Colorado River Ecology

Travelin' Trunk
Lesson Plan

Dear Educator,

We are pleased that you and your class are taking part in Grand Canyon National Park's Travelin' Trunk program. This program is designed to transport students and teachers to one of the world's premier learning destinations without ever leaving the classroom.

Travelin' Trunks provide a variety of materials and activities designed to assist you in making classroom study of Grand Canyon lively and interesting. Each trunk has a particular focus, and all are equipped with more material than most classrooms can typically use. This allows teachers to choose from a variety of lesson plans and activities in order to complement existing required curriculum.

We suggest that you review this teacher's guide and the contents of the trunk. Then, choose lessons and activities most appropriate for your students.

Please fill out the enclosed evaluation form. This feedback is important to us and future trunk users. We review and improve the contents of the trunks based on your feedback.

A ***Certificate of Completion*** is enclosed for you to copy and issue to your students. Please return the original to the binder for others to use.

Instructions for shipping the trunk back to the Grand Canyon Association are included in this binder. If the trunk needs replacement items, or if you have any questions, please contact us at **outreach@grandcanyon.org**, or by phone: 800-858-2808 ext. 7141 or 928-638-7141.

Please keep in mind that many of the items contained in the trunk are available for purchase through the Grand Canyon Association mail order department at 800-258-2808 ext 7030 or online at www.grandcanyon.org.

Thank you for visiting the Grand Canyon!

Grand Canyon Association

CONTENTS

LESSONS

RESOURCES & INFORMATION

LESSON 1 *WHY NATIONAL PARKS?*

DURATION	About 15-20 minutes
LOCATION	Classroom
KEY VOCABULARY	National park, mission, protection, preservation
TRUNK MATERIALS	Map of Arizona
ADDITIONAL MATERIALS	U.S. Map
LEARNING OBJECTIVES	Students will be able to: **1.** Locate Grand Canyon on a U.S. and/or Arizona map **2.** Explain the reasons national parks exist
BACKGROUND	Grand Canyon was first given federal protection as a forest reserve in 1893. It later became a national monument. In 1919 it was made a national park, only three years after the creation of the National Park Service. The National Park Service is an agency of the Department of the Interior and oversees more than 80 million acres of public land in the United States. The mission of all national parks and monuments is the same: *"To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."* National Park Service, Organic Act, 1916 Grand Canyon National Park protects 1,904 square miles (1.2 million acres) including the canyon and the plateaus on both the North and South Rims. Almost five million visitors come from all over the world to enjoy Grand Canyon each year. Prior to the creation of Grand Canyon National Park, many people came to the canyon with dreams and schemes for making their fortunes. One of the things tried was mining. Bat guano, copper, asbestos, and uranium were mined through a variety of methods. Tourist camps and hotels were built both in the canyon and on the rim. Building a railroad through the canyon was also entertained.

SUGGESTED PROCEDURE

Ask students the following questions:

1. Who has been to a national park? Which park or parks?

2. What was special about it?

3. How was the national park different from other parks or attractions that you have visited? Using a map of the United States ask students to locate the Southwest, then Arizona.

Explain that Grand Canyon National Park is located in the northern part of Arizona.

4. Why do we have national parks? What is their mission? (clarify as needed)

Explain to students that the materials and activities in the trunk are for their enjoyment and learning. It is hoped that as they increase their knowledge and appreciation of Grand Canyon National Park, they will also focus on the beautiful and interesting places in their area that are worth visiting and protecting.

EVALUATIONS

Ask students to imagine what Grand Canyon might be like if it were not protected as a national park? What might have been built there, and what might it be like to visit?

EXTENSIONS

1. Ask students to think of a feature or an area nearby that they feel would be worthy of preserving as a park. Have them explain (either verbally or in writing) why. What would be the benefits of this area becoming a park?

2. As time permits, or as a follow-up to trunk use, have students design a park and draw a map of it with a key to show the layout. Would this park preserve and protect the area or feature? Would it provide for the enjoyment of visitors without destroying what made it special in the first place?

LESSON 2 *COLORADO RIVER ECOLOGY SIMULATION*

DURATION	Two class periods or more
LOCATION	Classroom
KEY VOCABULARY	Riparian, sediment, rapid, debris flows, dam, ecosystem, hydroelectric power, native, exotic, reservoir, adaptation, endangered, extinct
TRUNK MATERIALS	• Model pieces: pre-dam red-brown river, post-dam green river with shorelines, brown Little Colorado River, dam, blue Lake Powell, sandpaper beaches, labels • Activity pieces: plant, animal, and event cards • Chart of pre- and post-dam river changes (found in binder) • Slide Set and Key • Map of Colorado River • Plumbing of the Colorado River poster • Books: *The Colorado River, Watts Library; Grand Canyon River Guide; An Introduction to Grand Canyon Ecology; Where Does Electricity Come From?*
LEARNING OBJECTIVES	Students will be able to: **1.** Name five ecological changes resulting from the construction of Glen Canyon Dam. **2.** Discuss the benefits and drawbacks of these changes. **3.** Formulate and express their ideas aloud or in writing with regard to the above.
BACKGROUND	Glen Canyon Dam was completed in 1963. It was built for the production of hydroelectric power, water storage, flood control, and to extend the life of Hoover Dam by slowing the rate of sediment fill in Lake Mead. Since its completion the changes to the Colorado River through Grand Canyon have been dramatic. Canyon life forms have made extraordinary adaptations to these shifts or in some cases have died out. See the chart in this guide for an overview. Other background resources include the books listed above, and related Web sites listed later in this guide.

LESSON 2 *COLORADO RIVER SIMULATION (cont.)*

SUGGESTED PROCEDURE

This activity is designed to engage students in exploring changes in the Colorado River corridor through Grand Canyon, and expressing their ideas and opinions about them.

1. Introduce vocabulary words as needed (see following vocabulary list). Use other resources listed above as needed to give students the desired background on Glen Canyon Dam and the resulting downstream changes.

2. Using a United States map, locate Grand Canyon and the Colorado River. Point out that the Colorado River basin drains portions of seven states, including Colorado, Utah, Wyoming, New Mexico, Arizona, Nevada, and California (see map and poster in trunk). The Colorado River has had many dams constructed along its course-more than any other river in the world. Discuss why people build dams (hydroelectric power, flood control, irrigation for farming, water supplies for growing cities, recreation). Ask students to explain what some of the negative effects of damming a river might be (loss and change of habitat, loss of native fish, beach erosion, controlled flow of water). Tell them that they will be participating in a simulation activity that allows them to explore some of the changes and effects resulting from the construction of Glen Canyon Dam, a few miles upriver from Grand Canyon National Park.

3. Complete the Colorado River simulation parts 1 and 2 allowing 30-45 minutes for each part.

If you are working with a large number of students you may wish to divide them into groups to give them a more hands-on experience. If so, have some work on other activities or work independently (for example, research Grand Canyon issues on the Internet, view one of the videos, or use the CD-ROM). Give each group the opportunity to work through the pre- and post-dam river simulation. See complete directions below.

SUGGESTED PROCEDURE (cont.)

Part 1: The pre-dam Colorado River
As the model is laid out, place the appropriate labels on it.

1. In an area with open floor space, lay out the long red-brown fabric to represent the pre-dam Colorado River. As you work through the activity, fold and unfold it to show how it changed from a small flow to a raging torrent depending on the time of year and storm activity.
2. Arrange the beaches (sand paper), plants, animals, and fish to give a visual representation of what lived in the river and along its banks before the dam was built (see accompanying chart). Allow time for students to read aloud the information on the back of the cards.

Explain: scientists do not have a complete picture of the life before the dam. The cards represent some of the more common species of plants and animals.

3. The pre-dam river was affected by a number of factors including snowmelt, seasonal precipitation, and climate changes. Place the event cards in a pile face down beside the river. Ask a student to draw one and read the event (not results) aloud. Repeat with other event cards. As each event card is turned up, allow the students to predict the effects it will have on the river, its plants, and its animals. Use the chart and the "results" given on the cards to guide discussion and arrangement of the model.
4. Discuss each event and how it would affect the river, beaches, plants, and animals. Make appropriate changes to the model to reflect the effects of the event. Discuss the changes made.
5. As a group, answer the following question: What would be considered a normal annual cycle for the Colorado River before the construction of Glen Canyon Dam?

Explain: that annual flooding caused by spring snowmelt alternated with low water levels through the winter months and in low precipitation years. Temperatures changed dramatically with the seasons.

6. What were the effects of this natural cycle of events on the plants, animals, and beaches in Grand Canyon?

Explain: that annual flooding scoured the plant life from the beaches allowing for little stable streamside habitat for animals. Flooding also cleared out driftwood, moved rocks, and rearranged rapids. Beaches were re-formed as flood waters deposited sediments. Muddy water and temperature variations determined the kinds of fish that thrived here.

LESSON 2 *COLORADO RIVER SIMULATION (cont.)*

SUGGESTED PROCEDURE (cont.)

Part 2: The post-dam Colorado River

1. In an area with open floor space, lay out the red-brown fabric to represent the pre-dam Colorado River. Place the dam across the river.

2. Lay out the blue-green/multi colored, patchwork fabric to represent the post-dam Colorado River below the dam. The pinkish colored cloth represents the soft sedimentary rocks in Grand Canyon. The black fabric represents the hard metamorphic rock in the bottom of the canyon. The hard rock called Vishnu Schist causes a constriction rapid shown by the current marks and white water. The brown felt fabric will be folded over the green when storms flood the Little Colorado River and other tributaries carrying a sediment load into the Colorado River. Place the blue, irregular-shaped fabric behind the dam to represent Lake Powell, the reservoir created by the dam. Refer to color diagram for layout.

Explain: that Glen Canyon Dam is one of many dams on the Colorado River. In fact, in the geologic past there were a number of natural lava dams that affected the river's flow. Glen Canyon Dam was completed in 1963. It took until 1980 for Lake Powell to reach its full depth. The dam rises 600 feet above the riverbed and ten million tons of concrete was used in its construction. The dam is operated and maintained by the Bureau of Reclamation under orders from the Western Area Power Administration of the U. S. Department of Energy. How much water is released, and when, is determined by the demand for electrical power. When power is needed water is released through eight 15-foot tunnels located deep beneath the surface of Lake Powell, turning eight giant turbines (generators) at the base of the dam. This water flowing into the river downstream from the dam is a constant 48° F and is blue-green in color.

Ask students to explain the change in color and temperature. (The sediment is trapped behind the dam and settles to the lake bottom. Water is released from deep within the lake and runs clear and cold.)

3. Arrange the beaches, plants, animals, and fish to give a visual representation of what now lives in the river and along its banks.

Explain: Streamside vegetation is now abundant due to the absence of scouring floods. This in turn has allowed many birds, insects, and other animals to thrive. Because the water is now clear most of the time and cold all of the time, some native fish are extinct or struggling to survive while non-native species of trout and carp flourish.

LESSON 2 *COLORADO RIVER SIMULATION (cont.)*

SUGGESTED PROCEDURE (cont.)

4. Place the event cards in a pile face down beside the river. Draw one and read it aloud.

5. Discuss the event and how it would affect the river, beaches, plants, and animals, as well as human activity. Make appropriate changes to the model to reflect the effects of the event.

6. Continue through remaining event cards as directed above.

7. As a group, answer the following questions:
A. How has the river changed since construction of the dam? (Refer to chart provided as needed and use model to make observations.)
B. What is the normal cycle for the river now? Why?
C. What beneficial changes can you observe?
D. What changes do you observe that are not beneficial?
E. Which of these changes are matters of opinion?

Explain: that flooding, both planned and unplanned, has occurred since the construction of the dam. What reasons are given for these floods? (Unexpected high runoff over-filling the lake or experimentation to see if beach erosion can be counteracted.) Since the construction of Glen Canyon Dam two other dams in Grand Canyon have been repeatedly proposed. Many people actively opposed these dams and they have not been built.

8. Show the slides included in the trunk. Observe and discuss what they show. Tie in with the model experience just completed.
See end of Lesson 3 for suggested extensions and evaluation.

EVALUATIONS & EXTENSIONS

See end of Lesson 3 for suggested extensions and evaluation.

LESSON 2 *COLORADO RIVER CHANGES*

Characteristic	Pre-Glen Canyon Dam	Post-Glen Canyon Dam
Water Color	Reddish-brown, full of sediment	Green and clear, except when flooded by tributary rivers and streams.
Water Temperature	33-40°F winter, 75-85°F summer.	48°F year round. Warms a few degrees downstream in the summer.
Sediment Load	Heavy: Average of 380,000 tons passed Phantom Ranch daily.	Light: Average of 40,000 tons pass Phantom Ranch daily.
Sandbars & Beaches	Plentiful. Renewed by annual flooding.	Dramatic decrease in size and number.
Water Flow Levels	Varied tremendously with annual seasonal flooding.	Stabilized. Released to accommodate human energy consumption.* No flooding, except 1983, 1996, 1997 (see "Floods" below).
Vegetation	Scoured from beaches during annual flooding. Little plant life growing in the river due to heavy sediment load.	Increased. Grows to water's edge. Much more stable. Dominated by tamarisk (a non-native riparian shrub). Single-celled plants including diatoms and algae (fed upon primarily by non-native fish species).
Wildlife	Fish: Native fish, some introduced species—not well documented Birds: species and numbers held in check by flooding.	Fish: Only four native fish species present, one of which, the humpback chub, is endangered. Many exotic fish doing well. Birds: Dramatic increase in pieces due to expanded and stable habitat. Some endangered species.
Human Activity	Limited. Unregulated.	Very popular for river rafting. Strictly regulated.
Floods	Occurred seasonally. Scoured and rebuilt beaches. Cleared out large boulders and lake overflow debris in the river.	Controlled or man-made: 1983 unplanned flood; 1996 planned 8-day flood; 1997 unplanned flood to create room for anticipated snowmelt.
Glen Canyon Dam	The river flowed through this natural, wild canyon providing habitat for plants and animals and quiet beauty for human enjoyment.	Now full of water and sediment. Created Lake Powell and its many recreational opportunities.

** Due largely to public pressure, an Environmental Impact Statement on the operation of Glen Canyon Dam was begun in 1989. This study resulted in the decision to set minimum and maximum flow levels in order to reduce the dramatic fluctuations that cause beach erosion.*

LESSON 2 *COLORADO RIVER SLIDE KEY*

Slide #	Subject
1.	Glen Canyon Dam, Page, Arizona
2.	Glen Canyon Dam, Page, Arizona
3.	Lake Powell stretches for miles behind Glen Canyon Dam
4.	Little Colorado River on its way to joining the Colorado River
5.	Colorado River flowing green, with flooded, sediment-laden Little Colorado River waters flowing in and mixing
6.	Cardenas Creek, an example of a tributary stream
7.	Rock, mud, and clay flowing into river
8.	Boat rowing through rapid
9.	Boat going through muddy water rapid
10.	Boat approaching rapid—observe constriction that causes rapid
11.	Tamarisk, an exotic species thriving on shore
12.	Flooded tributary stream flowing into river
13.	Person observing results of storm-caused debris flow
14.	Brown river, streamside tamarisk
15.	Green-colored river, riffle caused by rocks carried into river
16.	Flooded streamside vegetation
17.	Beach erosion along river
18.	Beach erosion along river at Furnace Flats
19.	Tributary stream beach erosion
20.	Boats on the beach
21.	Beach and vegetation
22.	Historic photo of early river runner's (Norman Nevills) boat
23.	Ellsworth Kolb in rapids at Cataract Canyon, USGS research trip, 1921
24.	Tributary canyon along Colorado River

LESSON 3 *GLEN CANYON DAM DEBATE*

DURATION	One or two class periods
LOCATION	Classroom
KEY VOCABULARY	Stakeholders, habitat, ecosystem, native, exotic, extinct, endangered
TRUNK MATERIALS	Stakeholder information cards. Additional background may be found in books and on related Web sites listed in this guide.
LEARNING OBJECTIVES	Students will be able to: **1.** Explain the point of view of two stakeholders who would benefit from the dam and the changes it has brought. **2.** Explain the point of view of two stakeholders who would not consider the dam and the changes it has brought to be beneficial. **3.** Explain their own point of view regarding these issues.
BACKGROUND	Since the completion of Glen Canyon Dam in 1963, the areas both above and below the dam have undergone many significant changes. Having addressed many of those changes in previous lessons, this lesson is designed to encourage critical thinking and understanding that this is not a simple matter of good or bad, but rather involves many points of view and considerations. The debate over whether or not to decommission Glen Canyon Dam and drain Lake Powell is occurring in real life, and is both an interesting and emotionally charged discussion.

LESSON 3 *GLEN CANYON DAM DEBATE (cont.)*

SUGGESTED PROCEDURE

Conduct a debate on the problems and advantages of draining Lake Powell or on the building of the dam in the first place. Have students role-play from the point of view of various stakeholders using stakeholder information cards provided in the trunk.

Video taping the debate or reading of the letters adds another dimension to the lesson.

1. Introduce the term stakeholder as needed. Stakeholders are those who have an interest in the management of the river. Brainstorm a list of stakeholders (endangered fish, bald eagles, power generation producers and users, water and Lake Powell users, Colorado River rafters, environmentalists, Native Americans, residents of Page, Arizona, the town beside the dam and Lake Powell, etc.). Think about what their interests are and how they might feel about the Colorado River, Glen Canyon Dam, and the changes the dam has brought. Ask students if they consider themselves to be stakeholders.
2. Pass out the stakeholder role-play cards to students. Allow time for them to read the cards and consider what their point of view will be for the debate. Make sure students understand that they may or may not agree with the role they play, and that they will have a chance later to express any personal opinions they may have.
3. Establish the rules for speaking during the debate. For example: one speaker at a time, speakers must be recognized before speaking, speakers introduce themselves and whom they represent, whenever possible give specific reasons for their stand, etc.
4. Following the debate, take a class vote to determine whether the dam is to be built or the lake drained. Students should carefully consider the arguments and evidence presented during the debate and should be prepared to explain their personal points of view.

EVALUATIONS FOR LESSONS 2 & 3

Assign students to complete one or more of the following:
1. An article explaining the changes in the Colorado River resulting from Glen Canyon Dam.
2. A letter to the Glen Canyon Dam Commission stating their points of view and the reason for them.
3. A persuasive essay taking either the pro or the con side of constructing Glen Canyon Dam or draining Lake Powell.
4. A song or a poem describing the pros and cons of Glen Canyon Dam.
5. A poster or a mural depicting the ecological changes they have learned about

EXTENSIONS FOR LESSONS 2 & 3 (cont.)

1. Allow students time to use the Grand Canyon CD-ROM to take a virtual trip down the Colorado River.
2. Invite a speaker to talk about endangered fish of the Colorado River (in Arizona contact Arizona Game and Fish Department)
3. Visit or research a local dam and its changed ecosystem.
4. Write to the Bureau of Reclamation or Army Corps of Engineers for more information on their policies.

FURTHER INFORMATION

For more information consult the following books:
The Colorado River Through Grand Canyon-Natural History and Human Change by Steven W. Carothers and Bryan T. Brown
A River No More—The Colorado River and the West by Philip L. Fradkin
Cadillac Desert by Mark Reisner.
A Story that Stands Like a Dam by Russel Martin.
Also, see related the Web sites listed later in this lesson plan.

LESSON 4 *VIDEO VIEWING*

DURATION	One or two class periods
LOCATION	Classroom
KEY VOCABULARY	Erosion, habitat, rapid, riparian, sediment
TRUNK MATERIALS	*River Song* video (17 minutes running time)
LEARNING OBJECTIVES	Students will be able to: **1.** Explain the significance of the Colorado River to Grand Canyon **2.** Explain who John Wesley Powell was and his role in exploring the Colorado River and Grand Canyon.
BACKGROUND	The video *River Song* provides a good overview of the Colorado River, its natural history, and its role in carving the canyon. Students will have the chance to see animals, plants, geology, and the great river itself in action. They will also be introduced to the river's first major explorer, John Wesley Powell.
SUGGESTED PROCEDURE	This video may be used as a preview to the other trunk lessons or after lessons 2 and 3 as a wrap up. 1. Give the students some ideas of what to focus on. These might include the role of the river in forming Grand Canyon, the color of the water, the streamside vegetation, or information on John Wesley Powell and other famous river runners. If appropriate assign note taking. 2. Follow the video with appropriate discussion. Questions may include the following: A. What role has the Colorado River played in the formation of Grand Canyon? B. Did you notice the color of the water? It is sometimes brown but more often green. Why? C. What made John Wesley Powell's expedition challenging and dangerous? What value did the expedition have?
EVALUATIONS	Evaluate students based upon participation in discussion and/or quality of notes if note taking is assigned.
EXTENSIONS	See other trunk materials and related Web site references in this guide. Depending on your goals and time available, view some or all of the *River Runners* video. It is fairly long but interesting, educational, and entertaining. Assign research reports on river runners and explorers, the Colorado River, and Glen Canyon Dam.

LESSON 5 *LEARNING CENTER*

DURATION	Duration of trunk visit
LOCATION	Classroom. You may wish to put out all appropriate materials on a table or counter, or a few items at a time. You may choose to use the activities as whole-group activities or individual. This will depend on your group, your goals and the time and space available.
TRUNK MATERIALS	Posters, books, pamphlets, audio/video, CD- ROM, and other trunk items.
ADDITIONAL MATERIALS	Provide an area specifically for these activities. Have on hand a cassette player (with headphones?), TV/VCR, PC (for CD ROM), pencils, paper. If coloring books are used, please select and copy appropriate pages for students to color. Do not write in or on any of the materials provided.
LEARNING OBJECTIVES	Students will be able to express verbally or in writing, their thoughts and feelings about Colorado River issues and Grand Canyon National Park in general.
BACKGROUND	The intent of the learning center is to allow exploration of trunk materials by small groups or individuals. Allowing time and choice offers students the opportunity to reflect upon and respond to the materials using a variety of learning styles and modalities (music, art, poetry, etc).
SUGGESTED PROCEDURE	Create a Learning Center by setting out materials on a table or counter with instructions. Spend a few minutes introducing the students to the materials. Set aside time when individuals or groups may work with these materials and set clear expectations. For example: complete one activity before going on to the next. Indicate how many people may work in the area at one time. Where should completed work be placed? Possible activities to accompany music include painting, drawing, writing a poem or story. Books may be read aloud to each other. Crossword puzzles could be created from vocabulary used in books. After reading a book, a small group may perform a short skit telling the story. Using View Masters ™, ask students to write one word expressing what each frame makes them think of then, create a poem including those words.
EVALUATION	Evaluation will vary depending on how these materials and activities are used, and, the expectations teachers have set for students.

COLORADO RIVER ECOLOGY VOCABULARY LIST

adaptation	A change that a living thing goes through so it fits in better with its environment
dam	A strong barrier built across a stream or river to hold back water.
ecology	The study of the relationship between plants, animals, and their environment; from the Greek word for "home"—therefore, the study of homes.
ecosystem	A community of animals and plants interacting with their environment.
endangered	A species or type of plant or animal that is in danger of becoming extinct.
erosion	The gradual wearing away of a substance by water or wind, as in soil erosion.
exotic	From another part of the world; non-native
ecosystem	A community of animals and plants interacting with their environment
extinct	If a type of animal or plant is extinct, it has died out.
habitat	The place and natural conditions in which a plant or animal lives.
hydroelectric power	Power generated by the energy of running water.
mission	A special job or task
national park	An area set aside by Congress and owned by the people of the United States for the purpose of public use and preserving the best of America's scenery, history, nature, and wilderness for future generations.
native	An animal or plant that originally lived or grew in a certain place. The kangaroo is a native of Australia.
preservation	The act of protecting something so that it stays in its original state.
protection	The act of guarding or keeping something safe from harm, attack, or injury.
rapid	A place in a river where the water flows swiftly.
reservoir	A holding area for storing a large amount of water (Lake Powell is the reservoir behind Glen Canyon Dam
riparian	Of, on, or relating to the banks of a natural course of water.
sediment	Dirt, rock, sand, and other matter carried by water.
stakeholders	Those who have an interest in the management of the river and the conditions that result from management decisions (such as dams, flow levels, floods, introduction of non-native species, river-running permits).

COLORADO RIVER ECOLOGY *TRUNK INVENTORY*

TEACHER'S GUIDE

RIVER MODEL

Model pieces: pre-dam river (long red-brown fabric), post-dam green river with shorelines (multi-colored patchwork fabric), Little Colorado River (short red-brown fabric), Lake Powell (Blue irregular-shaped fabric), dam, sandpaper beaches, labels for model. Activity pieces; plant, animal, and event cards, both pre- and post-dam, color diagram (matches post-dam fabric). Pictures of Colorado Plateau, Colorado River Drainage, pre-dam/post-dam graph, and the river in the Inner-Gorge of the Grand Canyon.

BOOKS

The Colorado River—Watts Library
Essentials of Aquatic Ecology in Colorado River
Fun Guide to Grand Canyon (2 copies)
Glen Canyon, Lake Powell: The Story Behind the Scenery
Grand Canyon Field Guide
Grand Canyon River Guide
An Introduction to Grand Canyon Ecology
Where Does Electricity Come From?

AUDIO/VIDEO

360 Degrees of Grand Canyon DVD/CD Rom
River Song (video)
Run the Wild Colorado: River Runners of the Grand Canyon (video)
Grand Canyon CD-ROM
Slides

POSTERS

Game Fish of Arizona
Grand Canyon (NPS)
Grand Canyon (scenery)
Native Fish of Arizona
The Plumbing of the Colorado River Basin

PAMPHLETS

Leave No Trace Outdoor Skills & Ethics pamphlet
Leave No Trace Outdoor Skills & Ethics plastic card (2)
Minimum Impact on the River/Archeological Sites (2)
Pocket Field Guide to Grand Canyon (2 copies)
Recreational Map of Arizona (folded)

OTHER

View Masters (2 with 9 reels)
Stakeholder cards (set of 12)

RESOURCES AND INFORMATION *ACADEMIC STANDARDS*

NATIONAL SCIENCE EDUCATION STANDARDS

Content Standard C: Life Science

Grades K-4	Organisms and Their Environments
Grades 5-8	Populations and Ecosystems

Content Standard F: Science in Personal and Social Perspectives

Grades K-4	Changes in Environments
Grades 5-8	Populations, Resources, and Environments
	Natural Hazards

ARIZONA ACADEMIC STANDARDS

Standard 1: Science as Inquiry

Students understand and use the processes of scientific investigation and scientific ways of knowing. They are able to design, conduct, describe, and evaluate these investigations. They are able to understand and apply concepts that unify scientific disciplines.

Standard 2: History and Nature of Science

Students understand the nature of scientific ways of thinking. Students understand that scientific investigation grows from the contributions of many people.

Trunk lessons and activities address these standards. However, it is the teacher's responsibility to integrate the activities into an appropriate framework of long- and short-term goals and adapt them to appropriate science curricula.

RESOURCES AND INFORMATION *RELATED WEB SITES*

Listed below are Web sites that you may find of interest.

GENERAL GRAND CANYON SITES

Grand Canyon National Park Environmental Education- Includes information on a variety of programs, activities, and contact information for the park's environmental education specialist. ***http://www.nps.gov/grca/education***

Grand Canyon Association- Information on educational opportunities and materials can be found here as well as information pertinent to the trunk program.
http://www.grandcanyon.org/fieldinstitute

Grand Canyon National Park- Official Information The latest news from the park and a broad range of information. ***http://thecanyon.com***

Arizona Game & Fish Dept- learn about wildlife conservation and management. Includes a wildlife photo gallery. ***http://gf.state.az.us***

GRAND CANYON-RELATED ECOLOGY SITES

Peregrine Fund- Includes information on California condors as well as peregrine falcons. Of particular interest is the section called "Notes from the Field." Here you can read about what California condors and birds of prey are up to and how they are faring in the wild.
http://www.peregrinefund.org

COLORADO RIVER ECOLOGY SITES

Colorado River Management Plan- Read past and current *Soundings* newsletters and link to other interesting information.
http://www.nps.gov/grca/crmp

Colorado River Water Users- Good overview and background information on the river.
http://crwua.org

Colorado River Plateau Region
Find a wide variety of information on this area including the Colorado River and Glen Canyon Dam.
http://www.cpluhna.nau.edu/Places/places.htm

Using the search engine of your choice, type in "Colorado River." You will find many interesting sites from which to choose.

RESOURCES AND INFORMATION *PACKING & SHIPPING*

PACKING

Please reassemble the trunk contents as you found them. Double check to be certain all of the "pieces" are repacked by using the Trunk Inventory. This will ensure that the next user will have all they need, and will save the time and trouble of tracking down missing pieces. If pieces have been lost or damaged, please notify us so that we may replace them.

SHIPPING

Please carefully read the following RETURN SHIPPING INSTRUCTIONS.

The return shipping fee is already paid!! Use the enclosed return shipping label to ship the trunk back to us via UPS ground.

NOTE - If your school has REGULARLY SCHEDULED UPS shipping & receiving service, arrange for the trunk to go to that pickup/drop off location for UPS pickup.

NOTE - If your school **DOES NOT** have REGULARLY SCHEDULED UPS service, you must take the trunk box to an authorized UPS location such as *UPS Store*, *Mailboxes, etc.*, or give the labeled box to any UPS driver. To find the nearest authorized UPS location, call UPS at 800-742-5877 or visit their website at www.ups.com.

If you have any questions regarding return shipping procedures, please call the Grand Canyon Association: toll free 800-858-2808 ext. 7141

If you have not sent your shipping fee, please send a check for the following amount:
$15 Arizona $25 for states bordering Arizona $40 for all other states

Send Check To:
GCA / Travelin' Trunks
PO Box 399
Grand Canyon, AZ 86023

If you have questions or problems, **PLEASE CONTACT US!**
Grand Canyon Association
800-858-2808 ext. 7141
E-mail outreach@grandcanyon.org

RESOURCES AND INFORMATION *EVALUATION FORM*

Evaluation forms and self-addressed stamped envelopes are provided to help us to improve upon existing and educational outreach endeavors. We appreciate you taking the few moments to complete and return this form.

School/ Group Name _____ City _____

Name of Trunk Used _____

1. How many students used the trunk? _____

2. How many teachers used the trunk? _____

3. Have you used GCA Travelin' Trunks in the past? _____

4. Are you planning to use a trunk next school year? _____

5. How did you pay for the shipping fee?
School funds ___ Personal funds ___ Parent Group ___ Other ___

6. Please check items that were used:
□ teacher guide
□ lesson plans
□ videos
□ cassettes
□ cd rom
□ books
□ posters
□ slides
□ other (please be specific) _____

7. Favorite activity?
_____

8. Please rate your overall experience with the trunk by checking below:

□ excellent □ good □ good, but needs improvement □ poor

Additional Comments
_____
_____
_____