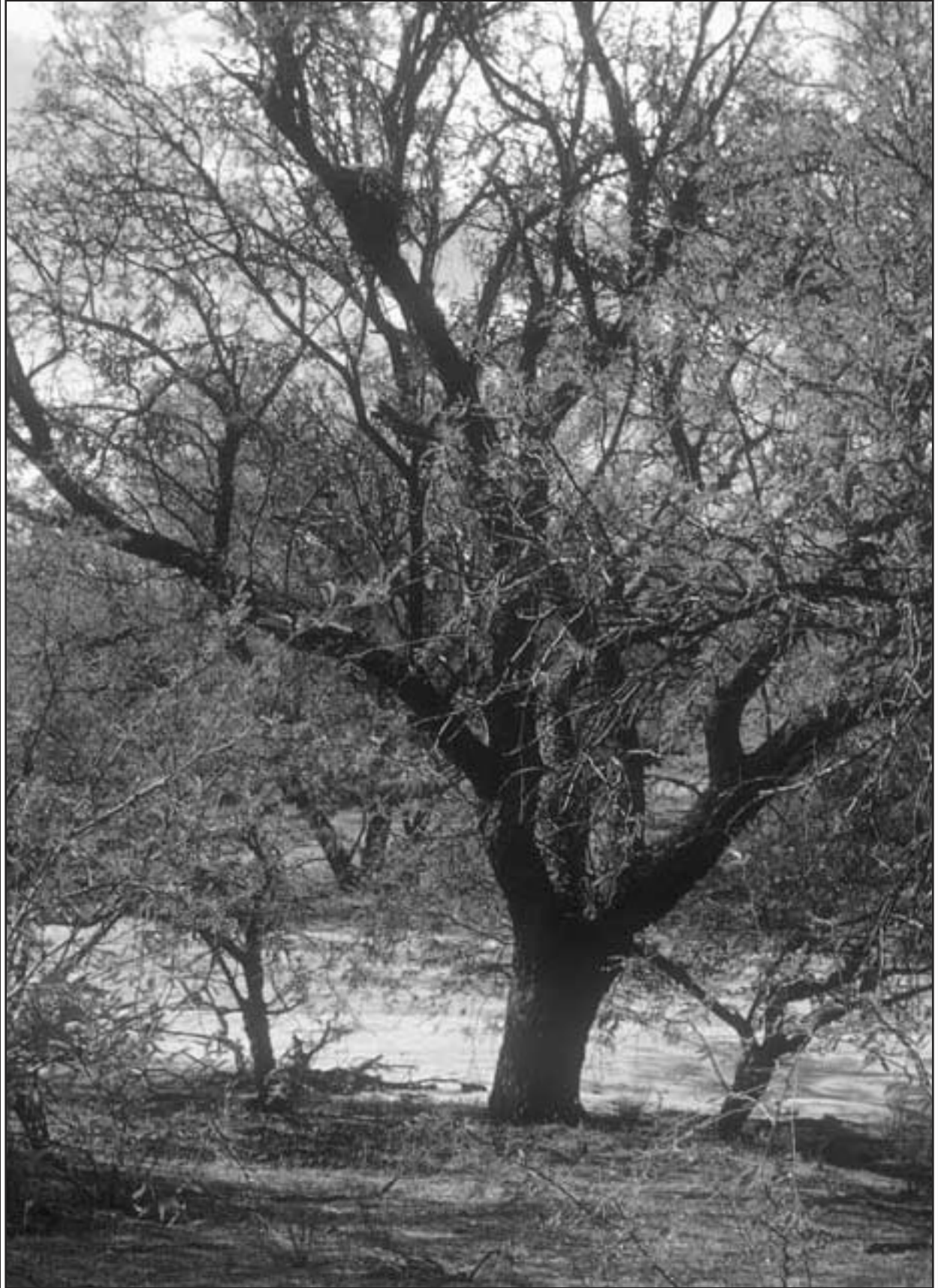


Enrichment

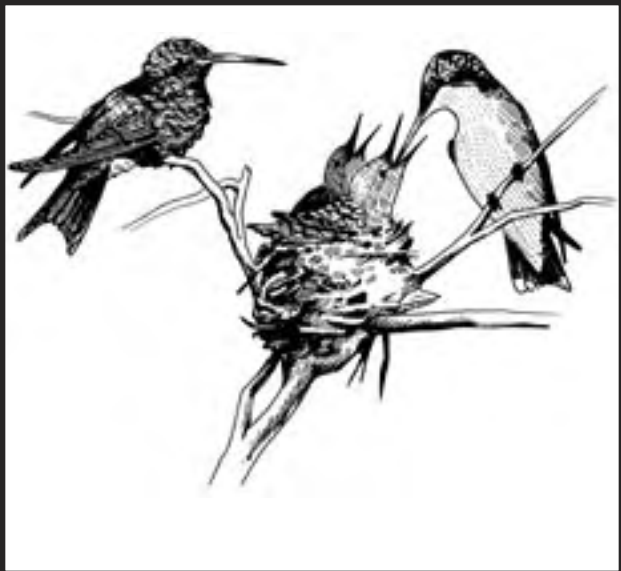
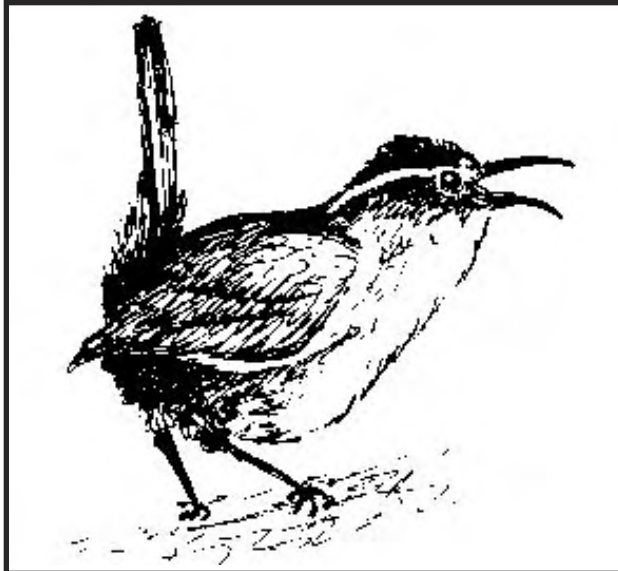
- Copy the twelve bird species on **Master Page 2.7 and 2.10** for each student and have them use bird guides or provided photographs to realistically color each species.
- As the twelve birds are common to Santa Cruz County, ask students to attempt to sight birds as a homework assignment.
- Take your class birding!

BIRD SPECIES ATTRIBUTES CHART

Bird Species	Size	Color	Beak Shape	Foot Type	Perching Habits	Nest Type	Habitat
Bewick's Wren							
Black-Chinned Hummingbird							
Northern Cardinal							
Gila Woodpecker							
Mockingbird							
Mourning Dove							
Phainopepla							
Red-Tailed Hawk							
Greater Roadrunner							
Say's Phoebe							
Turkey Vulture							
Vermilion Flycatcher							







BLACK CHINNED HUMMINGBIRD

Archilochus alexandri

FAMILY: Trochilidae (Hummingbird)

NEST: tiny cup shape in fork of branch

HABITAT: open woodland, riparian, parks, gardens

FOOD: insects, nectar, spiders

BEHAVIOR: flies backward, rapid wing-beat makes a humming sound

SIZE: body length 3 ½ inches

COLOR: black throat & white collar, male metallic green, violet band at base of throat

SOUND: high-pitched “tsst, tsst, teew”

MIGRATION: resident, range is western U.S. and Mexico

BEWICK’S WREN

Thryomanus bewickii

FAMILY: Troglodytidae (Wrens)

NEST: natural cavity or center of a brush pile

HABITAT: open woodland, brushland, hedgerows, stream edges

FOOD: insects, spiders on the ground

BEHAVIOR: Hops, picks through foliage

SIZE: body length 5 ¼ inches

COLOR: long tail with white corners, bold white eyebrow, striped mousy brown upper parts, stiff and short tail

SOUND: flat hollow chirp, song a high thin buzz

MIGRATION: winters along Sea of Cortez

GILA WOODPECKER

Melanerpes uropygialis

FAMILY: Picidae (Woodpeckers)

NEST: cavity

HABITAT: riparian woodland

FOOD: fruit, insects, lizard, bird eggs, mistletoe berries, acorns

BEHAVIOR: aggressive interaction, head bobbing, wood-boaring, flight is undulating

SIZE: body length 9 inches

COLOR: black & white zebra striped back, light brown body, white wing patches seen in flight, male has red cap, chisel-billed, two toes forward, two back, stiff spiny tails

SOUND: loud “churrrrr”

MIGRATION: year-round resident

NORTHERN CARDINAL

Cardinali cardinalis

FAMILY: Fringillidae (Grosbeaks)

NEST: cup shaped in low trees

HABITAT: dense shrubs, undergrowth, riparian thickets

FOOD: seeds, fruit, insects

BEHAVIOR: flocks up to 70 birds in winter

SIZE: body length 9 inches

COLOR: males are brilliant red with black mask and chin, red beak. Females are light brown with a red beak

SOUND: “tik, tik, tik”

MIGRATION: winter resident

MOURNING DOVE

Zenaida macroura

FAMILY: Columbidae (Dove)

NEST: plate-shaped, flimsy, on solid platform

HABITAT: open woodland, fields and trees

FOOD: seeds, waste grain from the ground

BEHAVIOR: picks through ground vegetation, stones, and foliage, bobs head while walking

SIZE: body length 12 inches with small heads

COLOR: light brown

SOUND: hollow, mournful “coah, coo, coo, co.” (At a distance only “coo's” are audible.)

MIGRATION: residents, nearly worldwide in tropical and temperate regions

OTHER: population fluctuates according to the availability of prickly poppy seeds

NORTHERN MOCKINGBIRD

Centzontle alibanco, Mimus polyglottus

FAMILY: Mimidae (Mimic Thrushes)

NEST: cup shaped in shrubs

HABITAT: most all habitats

FOOD: fruit and insects, sow bugs, crayfish, snails, berries, small birds

BEHAVIOR: picks through foliage

SIZE: body length 10 inches

COLOR: gray, slim, long tail, shows white wing patches and tail in flight

SOUND: has a powerful voice, mimics many sounds like sirens and other bird calls

MIGRATION: resident

OTHER: un-mated males sing at night in spring, predators include snakes



RED-TAILED HAWK

Buteo jamaicensis

FAMILY: Falconiformes (Hawk)
NEST: Bulky, large, made of branches in tops of trees or cliff edges
HABITAT: Woods with nearby open land, plains, prairies, groves, deserts
FOOD: rabbits, reptiles, insects, fish, other birds
SIZE: body length 22 inches
COLOR variable from dark brown to light tan, reddish tail, yellow beak
HABITAT: woods, plains, prairies, desert
SOUND: harsh descending “keeeer”
MIGRATION: winters as far south as Panama and breeds all the way to Alaska

PHAINOPEPLA

Phainopepla nitens

FAMILY Ptilogonatidae (Silky Flycatchers)
NEST: cup-shape in shrubs
HABITAT: semi arid and riparian woodland
FOOD: insects, berries (especially mistletoe)
BEHAVIOR: fluttering in flight, hawking, hovers, picks foliage, aerial acrobatics
SIZE: body length 8 inches
COLOR: male glossy black, slender crest, red eye, white wing patches seen in flight, female is tan
SOUND: brief, high-pitched “phewt” and “pre-tee-bird”
MIGRATION: Central to South America

SAY’S PHOEBE

Sayornis saya

FAMILY: Tyrannidae (Tyrant Flycatchers)
NEST: cup-shaped
HABITAT: open woodland near water
FOOD: insects, berries
BEHAVIOR: hovering flight, feeds just above water, regurgitates pellets. Perches quietly, sits upright on exposed branches and snaps up insects in flight
SIZE: body length 7-8 inches
COLOR: gray brown with black tail and peach belly, bill flattened with bristles at base
SOUND: plaintive, downward slurred “pweee” “pee-ee”
MIGRATION: tropics in winter

GREATER ROADRUNNER

Geococcyx californianus

FAMILY: Cuculidae (Cuckoo)
NEST: cup shape in low trees, cactus, shrubs
HABITAT: cultivated land, woods, open areas
FOOD: insects, lizards, snakes, rodents, birds, cactus fruit, and seeds.
BEHAVIOR: runs up to 15 mph
SIZE: body length 24 inches
COLOR: black shaggy crest, large feet, black and white striped underparts
SOUND: clicking and a low “brrrrrr”
MIGRATION: resident
OTHER: two toes forward & two back, New Mexico state bird

VERMILION FLYCATCHER

Pyrocephalus rubinus

FAMILY: Tyrannidae (Tyrant Flycatchers)
NEST: cup-shaped
HABITAT: riparian woodland
FOOD: insects, especially bees
BEHAVIOR: hovers and pounces on prey, pumps tail up and down while perched
SIZE: body length 6 inches
COLOR: male has flaming red underparts, bushy crest, with upper parts dark brown to black. Female is soft brown with a peach colored breast
SOUND: “pitazeeee,” downward, high-pitched call
MIGRATION: northern-most range is southern AZ, migrates to east Mexican gulf

TURKEY VULTURE

Cathartes aura

FAMILY: Cathartidae (Vultures)
NEST: none built, lays eggs in hollow stump/cave
HABITAT: dry country woodland, farmland
FOOD: carrion (any dead animal down to a tadpole size)
BEHAVIOR: soars high in wide circles, rocks and tilts unsteadily in flight, spreads wings while perched with back to sun
SIZE: 6 foot wingspan, body length 27 inches
COLOR: body black; wings two tone, black with gray outer flight feathers
SOUND: none
MIGRATION: south to Cozumel, Mexico
OTHER: makes a communal roost

BLACK CHINNED HUMMINGBIRD

Archilochus alexandri

1. If you are quick you can see me in open woodlands, parks or gardens.
2. I build a very tiny cup-shaped nest lined with spider webs.
3. I can fly backwards.
4. I am usually seen visiting flowers for their nectar.
5. I am only 3 1/2 inches long with a metallic green band below my black throat and white collar.
6. My wings beat so rapidly they make a humming sound.

BEWICK'S WREN

Thryomanus bewickii

1. I live in the open woodland.
2. I make my nest in the center of a brush pile.
3. I scratch on the ground turning over leaves to find spiders and other insects.
4. I am 5 1/4 inch from head to tail.
5. My tail is long and tilts upward.
6. I have a bold, white eyebrow and a light brown back.
7. The first part of my name sounds the same as a certain automobile maker.

NORTHERN CARDINAL

Cardinalis cardinalis

1. I am a year-round resident of riparian thickets and dense shrubs.
2. My call sounds like "tik, tik, tik"
3. My nest is cup-shaped in shrubs.
4. In the wintertime I flock with others of my kind in groups of up to 70 birds.
5. I eat seeds, fruit and insects.
6. My beak is red & conical shaped.
7. I am 9 inches from head to tail.
8. I have brilliant red feathers and black eyes, mask, and chin.
9. I have a red crest on top of my head.

GILA WOODPECKER

Melanerpes uropygialis

1. I can be seen all year long in woodland areas
2. I have a very loud call that sounds like "churrrr"
3. My nest is a cavity or hollow in trees.
4. In flight I show two large, white wing patches.
5. I am a 9 inch bird with a zebra-colored back and light brown head.
6. The male of my species has a red cap.
7. I hang on to the side of a tree trunk and look for insects.

NORTHERN MOCKINGBIRD

Mimus polyglottus

1. I live year round in most any habitat.
2. My nest is cup-shaped in low shrubs.
3. I eat foods such as insects, crayfish, snails, berries, & small fish.
4. In flight I show my white wing patches.
5. I am a slim, gray, 10 inch bird from head to long tail.
6. Snakes like to eat me.
7. The un-mated males of my species sing all night long in the spring.
8. I have a powerful voice and I can imitate just about any sound from sirens to other birds' songs.

MOURNING DOVE

Zenaida macroura

1. My habitat is open woodlands and agricultural fields with trees.
2. I am very common in many backyards.
3. I make a plate-shaped, flimsy nest in trees or on the ground.
4. I walk along the ground picking up seeds and grain that is not harvested.
5. I am 12 inches from head to tail.
6. My wings whistle when I fly.
7. I have a small head and large brown body.
8. I make a "coo, coo" sound.
9. People think of me when they think of love.

PHAINOPEPLA

Phainopepla nitens

1. I sit at the top of a tree in semi- arid and riparian woodlands.
2. My nest is cup-shaped and built in shrubs.
3. I like insects and berries, but especially mistletoe berries.
4. One of my calls sounds like “pre-tee-bird.”
5. I make acrobatic maneuvers by fluttering, dodging & swooping in flight.
6. You can see my white wing patches when I fly.
7. I look like a small cardinal, but am black with a red eye.

RED-TAILED HAWK

Buteo jamaicensis

1. I am a very common sight along and above highways.
2. I build nests that provide me with a view on cliffs or in tall trees.
3. I eat birds, reptiles, insects, and rodents.
4. You can usually hear my squeal or high pitched “keeeeerrrr” in open country or woodlands.
5. I soar in wide circles on 22 inch long wings.
6. My tail is wide with reddish upper tail feathers.

GREATER ROADRUNNER

Geococcyx californianus

1. I make clicking sounds as I walk along in open areas, fields or woodlands.
2. My nest is cup shaped in low trees, cactus or shrubs.
3. I am a great hunter of insects, lizards, snakes, rodents, and birds.
4. I also eat fallen seeds and cactus fruit.
5. My large feet have two toes forward and two toes backward.
6. My head is adorned with a shaggy crest.
7. I can run up to 15 miles per hour.

SAY’S PHOEBE

Sayornis saya

1. I can be seen in open woodland near water.
2. I build my cup-shaped nest under roofs, on outdoor light fixtures, and in trees.
3. My call is like a downward “pweerrr”.
4. I hover in flight and catch insects on the wing, but I also eat berries.
5. You might see me flying just above the surface of water.
6. I am gray-brown on the back and have a peach colored belly.

TURKEY VULTURE

Cathartes aura

1. I live in a communal roost with hundreds of my own kind.
2. You won’t find me building nests to lay my eggs. I use a hollow stump or cave floor to lay them.
3. I soar high on 6 foot wings in wide circles with a rocking, unsteady, tilting flight.
4. I eat dead food that I find along road sides or anywhere an animal has died.
5. I have no feathers on my red head.
6. I do not make a call or song.
7. I am 27 inches long with black & gray wings.

VERMILION FLYCATCHER

Pyrocephalus rubinus

1. You can usually see me in riparian woodlands.
2. I like to hover above water or land, catching insects in the air.
3. My nest is cup-shaped built between the fork of a tree branch.
4. When I am sitting I pump my tail up and down.
5. I make a “pita zeee” sound.
6. I have a bushy crest on my head.
7. The male of my species has beautiful flaming red underparts and a black back.

LESSON 3

FIELD TRIP TO THE MISSION AND RIVER



Students will analyze three historic cultures in Tumacacori National Historical Park. They will discover how past and present cultures affect and impact bird habitat and local ecosystems, and how protection of the Santa Cruz river will insure a healthy environment.



LESSON OVERVIEW

Students will analyze three historic cultures in Tumacacori National Park. They will discover how past and present cultures affect and impact bird habitat and local ecosystems, and how protection of the Santa Cruz river will insure a healthy environment.

Subjects

Science, Social Studies

Standards

Science in personal and social perspectives.

Objectives

Students will:

1. Listen to traditional stories and songs and discuss how O'odham and Apache people related to their environment.
2. Observe, identify and list local bird species.
3. Complete journal questions and activities.
4. Tour an historical mission, its grounds, and the Santa Cruz River.

Preparation

Divide your students into work groups; make copies of the *Student Journal* found in the *Appendix*; for each student; provide field packs with bird guides, binoculars, journal, pencil and clipboards.

Time

4+ hours.

Vocabulary

bosque, habitat, icon, landscape, mesquite, motif, revere, riparian.

FIELD TRIP TO THE MISSION AND RIVER

TEACHER BACKGROUND INFORMATION

The Setting

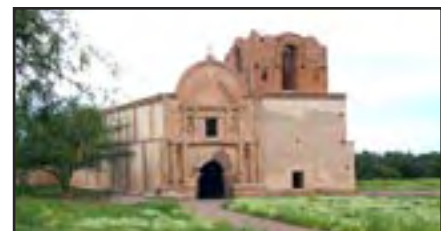
Tumacacori National Historical Park provides a setting to study past and present cultures, their impacts on the Santa Cruz River and its two habitats: mesquite bosque and cottonwood-willow riparian.

Dominating the mesquite bosque landscape is the 310 year old mission site. Archaeological evidence shows the presence of a large mission and Indian population throughout the grounds. An additional 300 acres incorporates the original mission fields and includes over one mile of river and surrounding environment. A visitor center, service buildings, and garden compliment the site. This is surrounded by a mesquite bosque and agricultural fields.

A walking path from the mission leads through a mesquite bosque habitat consisting of Velvet Mesquite, Nettleleaf Hackberry, Mexican Elder, and Catclaw Acacia. Adjacent to the tree-lined path are

plowed agricultural fields and scrubland. This leads into the Southwest Cottonwood-Willow riparian area about 1/3 mile from the Visitor Center. Here the environment is drastically affected by river flooding, drought and human impacts such as trash, pollution and all-terrain vehicle tracks. Non-native invasive plant species such as Salt Cedar (*Tamarix ramosissima*) conflict with native species. Students are able to really see the naturally changing landscape compared with the effects of human influence.

Arriving at the waters edge of the Santa Cruz students will experience the beautiful cottonwood-willow habitat complete with an abundance of birds, cool shade provided by the towering trees and the music of the flowing river.



Environmental History

The environmental history of the Santa Cruz River Valley is diverse and fascinating. For hundreds of years people have utilized and manipulated the natural environment to their benefit. Each culture in its own way has affected the environment whether Spanish, American, or Indian.

The early Hohokam people settled the area prior to European contact and they mastered survival techniques and utilized natural resources to their benefit. They were sophisticated desert farmers who built elaborate structures and used floodplain farming as well as creating the largest pre-historic irrigation system in present-day Arizona. As gatherers, they collected and cultivated various native plants such as mesquite and prickly pear. An estimated 100,000 agaves may have been roasted in pits in the twelfth and thirteenth centuries. As hunters, they harvested a variety of animals and, according to some archeological evidence, eventually over-hunted the larger animals such as deer and bighorn sheep, causing them to be replaced with smaller rodents and rabbits.

After the disappearance of the Hohokam civilization in the mid to late 1400s, their O'odham successors lived a comparatively simpler lifestyle which Father Kino encountered when he arrived in 1691. Sedentary farmers, hunters and gatherers, they eked out their living along the banks and tributaries of the Santa Cruz River. Like their predecessors, they used floodplain-farming techniques to grow summer crops of corn, squash, beans and cotton, and may have had complex irrigation systems as well. Houses were simple round structures made of willow, mesquite and mud. They utilized trees such as Mexican elder, netleaf hackberry and mesquite for food and medicine. Animals such as rabbit, deer, birds, beaver and bear were harvested to supplement their diet. They lived closely and intimately with nature; at times a rich and romantic lifestyle.

On the other hand, making a living from the land was not easy. Water and resources could be scarce, and freezing temperatures made it impossible to grow year-round crops. As romantic as their culture might seem to us, it was a difficult life.

The Apache people also utilized the Santa Cruz River Valley beginning in the 1600s. Their culture originated in the north, in Canada, and possibly Alaska, along with other cultures having an Athabascan language base. Although some Apaches took to peaceful farming, others took on a lifestyle of nomadic hunters, gatherers and raiders. O'odham villages, and later Spanish settlements and missions, were subject to Apache attacks, loss of crops, and kidnapping of women and children, making life difficult and dangerous for anyone not allied with them. In regards to the environment, however, impact was probably minimal. As nomads and warriors, they were masters at moving through nature with little trace.

In 1691, the O'odham villagers invited Jesuit missionary Eusebio Francisco Kino to Tumacácori to establish the first mission in present-day southern Arizona. The next day he established Guevavi Mission, which became the cabecera, or head church. Despite his good intentions, however, these sites along with Sonoitac (near present-day Patagonia), Arivaca and San Xavier del Bac all remained visitas until the 1730s with Kino, his successor Father Campos, or other priests visiting infrequently. Cattle, horses, wheat and more were introduced during this period, much of which had an impact on the environment, albeit minimal. As a result of political changes, Guevavi and San Xavier missions began hosting resident priests about 1732. This, with the discovery of silver near to the Arizona ranch (located in Mexico between Nogales and Saric), brought more Spanish settlement, introduced species and environmental impact.

As a result of the short-lived Pima Rebellion in 1751, the military established a Presidio in Tubac and the first formal church was constructed at Tumacácori. Other missions were also renovated at this time and various villages were consolidated into larger settlements. When the Jesuits were expelled in 1767, the Franciscans replaced them, but soon abandoned Guevavi as the cabecera and made Tumacácori the head mission for the area. They eventually added a three-sided convento, created an acequia or canal, to bring in water, and constructed the larger church. During the mission's peak there were an estimated 300 people, up to 6,000 head of stock and possibly hundreds of acres of crops. The impact on the land was substantial in comparison with that of the Indians. The Mexican War of Independence meant that Tumacácori would never see another permanent priest and Apache attacks increased. Finally, a cold winter left the Tumacácori Mission abandoned about 1848.

The northern Pimería Alta which Padre Kino had claimed for God and Spain became a territory of the United States with the Gadsden Purchase of 1853. The Americans were slow in coming, mostly due to Indian hostilities and fierce Apache raids. This all changed in the 1880s. With the coming of the railroad and soon after the surrender of Geronimo, more people settled the area and with them came new technology. Business and exportation became lucrative, and mining and extraction of natural resources increased tremendously as did large-scale cattle operations. Huge mining camps like Bisbee and Morenci brought boomtowns of thousands of people. By the turn of the 20th century, there were an estimated 1.5 million cattle in Arizona.

Environmental impact further increased in the 1930s when a mechanized water pump allowed farmers and ranchers to tap into the aquifer as well as divert surface water. The Santa Cruz Valley soon became a major crop producer, with large farms and ranches lining the banks of the Santa Cruz River

from Nogales to Sahuarita. Historic pictures of Green Valley, for example, reveal solid cotton fields with Mt. Hopkins and Mt. Wrightson in the background. The combined impact of large agricultural operations and an extended drought resulted in the scarcity of cottonwoods along the river and the eventual drying up of surface flow in the river by 1970.

In 1971 the Nogales International Sewage Treatment Plant was installed in Rio Rico. The present-day plant treats up to 17 million gallons daily from both sides of the border and insures a flow of water in the Santa Cruz River. Although the effluent from the plant is estimated to account for only 20% of the river's current, the historically intermittent river now flows year-round at Tumacacori, and sometimes as far as Tubac. As a result, we now have a substantial greenbelt that most likely never occurred before. It is not without problems, however. The water quality of the effluent, although cleaned and monitored at the plant, is questionable from a health standpoint. Monsoon floods bring tons of trash from both sides of the border and litters the riverbanks. This trash might also include dangerous substances, syringes, and possible chemical spills from the Nogales Wash; an area known for high rates of lupus and rare cancer. The river has also become a playground for ATVs (All Terrain Vehicles) causing damage to habitat and wildlife as well as noise pollution.

Despite all the problems, the Santa Cruz River is an oasis in an otherwise harsh environment. It is a beautiful area for recreation and a migratory corridor for neotropical songbirds; a haven for birders. The 4 ½ mile section of the Juan Bautista de Anza National Historical Trail between Tumacácori and Tubac has become an important hiking corridor that is easily accessed by the public. The area also serves as an educational study area for local schools, universities and professional researchers.

LESSON 3 - FIELD TRIP TO THE MISSION AND RIVER

Activity 1

Identifying birds of the Mesquite Bosque
(*Meet the garden fountain*)

1. Pre-divide students in four groups before arriving at the park. Hand out journals, clipboards, pens, pencils, etc. to each student.
2. Meet students in the garden and review rules of conduct. (see Journal page 9) Distribute binoculars and clipboards.
3. Give brief introductions and demonstrate how to use the binoculars. Further discuss other birding techniques, do's and don'ts.
4. Working in small groups with adult leadership, walk around the grounds of the park and go birding. Identify birds and ask students to record any species observed in their Journal on page 1.
5. Complete the birding activity (30 to 45 minutes) and meet at the O'odham Ki.

Activity 2

Native Americans and their Environment

1. Ask students to enter the *Ki* and imagine what it was like to be a teenage O'odham boy or girl while leaders briefly describe their history and lifestyle.



2. Read the O'odham story about coyote and quail on Master Page 3.4. Ask the students to listen for clues in the story that describe the habitat and birds of the mesquite bosque.



(*Meet at the O'odham House or Ki*)

3. Briefly discuss the historical habitat based on the story. Further talk about how the O'odham people related to, and utilized their natural environment.
4. Have students step outside the Ki and sit down under the adjacent ramada to listen to the Apache Eagle song (tape provided, music score on Master Page 3.4).
5. Help students to visualize and imagine life as a teenage Apache. Continue to discuss how the Apache people related to and utilized their natural environment.
5. Using samples from Lesson 1, Master Page 1.5 to 1.8, introduce and discuss ancient rock art.
6. Helping students imagine they are an O'odham or Apache living at the Ki, ask them to work in their journals, answering the questions on Page 1, and to draw at least one example of rock art depicting a bird or other environmental image on Page 3. No copying or tracing! Emphasize student creativity.

LESSON 3 - FIELD TRIP TO THE MISSION AND RIVER

Activity 3

The Spanish Mission:
Priests and People

(At the mission church and graveyard)

1. Students will follow a guide for a short tour of the church with a focus on Spanish and Mission culture.
2. Kneeling inside the dark, cold church at the altar students will experience first hand a taste of mission life through singing or listening to a traditional Gregorian Chant.
3. Discuss how the mission influenced and affected the Indians and how this may have altered their way of life.
4. Show students the paintings of grape and wheat on the sides of the arch in front of the altar, emphasize how the missionaries related to and utilized their natural environment through construction, planting crops, using water, introducing domestic animals, etc.
5. Ask students to use their binoculars, showing them the bird image painted on the inside front wall of the church, above the door to the left of the window. Use this as to define and discuss religious icons (artwork conveying a religious symbol).
6. Ask the students to use their *Journals*, answering the questions on Page 4, and drawing one or more icons on Page 5. The drawing should not be traced or copied, but a product of their imagination. It should be of bird, or another environmental related image as the mission priests might have done long ago.



Activity 4

The Americans

(A walk through a modern landscape)

1. Students will walk from the mission to Anza Trail stopping at or near the interpretive ramada. Viewing a ranch to the south, students will receive an orientation about the early Americans and how they interacted with the local environment.
2. Ask students to complete the questions on Page 8 in their *Journals*.

Activity 5

1. Following the dirt road to the east and the road will make a 90 degree turn to the left. You will see a water tank in front of you. Do not follow the road, but take the small path on the right which leads through a small gate. At this point, stop in the shade and explain that the river is very dynamic and actually floods to where they are standing.
2. Introduce students to their assignment. Explain that they will each have a place to sit, alone by the river, during which time they are to answer *Journal* Pages 6 and 7. Encourage them to enjoy and explore their personal area.
3. Continue walking east, down the small hill, ask students to use their senses to detect changes in habitats as they walk along. The trail will then drop into the sandy river's floodplane.
4. At the rivers edge, place students individually in comfortable spots located on the river's edge. Continue walking down the trail and doing so until all students have their own special spots.
5. In silence students complete *Journey into the Heart of the Santa Cruz River*.
6. Return to the Visitors Center and home.

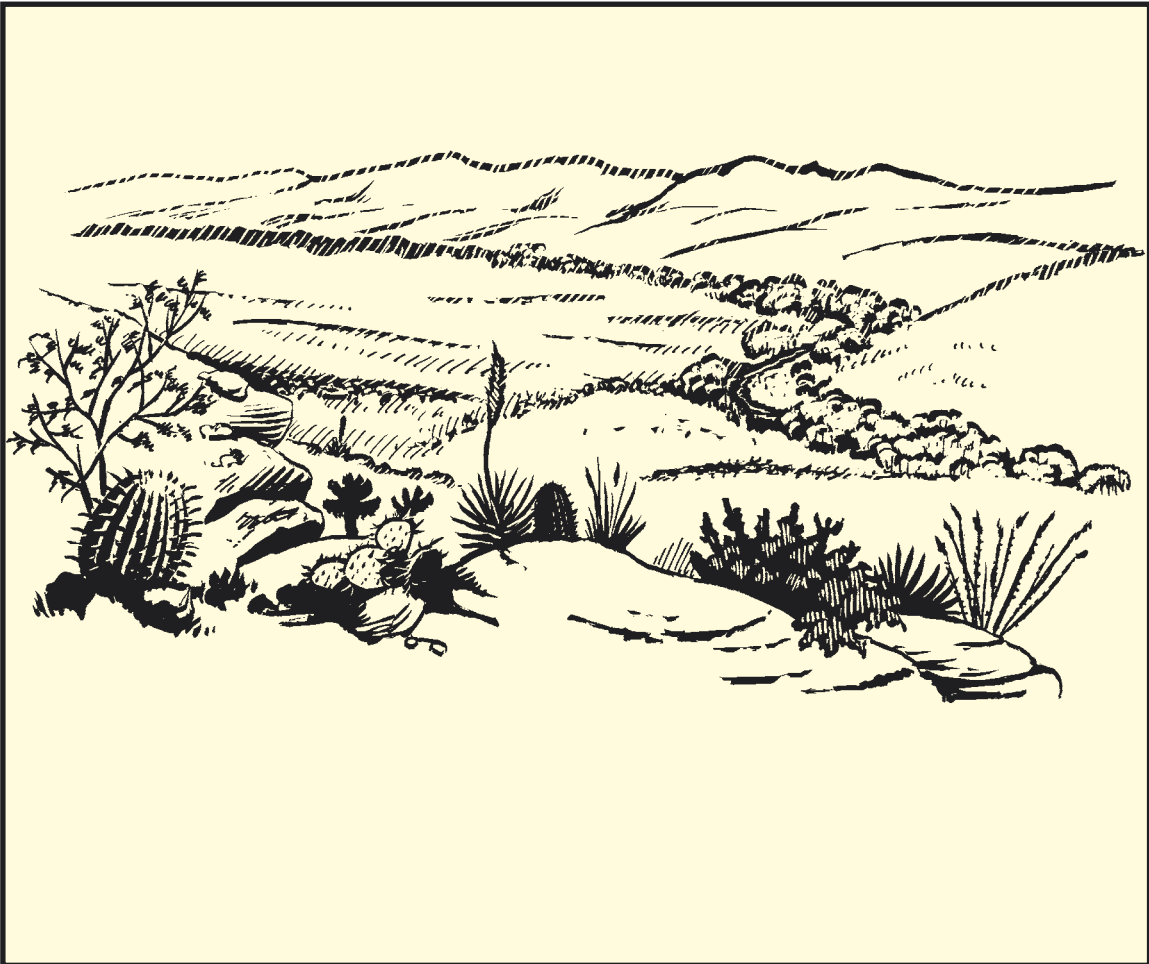
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As passed down to Nathan Allen

Tohono is the home of Ca Kai Choo (quail) and Bun (coyote). Ca Kai Choo often played tricks on Bun. One time they took some of his body fat while he slept. Bun awoke and was angry! He chased the Ca Kai Choo, but they flew to safety, into their little holes along the Akimel (river). Bun went to the first hole and reached in. He grabbed the first Ca Kai Choo and growled, "Are you the one who did this to me?" A tiny peep, "No! try the next hole," was heard. And so Bun went from hole to hole until he came to the last one. "Was it you?" Again a tiny peep, "No! try the next hole." Bun stuck his paw into the next hole full of hanum (cholla)! Bun howled with pain as the Ca Kai Choo ran away with glee and laughter. Again Ca Kai Choo had gotten the best of Bun, their worst enemy!

LESSON 4

RIVER ISSUES



Students will learn about specific issues relating to the Santa Cruz River, assert their opinion about each, and participate in a debate using knowledge gained.

4



LESSON OVERVIEW

Students will learn about specific issues relating to the Santa Cruz River, assert their opinion about each, and participate in a debate using knowledge gained.

Subjects

Reading, Science, Social Studies

Standards

Science in Personal and Social Perspectives, Life Science, Earth Science

Objectives

Students will:

1. Read about issues currently affecting the Santa Cruz River.
2. Summarize and present the contents of a reading assignment.
3. Discuss and evaluate current issues.
4. Present and defend their position on a current issue.

Preparation

Make copies: 1) **Master Pages 4.3 - 4.4**, either one per two students, or cut them out to make cards, 2) **Master Page 4.5**, one for each student, 3) five of **Master Page 4.6**

Time

One to two 50 minute sessions.

Vocabulary

ATV, interpretation, littering, pollution, riparian

RIVER ISSUES

Part 1 - The Issues

1. Review the information on **Master Pages 4.3 - 4.6** as teacher background before proceeding with the lesson.
2. Review and discuss each of the following four issues affecting the river: As much as possible, try to present each issue without biasing or influencing the students.

Water

ATVs

Littering

Pollution

3. Divide students into groups of two or three and hand out a copy of the Jigsaw readings on **Master Pages 4.3 - 4.4** (see preparation) to each group. Consider reading abilities when selecting groups.
4. Assign a reading to each group and explain that they will need to summarize the content and present it to the rest of the class.
5. Have each reading group present their summary to the class.

Part 2 -

What Do You Think

1. Hand out a copy of **What Do You Think?** on **Master Page 4.5** to each student and ask students to complete the worksheet, based on what they learned from the reading.
2. Upon completion of the worksheet, discuss each of the four issues allowing students to interject their personal opinions. Use the following questions as guidelines:

WATER

What will happen if the Santa Cruz River Valley gets as big as Tucson?
Is there enough water for housing, recreation, agriculture, and the river?

ATVs

Should ATVs (All Terrain Vehicles) be allowed along the Santa Cruz River? If not, is there somewhere else they could go?

LESSON 4 - RIVER ISSUES

LITTERING

Is trash bad or dangerous? Why? How can trash be controlled?

POLLUTION

In what ways does pollution affect us individually or as a community?

4. In their own group, ask students to write answers to the following questions:

What kind of people are in the group? Do they share any common interests? Does the culture of the members have anything to do with the group? How do they use the river? How often do they go there? Do they help the river or its environment in any way? Do they hurt it?

5. Have students prepare for the upcoming debate by creating a small presentation (a speech or an advertisement) to convince others that your group's activities at the river are important. Speak out for the cause!

6. Discuss the following with the class:

What are the other groups' views about the river? How do they use the river? From your group's point of view, are they helping or hurting? Is your group on good terms with them? Will they support you in a debate? How can you work together so that everyone is happy?

Part 3 - Preparing for the Debate

1. Introduce the groups listed below and discuss how each group might want to use the Santa Cruz River:

Off-road vehicle users

Developers

Picnickers

Hikers

Birders

2. Divide the class into five working groups. Assign each group to represent one of the user groups on **Master Page 4.6**. Give students a copy.
3. Explain that each student is to pretend that they are members of their assigned club or special interest group. The goal of the meeting is to prepare for a public hearing about the future of the Santa Cruz River.

Part 4 - The Debate

1. Once each group is ready, call the whole class together for a public hearing. Have each group present their position to the other groups. Allow some time for questions after each presentation. Upon completion of all group presentations, open the floor to debate.

Enrichments

- Plan a field trip to the Santa Cruz River, the Nogales Wash, or Nogales Wastewater Treatment Plant.
- Bring in a representative from the Friends of the Santa Cruz River, Anza Trail Coalition or other group associated with the river to speak with your class.

LESSON 4 - RIVER ISSUES

<p>1) Water is the most important thing in the Santa Cruz River Valley. Without it, animals couldn't survive, plants wouldn't grow and people couldn't live here. There were few people and plenty of water, before today.</p>	<p>2) In the 1880s things changed during a drought (a time of little rain). Also came big cattle drives, larger farms and the railroad (that allowed ranchers to transport the cows to other parts of the country). All this affected the water.</p>	<p>3) The invention of a new water pump in the 1940s allowed farmers to easily take the water out of the aquifer (a lake under the ground) in different areas along the river. The biggest aquifer is under Tucson with smaller ones between Green Valley and Mexico.</p>
<p>4) In Tucson, more and more people came, built houses and the water supply dropped. To control flooding, river banks were cemented or changed. The water that normally goes back into the water table was moved out of the area.</p>	<p>5) By 1970 the river was pretty much dry on the surface and we were using up more water than was returning into the ground. Then in 1972, many large farms left and they opened the International Wastewater Treatment Plant in Rio Rico.</p>	<p>6) Today, thanks to the recycled water from the treatment plant and better management, the water is put back in the river and it flows year-round between Rio Rico and Amado. Both animals and people use and enjoy the flowing river.</p>
<p>7) But what happens as more and more people move to the Santa Cruz River Valley? Large developments in Rio Rico and Green Valley Nogales are adding new houses every day. Stores and warehouses are built to support goods from Mexico.</p>	<p>8) What will happen if the area becomes as populated as Tucson? Is there enough water? How can we ensure that there will be?</p>	<p>9) One of the main problems along the river is trash. Picnickers, hikers and other people drop litter. Tons of litter is left when trash from Nogales is carried downstream and deposited along the river after a heavy rain.</p>

<p>10) Trash that ends up in the river includes trash from Ambos Nogales (both sides of the border). An estimated 300,000 people live in Nogales, Sonora! Can we work together to educate people in both Mexico and the United States?</p>	<p>11) Pollution is a problem that involves all of the other issues (water, littering and ATVs). The most serious thing is health. Do you know that Nogales, Arizona, has one of the highest rates of lupus disease in the country?</p>	<p>12) Experts believe that groundwater or air pollution are the causes of lupus and other health problems. Poor management in Nogales, Mexico allows factories to dump their waste and toxic chemical spills which cause many problems.</p>
<p>13) With 25,000 people in Nogales, Arizona, and an estimated 300,000 people in Nogales, Mexico, more air pollution is made from uncontrolled automobile and factory exhaust, smoke from fireplaces, and dust from unpaved roads.</p>	<p>14) Disposable diapers, chemical cleaners, soap, batteries and other household, factory and medical products are thrown in the Nogales Wash daily, from both sides of the border, and end up downstream. The chemicals also leak into the ground.</p>	<p>15) ATVs (All Terrain Vehicles) - include motorcycles, three-wheelers, dune buggies, etc. Many people love to drive them along and through the river. It's a lot of fun to race an ATV through the river with water splashing everywhere.</p>
<p>16) Not everyone likes ATVs though. Hikers and bird watchers are upset by the loud noise. ATV tracks make parts of the river look like a highway. Animals, fish and birds are disturbed by ATVs, which can destroy their homes and habitat.</p>	<p>17) As much fun as they are, ATVs can hurt the natural environment. Along the river private property owners have been unable to control ATVs. "No Trespassing" signs and fences are often torn down.</p>	<p>18) What do you think about ATVs? Is there a place for them along the river? Are there other areas that could be used for ATVs? Is there a way to control or limit their use?</p>

WHAT DO YOU THINK?

What do you think about the following issues that affect the Santa Cruz River? Study each of the issues below. In the blank space write down your opinions. Is it a good thing? Should it be managed? How?

ISSUES	WHAT DO YOU THINK?
<p>WATER</p> <p>Water is the most important resource in the Santa Cruz River Valley. Without it, animals couldn't survive, plants wouldn't grow and people couldn't live. People must manage the water very carefully. Do you think that there is enough water in the Santa Cruz River Valley? Would there be enough if the area had as many people as Tucson?</p>	
<p>ALL TERRAIN VEHICLES (ATVS)</p> <p>ATVs are a lot of fun to race through the water, water splashing everywhere, but they hurt the natural environment. Animals and birds are disturbed. Often their homes and habitat are destroyed. As much fun as they are, should they be allowed in and along the river? If not, where should they go? Should they be controlled? How?</p>	
<p>POLLUTION</p> <p>All living things require clean water and air. But what happens when people's septic tanks leak into the water? Factories and individual people sometimes dump harmful chemicals into the ground and the river and pollute the air. Is this right? Can the pollution be controlled?</p>	
<p>LITTERING</p> <p>One of the main problems along the river is trash. Picnickers, hikers and other people drop litter. Even more litter is left when trash from Nogales is carried downstream and deposited along the river after a heavy rain. An estimated 300,000 people inhabit Nogales, Sonora alone! Is trash bad or dangerous? Why? What can you do to help control litter?</p>	

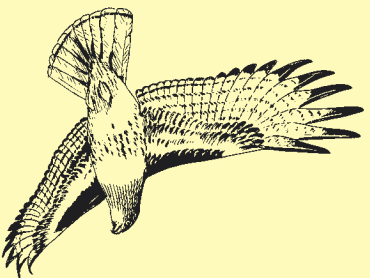
SPECIAL INTEREST GROUPS USING THE RIVER

OFF ROAD VEHICLE USERS	DEVELOPERS	PICNICKERS	HIKERS	BIRDERS
<p>Use motorcycles and ATVs with unrestricted use. All other users are welcome.</p> <p><u>Problem</u></p> <p>Destroys habitat and natural beauty; causes noise and air pollution; disturbs others trying to enjoy the solitude of the river.</p>	<p>Primary goal is to make a housing development. Areas of the river will be preserved as part of the scheme. Others are welcome if they respect homeowners rights and rules.</p> <p><u>Problem</u></p> <p>Destroys habitat and natural beauty; access for others could become limited; may affect the water supply and its course.</p>	<p>Local families like to enjoy the river. Kids enjoy wading and playing while adults like to picnic or party. All others are welcome at the river.</p> <p><u>Problem</u></p> <p>Litter; possible water pollution; possible health and safety hazards.</p>	<p>The Anza Trail allows hikers to walk between Tubac and Tumacácori. They enjoy the trail while learning about the natural area. Everyone who respects the natural area is welcome.</p> <p><u>Problem</u></p> <p>Any group or activity that damages or disturbs the habitat and its natural beauty is not welcome.</p>	<p>The river provides some of the best bird-watching in Arizona. Because they need it quiet, a birder prefers the area to have limited or no access for other user groups except for quiet observers and researchers.</p> <p><u>Problem</u></p> <p>Because birders prefer a quiet environment, other “noisier” activities might be in conflict.</p>

APPENDIX

STUDENT JOURNAL

Tumacácori National Historical Park

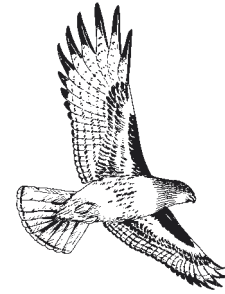


Students will complete the following journal as
part of the field trip to
Tumacácori National Historical Park.

*Please make copies, excluding this title page,
for each student.*

JOURNAL

Tumacácori National Historical Park



Name: _____

Date: _____

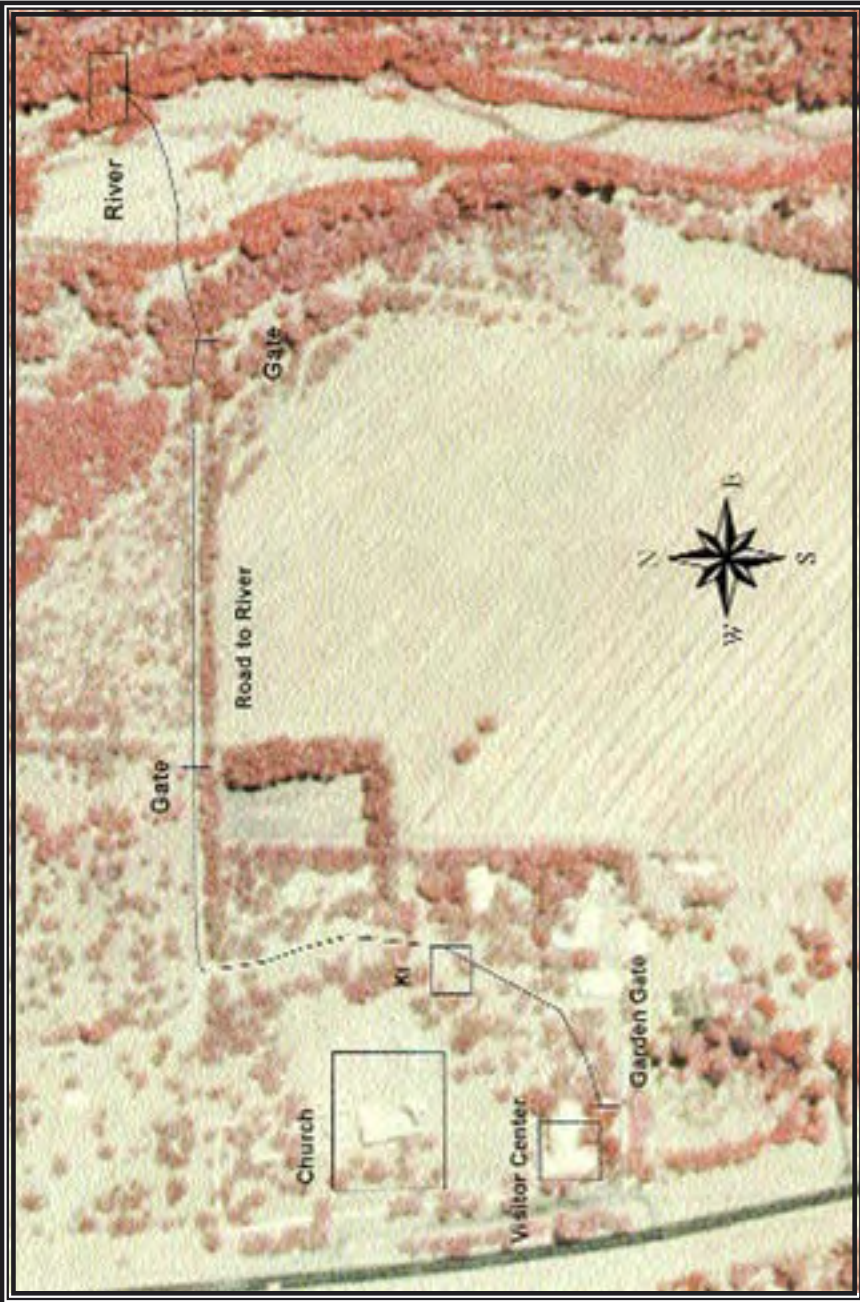


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PARK RULES AND SAFETY

Tumacácori National Historical Park preserves an area of great significance to the history of both the United States and Mexico. With more than 65,000 visitors a year we work hard to insure that everyone has an enjoyable and safe visit. To help preserve the park's resources as well as protect our visitors, please follow these rules. Your support is important.

- * Student must stay in their specified groups and under adult supervision at all times.
- * Collecting of natural and cultural objects is illegal. Please leave everything as you find it for others to enjoy.
- * Please stay on walkways and trails.
- * Please do not climb, sit, or stand on any walls or trees.
- * Please don't play in the garden fountain.
- * Please help us keep the bathrooms clean and tidy for other visitors.
- * Please show common respect, at all times and in all places, to other visitors and to this unique historical treasure.



THE AMERICANS

Rely on your experience and knowledge of the early Americans that visited or lived in the Santa Cruz Valley. Answer the questions as though you are one of these early settlers to the area.

QUESTIONS

1. Do we, as Americans, honor or respect wildlife? In what way?
2. What plants, animals or their parts are used in our daily culture for:
 - a. food
 - b. clothing
 - c. religious ceremony
 - d. story, art or song
 - e. shelter
3. The Americans used the natural resources in order to live and survive, and in doing so changed their environment. List at least three ways in which it changed.

BIRDS OF TUMACACORI

CHECKLIST (Circle or list birds sighted)



Bewick's Wren



Phainopepla



Black-Chinned Hummingbird



Red-Tailed Hawk



Northern Cardinal



Greater Roadrunner



Gila Woodpecker



Say's Phoebe



Mockingbird



Turkey Vulture



Mourning Dove



Vermilion Flycatcher

THE O'ODHAM, APACHE AND NATURE

At the Ki: O'Odham "Ki" or House

Rely on your experience and knowledge of the O'odham and Apache cultures that lived among the trees of the Mesquite Bosque. Answer the questions as though you are one of the people of an O'Odham or Apache village.

QUESTIONS

1. Do my people honor or respect wildlife? In what way?
2. What plants, animals or their parts are used in our daily culture for:
 - a. food
 - b. clothing
 - c. religious ceremony
 - d. story, art or song
 - e. shelter
3. The Native Americans used the natural resources in order to live and survive, and in doing so changed their environment.
List at least three ways in which it changed.

JOURNEY TO THE HEART OF THE SANTA CRUZ RIVER

6. Without getting up, use your hands to find the warmest and coldest places around you.
 - a. Describe the coldest spot
 - b. Describe the warmest spot
7. Close your eyes and focus your attention on your sense of smell. Describe at least one smell.
8. Write a vertical poem like the example below.
Choose a word (short or long) that captures the feeling of the place where you are. Then use each letter of the word to begin a line (word or phrase) of your poem.

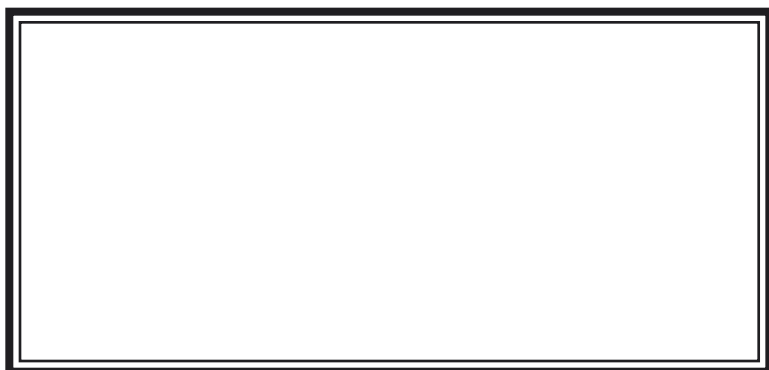
example: Silently I sit
 Peaceful and content
 Running water
 Inside a towering forest of Cottonwoods
 Nurturing my soul
 Giving life

JOURNEY TO THE HEART OF THE SANTA CRUZ RIVER

Choose a special spot within the designated area, somewhere you can sit, enjoy nature, reflect and write.

1. What are some of the first things you notice about the spot you chose?

2. Sketch your spot.



3. Name your special place. (example: Mesquite Heaven)

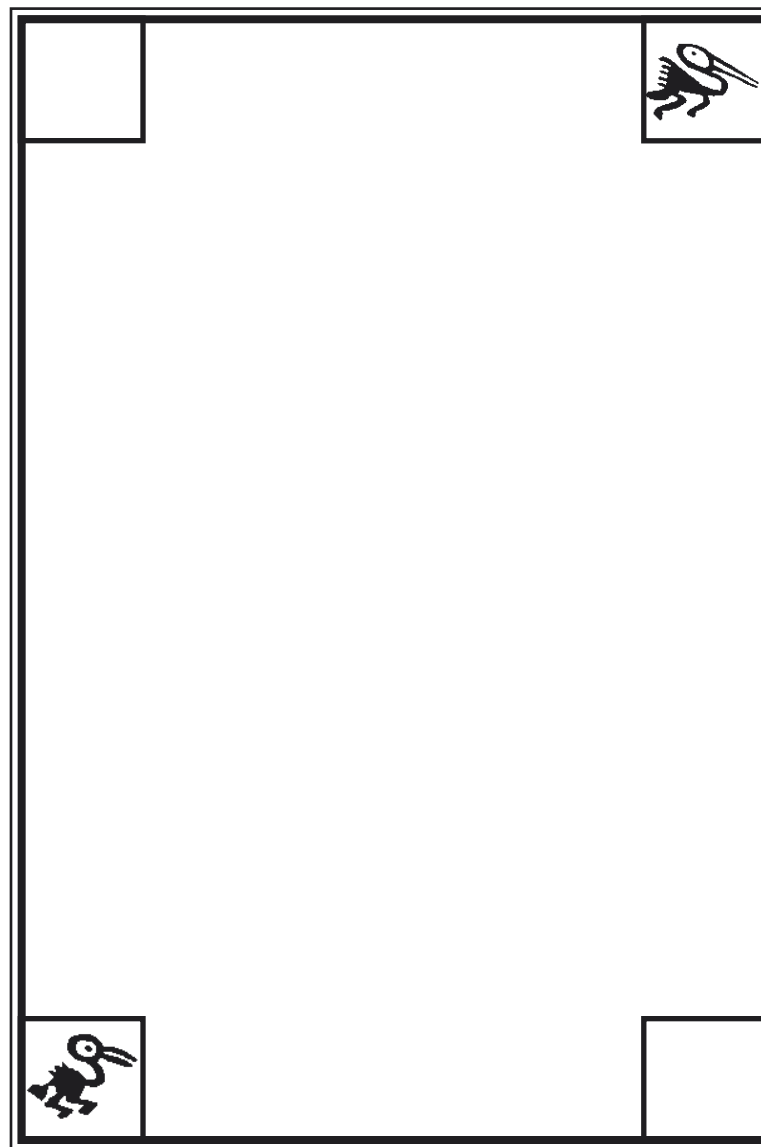
4. Listen for at least 3 different sounds. List them.

- a.
- b.
- c.

5. How many different birds can you hear? Describe, in writing, at least one bird's call.

ROCK ART

Draw one or more original Rock Art pictures depicting the Native Americans relationship with nature. **No Copying!**



MISSIONARIES AND THE ENVIRONMENT

In the mission church

Rely on your experience and knowledge of the Mission culture. Answer the questions as though you were a Jesuit or Franciscan priest living at the mission.

QUESTIONS

1. Do my fellow missionaries honor wildlife? In what way?

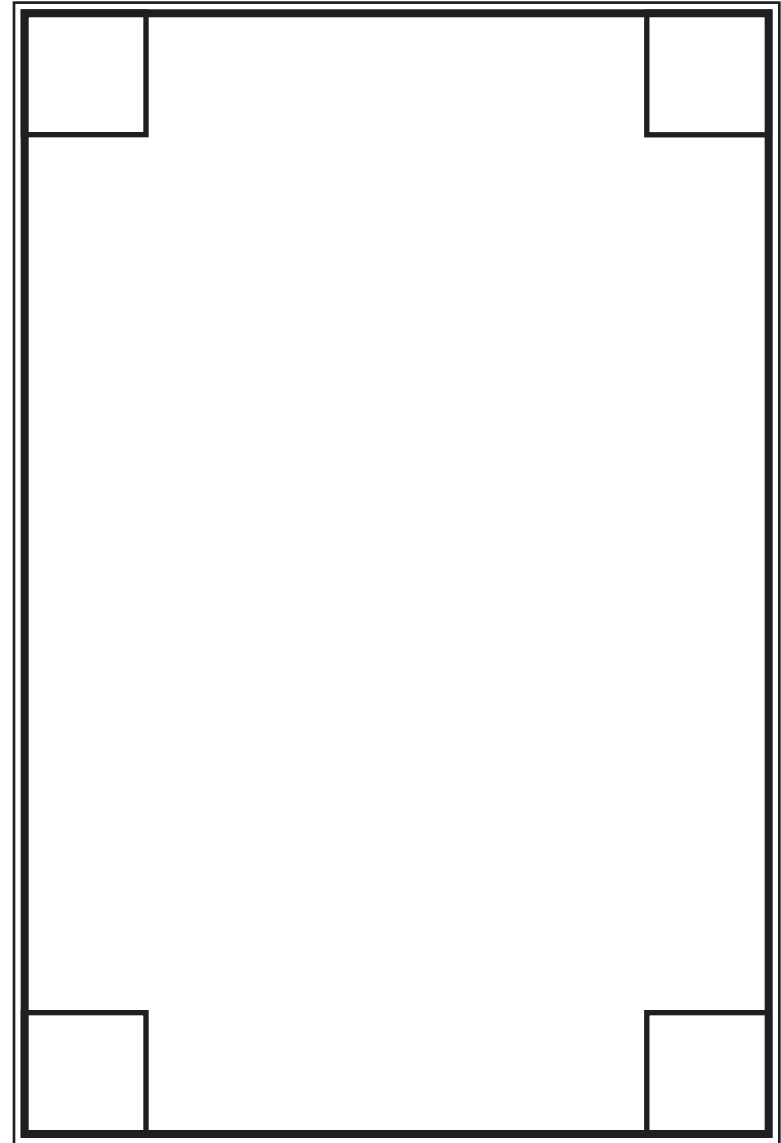
2. What plants, animals or their parts are used in our daily culture for:

- a. food
- b. clothing
- c. religious ceremony
- d. story, art or song
- e. shelter

3. The Spanish used the natural resources in order to live and survive, and in doing so changed their environment. List at least three ways in which it changed.

RELIGIOUS ART - ICONS

Draw one or more original Religious Art pictures depicting Missionary culture. **No Copying!**





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