

**GRAND CANYON ASSOCIATION &
GRAND CANYON NATIONAL PARK
Natural & Cultural Resources Annual Research Fund
Call for Proposals**

Natural & Cultural Resources Annual Research Fund

Grand Canyon Association (GCA) is a nonprofit organization that works in partnership with Grand Canyon National Park (GCNP). It is GCA's mission to enrich the visitor experience through knowledge acquired from education and research programs. A strong part of GCA's mission is to support scientific and cultural research through the park Science Center.

Grand Canyon National Park, through Grand Canyon Association, is announcing a call for proposals to enhance the knowledge base and management of natural and cultural resources of Grand Canyon National Park. The GCA research grant fund is a maximum of \$35,000 per year (more than one project may be funded). Proposals should address research questions related to the physical, biological, ecological, or cultural sciences in order to inform and promote science based management. A list of priority research needs are included below.

FUNDING AWARD: up to \$35,000 annually. Fifty percent of the total grant award can be released after May 2007 award announcement. An additional 25% will be released after proof of adequate progress following March (month 10) progress reports. Remaining 25% will be released after final report and deliverables are submitted and approved by Grand Canyon Research Office.

A review panel consisting of GCNP Resource Managers, GCA Board of Directors and Peer Reviewers will evaluate the research proposals for grant award.

RESEARCH TIMELINE: June 1, 2007 – December 31, 2008 (19 mo). The 2008 Natural & Cultural Resources Annual Research Fund is planned for an earlier timeframe with Call for Proposals to be announced in Fall 2007.

PROPOSAL SUBMISSION DEADLINE: 1 April 2007, 5:00 pm

AWARD ANNOUNCEMENT: May 2007

SUBMISSION INFORMATION: Submit research proposals to Grand Canyon Science Center, Research Office, 823 N. San Francisco St., Suite B, Flagstaff, AZ 86001, Atten: Natural & Cultural Resources Annual Research Fund.

Submit the proposal by hardcopy (eight paper copies stapled plus one copy paper-clipped). Please make copies on front and back of pages and number the pages. Submit to address above by deadline. Proposals received after the deadline will not be reviewed and, therefore, not be considered for funding.

FUNDING CRITERIA and OVERHEAD COSTS:

All of the submitted research proposals must be well written and well developed, demonstrating current scientific knowledge, clear organization, and technical completeness. Proposals must follow the set guidelines (see below). Proposals reviewed as less than high quality, or not following all of the guidelines, will not be funded.

Graduate students may not serve as project PIs. They may be listed as a Co-PI, if the PI is the academic advisor. All graduate students working on a project must be identified. Grand Canyon National Park staff are not eligible, nor are employees or Directors of the Grand Canyon Association able to apply.

Grants will not be awarded that include administrative or overhead costs greater than 15%.

Grant recipient will be required to obtain a Research & Collection Permit from Grand Canyon Science Center Research Office. Contact Emma Benenati and NPS Research Permitting and Reporting System (Emma.Benenati@nps.gov; <http://science.nature.nps.gov/research/>).

Proposals will be evaluated on these points:

- Research Proposal must follow format guidelines listed in this document (see **PROPOSAL GUIDELINES** below).
- Problem Definition and Information Base: Is problem clearly defined and information base sufficient?
- Technical soundness and clarity of the research methods and plan.
- Qualifications of the investigator(s) and other key personnel and the adequacy of institutional resources to support the proposed research.
- Appropriateness and adequacy of the proposed budget to support the research.
- Merit of proposed research to inform GCNP resource management and primary research needs.

2007-2008 TIMELINE

March 1 (2007)	Call for Proposals
April 1 (2007)	Deadline for proposals
Week of May 1 (2007)	Awards announced
May (2007)	50% of award released
June 1 (2007)	Project begins
March (2008)	25% of award released following progress reports
December 31 (2008)	Project ends 25% award released following deliverables approval

TIMELINE FOR DELIVERABLES

March 2008	On-line short-form Investigator Annual Progress Report due (http://science.nature.nps.gov/research/) Written report due containing details of research progress.
August 2008	Draft Final Report due.
December 2008	Final Report and all other deliverables due on time to receive final 25% of award.

PROGRESS REPORTS AND FINAL REPORT REQUIREMENTS

Progress reports must be submitted in March 2008 (month 10) as an online short form Investigator Annual Report and a written report containing details of research project progress. Draft Final Reports are due August 2008 (month 15). Final reports are due by December 2008 (month 19). Funding will be terminated if the final report is not received by that date. Submit electronic version and 5 hardcopies to Grand Canyon Science Center, Research Office 823 N. San Francisco St., Suite B, Flagstaff, AZ 86001. Final report should be in MS Word and data, maps, photos, etc. must be in readable format. It must be confirmed that PI has had an informal meeting with park staff to discuss the research findings, including the project relevance and interpretation as related to the park.

PROPOSAL GUIDELINES

Proposal authors should write for a well-educated audience, who are generally knowledgeable in identified focal areas. Panel reviewers as a whole will have expertise across all disciplines of proposal subjects. In addition, independent peer reviews with expertise in the particular discipline will be obtained. The maximum proposal length limit is ten pages, single spaced with a minimum 12 pt font and 1 inch margins. The ten page limit includes tables, charts, and the literature citation, but excludes the cover sheet, bio-sketches, and CVs.

Submit the proposal in this format:

Cover Sheet - include proposal title, date, investigator and co-investigator name(s), institution, contact information.

Project Summary - specify clearly the GCA / GRCA research needs and outcomes addressed by the project. This summary must be in lay language that could be used for press releases or explanation to a non-scientific audience. Limit this section to one page.

Table of Contents

Background and Significance - of the Proposed Project

- Summarize the proposed project by describing the problem or issue being investigated, as well as any previous pertinent research with literature citations.

- A. **Statement of issue** - Describe the importance and relevance of the issue to be investigated to science and to GCNP. Provide relevant background information that clarifies the need for the project and why it is valuable for the research and/or collecting to be conducted in the park as opposed to areas outside the park.
- B. **Literature summary and citations** - Summarize the relevant literature regarding the issue, problem, or questions that will be investigated.
- C. **Scope of study** - Describe the overall geographic and scientific scope of the project.
- D. **Intended use of results** - Describe how the products will be used, including any anticipated commercial use.

Objectives / Hypothesis to be tested - Describe the specific objectives of the proposed project. Where appropriate, the objectives should be stated as specific hypotheses to be tested.

Methods - Describe how the proposed methods and analytical techniques will achieve the study objectives or test the stated hypothesis/question. Provide pertinent literature citations.

- A. **Description of study area** – Clearly describe the study area in terms of park name(s), geographic location(s), and place names. You should provide maps, park names, or geographic coordinates as appropriate. Indicate whether your work will take place in an area designated or managed as “wilderness” by the National Park Service.
- B. **Procedures** - Describe the proposed study design that addresses the stated objectives and hypotheses. Explain the methods and protocols to be employed in the field and laboratory, as appropriate.
- C. **Collections** - Describe the type, size, and quantity of specimens or materials to be collected, sampled, or captured, and your plans to remove them from the collecting site. Describe existing collections of similar specimens and why additional collecting is necessary. Provide scientific nomenclature where possible. Provide information on all other applicable federal or state permits where required.
- D. **Analysis** - Explain how the data from the study will be analyzed to meet the stated objectives or test the hypotheses. Include any statistical techniques or mathematical models necessary to the understanding of the analysis.
- E. **Schedule** - Provide a schedule that includes start of project, approximate dates of fieldwork/research, analysis, reporting, and completion dates.
- F. **Budget** - Briefly outline the expenses associated with this project and identify your expected funding source(s). Include the anticipated costs pertaining to the cataloging of collected and permanently retained specimens or materials.

Products / Deliverables

- A. **Publications and reports** - Describe the expected publications in addition to reports that will be generated as part of this study.
- B. **Collections** – Describe the proposed disposition of collected specimens or materials. If you propose that the NPS lend the specimens or samples to a non-NPS institution for long-term storage, identify that institution and give a brief justification for this proposal. Disposition to a non-NPS institution requires the permission of the NPS.
- C. **Data and other materials** - Describe any other products to be generated as part of the project, such as, photographs, maps, models, handouts, exhibits, software presentations, raw data, GIS coverage, or videos, and the proposed disposition of these materials. If data is to be collected from the public as part of this study, provide a copy of the data collection instrument (survey, questionnaire, interview protocol, etc.).

Literature Cited- Include full bibliographic citations for all reports and publications referenced in the proposal.

Qualifications - Curriculum vitae for the Investigator(s) and key staff. Also, provide a Bio-sketch or background summary and identify their training and qualifications relevant to the proposed project and their ability to conduct field activities

in the environment of the proposed study area. Describe previous research and collecting in NPS areas, including study and permit numbers if available.

Budget – Travel, equipment, salaries, stipends, etc. required to conduct research project must be listed in the Budget. Request for salaries or stipends must indicate what work is to be done to merit the payment and the rate of pay. Graduate stipends will be supported. Tuition and health insurance payments will not be supported.

Budget Explanation and Justification – Explain Budget requests in detail.

Supporting Documentation and Special Concerns - Provide information on the following topics where applicable. Attach copies of any supporting documentation that will facilitate processing of your application, such as other required federal and state permits, copies of peer reviews, letters of support and matching funding commitments, and certifications. Collection of information from the public when federal funds are used may require approval from the Office of Management and Budget.

- A. **Safety Plan** - Describe any known potentially hazardous activities, such as electro-fishing, rock climbing, scuba diving, whitewater boating, aircraft use, wilderness travel, wildlife capture, handling or immobilization, use of explosives, etc. The Safety Plan should identify hazards and methods to mitigate those hazards.
- B. **Access to study sites** - Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe duration, location, and number of participants for planned backcountry camping.
- C. **Use of mechanized and other equipment** - Describe any field equipment, markers, or supply caches by type, number, and exact location. You should explain how long they are to be left in the field. Explain the need to use these materials in restricted areas and the alternatives that were considered.
- D. **Chemical use** - Identify chemicals and hazardous material that you propose using within the park. Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into the environment. Attach copies of Material Safety Data Sheets.
- E. **Ground disturbance** - Describe the type, exact location, area, depth, number, and distribution of expected ground-disturbing activities, such as soil pits, cores, stakes, or latrines. Describe plans for site restoration of significantly affected areas.
Proposals that entail ground disturbance will be reviewed by a GCNP archeologist and may require an archeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including UTM's (NAD 83 xy coordinates) and identification of each ground disturbance area on a USGS 7.5-minute topographic map.
- F. **Animal welfare** - If the study involves vertebrate animals, describe your protocol for any capture, holding, marking, tagging, tissue sampling, or

other handling of these animals (including the training and qualifications of personnel relevant to animal handling and care). If your institutional animal welfare committee has reviewed your proposal, please include a photocopy of their recommendations. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal.

- G. **NPS assistance** - Describe any NPS assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from staff.
- H. **Wilderness “minimum requirement” protocols** - If some or all of your activities will be conducted within a location administered by the NPS as a designated, proposed, or potential wilderness area, your proposal should describe how the project adheres to wilderness “minimum requirement” and “minimum tool” concepts. Refer to NPS Management Policies for further information.

GRAND CANYON NATIONAL PARK RESEARCH NEEDS:

Natural Resources: Wildlife, Vegetation, ATBI (All Taxa Biodiversity Inventory), Recreation, Earth and Water, Air Quality.

Cultural Resources: Archaeology, Ethnography, History, Cultural Landscape, Historical Structures.

1) Wildlife

Avifauna Data Analyses and Post-Burn Data Collection

GCNP has an extensive database of avifauna point counts along transects based on habitat types that occur within the Park. This information was compiled during a three year inventory study from 1998 through 2000. There is a wealth of information concerning bird species richness and diversity by habitat type, and also a fair amount of density information for a limited number of habitats. Many of the areas covered by the bird and habitat transects have since been burned at varying intensities. A post-burn comparison of the parameters measured in the earlier study would provide valuable information concerning the effects of fire on the avifauna component of GCNP biota. The researcher would work with GCNP's Wildlife and GIS staff to select a subsample of the dataset to analyze, and would develop recommendations for future prescribed burns and fire-use incidents. For more information, contact Wildlife Program Manager RV_Ward@nps.gov (928-638-7756).

Bighorn GIS Predictive Model

GCNP has no data concerning bighorn demographics within park boundaries. While a complete census is not feasible given present funding levels, it may be possible to construct a GIS model based on topography, water sources, vegetation and/or other parameters to delineate adequate sample areas within which counts could be made which could be extrapolated to the park as a whole or serve as an index to population trends. The data acquired would be used in the upcoming Back-country Management Plan and

the implementation of the Colorado River Management Plan. For more information, contact Wildlife Program Manager RV_Ward@nps.gov (928-638-7756).

Goshawk Distribution and Reproduction

The goshawk is listed as a sensitive species in the state of Arizona due to concern over habitat loss and reduced population size. The goshawk has been found on both the north and south rims of GCNP. Knowledge of goshawk distribution and reproduction within the Park is limited to data collected through compliance surveys and the efforts of US Forest Service research biologists. The Park's Fire program is being used to actively manage forested areas that goshawks inhabit. The degree to which this program benefits goshawks is not known. The purpose of this proposed project is to complete goshawk surveys in areas of the Park that contain suitable habitat but have not been surveyed, identify and mark nest trees, use field observations, aerial photos, and GIS to estimate goshawk nesting stands, and develop and submit a proposal for a goshawk reproduction and habitat use study. This proposed project would provide information that would assist managers in their current efforts as well as lay the foundation for a more detailed study of goshawk health within the Grand Canyon National Park. For more information, contact Wildlife Program Manager RV_Ward@nps.gov (928-638-7756).

2) Vegetation

Endangered Sentry Milkvetch & North Rim astragalus

Sentry Milkvetch (*Astragalus cremnophylax* var. *cremnophylax*) is the only plant species in Grand Canyon National Park (GRCA) that is on the Endangered Species list of the U.S. Fish and Wildlife Service (FWS). Only a few small populations are known. All populations occur along the rim of the Grand Canyon on limestone outcrops with unusually high magnesium content. Most or all sites have an abundance of uncommon hematite/magnetite rocks on the surface of the limestone outcrops. It is suspected that extremely unusual soil and site characteristics, combined with poor seed dispersal, limit the species abundance and distribution. The draft FWS recovery plan for the species calls for eight populations, each with > 1,000 individuals, before delisting can be considered. The largest population known has only ~400 individuals, and only a few populations are known. In this project the researcher would determine and compare the soil and other site characteristics of existing species locations, and locate as many sites with similar characteristics as possible (within the limits of the funding) that could be used for transplant sites for the recovery effort. In addition, the researcher could focus research on life history characteristics, genetics, restoration, inventory and monitoring efforts and continue genetic and life history work started for North Rim astragalus (*Astragalus septentriorema*), and develop long-term planning documents for the survival of that species. For more information, contact Chief of Natural Resources [Cole Crocker-Bedford@nps.gov](mailto:Cole_Crocker-Bedford@nps.gov) (928-638-7750).

Rare Plant Analyses

GRCA does not have a botanist so there is ample opportunity for a researcher interested in botanical work. The focus is on the park's most rare plant species, for which there is

little inventory information, no spatially displayed information, and no data on trends. For some of these species, populations could be declining to the point of no return, without park staff even being aware of the issue. Potential projects include:

- ☼ Develop a list of high priority species for additional research including endemics, species known from only a few collections, species known as rare outside the park, monotypic genera, and problematic taxa.
- ☼ Compile all currently available data (herbarium searches, databases, Nancy Brian's 2000 Field Guide to Sensitive Plant Species) and develop inventory and monitoring plans that are compatible with NPS standards, including Vital Signs monitoring.
- ☼ Develop a distribution map for all species based on currently available data and a basic model to predict rare, sensitive and endemic plant species distribution.
- ☼ Compile a list of under-collected species based on local herbaria information and develop plant collection protocols.
- ☼ Update the Brian (2000) Field Guide to the Special Status Plants of Grand Canyon National Park, which includes 63 plant species that have Federal listing, candidate status, or are considered rare, endemic, or new to science.
- ☼ Research and develop propagation and seed collection protocols for a subset of the park's rare plant species.
- ☼ Research and compile phenological and ecological information for the park's most rare species.

There could be numerous other final products, all of which would be used by park staff to help them make informed management decisions. For more information, contact Vegetation Program Manager [Lori Makarick@nps.gov](mailto:Lori_Makarick@nps.gov) (928-226-0165).

Exotic Plant Management

The potential impacts of invasive exotic plant species are tremendous and GCNP ecosystems are in jeopardy. There are many experts in a variety of universities working in this field and attempting to tackle this enormous resource management issue. The NASA Office of Earth Science and the US Geological Survey are working together to develop a National Invasive Species Forecasting System for the early detection, remediation, management, and control of invasive species on Department of Interior and adjacent lands. Project opportunities for research include:

- Investigate routes of entry and colonization and complete surveys in high priority areas throughout the park.
- Spatially display all currently available invasive plant data for GCNP and surrounding areas. Using GIS layers and literature search information, develop a model to predict invasive plant species distribution, abundance, frequency and cover.
- Develop suitable management alternatives to control infestations and limit damage to native species and other park resources,
- Prepare a 5-10 year invasive plant species management plan based on currently available data. For more information, contact Vegetation Program Manager [Lori Makarick@nps.gov](mailto:Lori_Makarick@nps.gov) (928-226-0165).

3) All Taxa Biodiversity Inventory (ATBI) **Riparian Side Canyon ATBI Project**

Grand Canyon National Park, a World Heritage Site, encompasses more than 1.2 million acres. Well known for its geological significance the Grand Canyon is one of the most studied landscapes in the world. The park contains several major ecosystems and its great biological diversity can be attributed to five of the seven life zones and three of the four desert types in North America. The five life zones represented are the Lower and Upper Sonoran, Transition, Canadian, and Hudsonian. The park also serves as an ecological refuge, with relatively undisturbed remnants of dwindling ecosystems. It is home to numerous rare, endemic, and threatened/endangered species. Although Grand Canyon has one of the largest research programs in the National Park System, there are large gaps in knowledge on the diversity of species in the park. This is especially true for the riparian corridors of side canyons that drain into the Colorado River.

An expansion of the Great Smoky Mountains “All Taxa Biodiversity Inventory” (ATBI) program to regional and national levels is being initiated and warmly received by the National Park Service. The regional Colorado Plateau ATBI program covers 35 National Park Service units including Grand Canyon National Park. This is a great opportunity to further expand the efforts of the park in ATBI activities and help conserve biodiversity. The Great Smokies program has identified over 700 new species to science and 5,000 new species for the park, and has supported educational programs in the process; undoubtedly there is similar potential for discoveries at Grand Canyon National Park

It would be extremely valuable to conduct an ATBI project that integrates research and education and focuses on side-canyon tributaries, one of the most unique but under-studied characteristics of the park. The project could target a few key side canyons and include 1) one or two large bio-blitzes, where a large number of volunteers work with scientists to identify and collect species over a weekend; 2) Hands-on workshops and talks about conserving biodiversity in common visitor areas; and 3) Year-long focused effort to obtain as much information about the parks side canyons as possible. For all of these activities we recommend involvement from US and international taxonomists, ecologists, and educators with a goal of collecting information on all organisms from slime molds to birds. For information contact Research Coordinator [Emma Benenati@nps.gov](mailto:Emma.Benenati@nps.gov) (928-226-0163) or ATBI Coordinator Larry Stevens (Farvana@aol.com)

4) Recreation

Recreational Experience Related to River Flows

Flows from Glen Canyon Dam are important influences of recreational experience in the Colorado River corridor through Grand Canyon National Park. The importance of flows relative to other physical and social attributes that define a high quality recreational experience is less certain. Flows can affect recreational experiences in multidimensional respects. Evaluations of recreation experience are coupled with GRCA management goals for river-based recreation (e.g., maintaining wilderness qualities, access, and ecosystem function). Although dam operations are managed by the Bureau of Reclamation, the NPS and other agencies are charged with evaluating the effects of those operations on downstream resources including impacts to recreational activities and the visitor experience. In this project the researcher may answer one of several questions that

evaluate the relationship between Glen Canyon Dam flows and the quality of Colorado River experience. Sample questions include: *What is the relationship between flow levels and whitewater boating safety? What is the relationship between flows and non-boating human health and safety? What are the key attributes of a quality Colorado River experience and how are they affected by various flow regimes?* For more information contact Wilderness Coordinator Linda.Jalbert@nps.gov (928-638-7909).

Visitor Discretionary Time, Recreational Experience, and Potential Impacts

For the Colorado River Management Plan (CRMP), the NPS used the amount of “discretionary time” as one method of analysis visitors experience at camps and attraction sites along the river corridor. Discretionary time was defined as “free time” to enjoy the resource; is not considered time spent on group or personal logistics such as personal care, packing, preparing or eating meals and sleep and does not include the on-river time traveling to/from various locations. Discretionary time is influenced by trip length, daylight hours (seasonal) and types of trips (e.g. motorized, oar-powered, and commercial or self-guided), regulated flows and environmental conditions (e.g. weather). The NPS developed a model based on data collected regarding various visitor use, but did not have specific information that described the relationship between discretionary time and impacts to visitor experience and resource condition. As discussed in the CRMP, discretionary time may be important in two ways: trip quality and adverse impacts to natural resources. Discretionary time is an indicator of trip quality as it relates to the time visitors have for exploration or activities at camps and attraction areas, as well as, increased opportunities to explore or appreciate natural or cultural resources. Discretionary time may also have an unintended consequence of adverse impacts to these resources. Research on discretionary time is needed on discretionary time to provide information about available free time on various types of river trips, visitor activities, and potential adverse impacts to natural and cultural resources of concern to the NPS. This project would explore the actual relationship between visitor discretionary time and the beneficial and adverse impacts to the recreational experience and condition of natural and cultural resources including campsite area vegetation, soils, and archeological sites. For further information, contact Wilderness Coordinator Linda.Jalbert@nps.gov (928-638-7909).

5) Earth and Water

Delineation of Recharge Areas, Groundwater Flow Pathways, and Travel Times on the Kaibab Plateau

Roaring Springs emerges from the Kaibab Plateau on Grand Canyon’s North Rim. This water is partially diverted as the sole municipal water supply for the park. Grand Canyon National Park is seeking a greater understanding of ground water flow pathways, regional and local ground watershed boundaries, and recharge rates to address critical ground water resource issues in the park. Recent NPS solicited studies (Ross, 2005) have provided a good conceptual groundwork and a more in-depth approach is now needed to better understand recharge rates and travel times of water from sinkholes through faults and fractures. GCNP is seeking proposals on a study to delineate ground water flow paths through the Kaibab Plateau. This will include a quantitative approach including event based precipitation and spring water samples over at least a full year to better refine

water travel times. Sampling must be conducted over several monsoon and winter storm events at Roaring Springs, and from springs up Bright Angel Canyon upstream from Roaring Springs. In addition, introducing tracers into sinkholes would help to define specific pathways and travel times for recharge on the Kaibab Plateau. The sampling design will help to understand both the properties of a conduit driven flow system as well as the flow system in the unfractured rocks which contributes base flow to the springs after specific recharge events (Abe Springer, Northern Arizona University Geology, 2007 pers. comm.). The researcher will work with park resource personnel in developing and executing this project.

Ross, Lanya. 2005. Interpretive Three-Dimensional Numerical Groundwater Flow Modeling, Roaring Springs, Grand Canyon, Arizona. M.Sc. Thesis, Northern Arizona University.

For more information contact Earth Science Program Manager John_Rihs@nps.gov (928-638-7905).

Database Development of Cave, Karst and Mine Resources

Grand Canyon National Park has developed a new management plan that addresses critical resource management needs concerning cave, karst and mine resources. This is a GIS project to develop “real world” solutions to natural resource management needs. To implement this plan an “ARCVIEW/ACCESS” based database is needed. A portion of the new “Rapid Cave Inventory Form” developed by the park is in ACCESS form but this needs to be completed, then tied to GIS layers with cave locations, cave plane views, detailed I&M data and photographs and digitized reports, and all with differing levels of security built in. Eventually all caves will be classified with different levels of access. Researcher will work with park resource personnel in developing this project.

For more information contact Earth Science Program Manager John_Rihs@nps.gov (928-638-7905).

Paleontologic Resource Management

The Earth Science Program is seeking assistance in the implementation of a paleontologic site inventory and condition assessment pilot study. This study will document and assess high use sites along the South Rim to evaluate the methodology of the paleontologic site inventory. Database development will be required, as well as, delving into GCNP collections. This project has great potential for expansion (pending additional funding). Researcher will work with park resource personnel in developing this project. For more information contact Earth Science Program Manager John_Rihs@nps.gov (928-638-7905).

6) Air Quality

Survey Ozone-Sensitive Plant Species for Foliar Damage due to Ozone

Grand Canyon has monitored ozone concentrations on the South Rim continuously since 1989, with additional special studies in other locations. Ozone is a potent phytotoxin, although species vary in their sensitivity to ozone exposures. Ozone concentrations and exposure indices have risen at a statistically significant rate since 1989 and current ozone

exposures are within the range known to cause foliar damage, although they have not yet exceeded EPA standards established to protect human health. The park has no recent data documenting the presence or absence of ozone damage to plants, though by 1999 ozone damage to leaves was recorded in some National Parks in southern Utah. A survey of the GCNP for ozone injury on sensitive plant species is needed. Such a survey can then be the basis from which to evaluate plant responses to changing ozone concentrations. Knowing the characteristics of any ozone damage to park plants can also guide NPS gaseous monitoring efforts and inform resource managers and air quality regulators of the nature and extent of such problems. For more information, contact Air Quality Specialist [Carl Bowman@nps.gov](mailto:Carl.Bowman@nps.gov) (928-638-7817)

Project Descriptions for submitted proposals: CULTURAL RESOURCES

7) Natural Register Nominations

Research and Prepare National Register Nominations for Individual and Multiple Properties

A variety of historic properties lack National Register evaluations and nominations.

Those needing nominations include:

- Archeological Sites. Currently, all existing and newly discovered archaeological sites and historic properties are eligible to the National Register of Historic Places under a 1984 Multiple Resource Partial Inventory. Very few individual properties have been nominated to the National Register. A researcher is needed to update the Multiple Resource Partial Inventory, South Rim and North Rim historic Native American archaeological district and the 1956 United-TWA mid-air collision National Historic Landmark district.
- Historic Roads and Trails. Sixteen years ago, GCNP was able to research and write informal context studies for Grand Canyon's roads & trails in the form of a Multiple Property nomination, and individual nominations for ten of the park's named trails. The ten trails nominated are the Thunder River, North Bass, South Bass, Hermit, North Kaibab, South Kaibab, Bright Angel, Colorado River, Grandview, and New Hance. GCNP is seeking a proposal to research and write nominations for seven more named trails (Bill Hall, Boucher, Tanner, Beamer, Nankoweap, Clear Creek, and Whitmore Trails) and the park's six major roads (North Entrance, Cape Royal, South Entrance, Hermit Roads and the Desert View and Village Loop Drives).
- Historic Buildings. Two significant historic buildings within Grand Canyon National Park presently lack National Register nominations. The Shrine of Ages is a nationally significant Mission 66-era building; while Tusayan Museum is a 1931 wayside museum interpreting Grand Canyon's archeological history. Both buildings are integral to the history and evolution of Grand Canyon, visitor services, and national trends in interpretation and resource management. A researcher is needed to research, document, photograph, and prepare National Register nominations for one or both of these properties. Contact Jan Balsom, Chief of Cultural Resources, [Jan Balsom@nps.gov](mailto:Jan.Balsom@nps.gov) (928-638-7758).

8) Archaeology

Prehistoric Standing Architecture

Grand Canyon National Park has over 700 known sites containing standing prehistoric architecture. Multi- and single-unit masonry structures, masonry granaries, jacal structures, standing forked-pole sweatlodges and wickiups make up a diverse array of structure types. The park's Vanishing Treasures program is currently in the process of inventorying and evaluating standing architecture and writing a ruins preservation plan. Research topics needed to support the ruins preservation program include changes in use of construction materials and techniques through time, changes in architectural types through time, comparisons of architectural styles, materials and techniques between cultural areas, identifying prehistoric material sources for various area in the park and analyzing and testing the application of modern preservation materials. Contact Ian Hough, VT Archeologist, Ian_Hough@nps.gov (928-638-7659).

Effects of Wildland Fire on Archeological Resources

Grand Canyon National Park has a very active Prescribed Fire and Wildland Fire Use programs. Between 1995 and 2005, GRCA averaged 3,420 acres burned per year in wildland fire use. There are approximately 424,526 acres of forests and woodlands within Grand Canyon National Park. The average site density is 1 site per 23.2 acres totaling an estimated 18,298 archeological sites in the forests and woodlands. Research on the effects of fire on Grand Canyon archeological sites is limited to one late-1970s study which focused on impacts to artifacts. Most prescribed and wildland fire use fires burn at low to moderate severities. The existing fire effects literature primarily addresses the effects of high severity suppression fires on archeological resources, and does not address the effects of low and moderate burn severities. Additionally, most studies do not address such long-term effects to cultural resources as changes in erosion rates, visitor impacts, or other effects resulting from fire suppression, rehabilitation, and the loss of the vegetative cover. Research is needed to quantify and explain direct and indirect fire effects to a variety of archeological resource types at all fire severities within the range of forest ecosystems found at Grand Canyon. Contact Amy Horn, Park Archeologist, Amy_Horn@nps.gov (928-638-7742).

9) Ethnography

Kaibab Plateau Ethnographic Studies

To date, there has been little systematic research regarding ethnographic uses of the Kaibab Plateau (North Rim) within Grand Canyon National Park. This high plateau reaches 10,000 feet in elevation and is covered by forests and open, grassy parks. Kaibab means "mountain lying down" to the Paiute that claimed and used the area for hunting and gathering into historic times. More detailed studies are needed to synthesize existing ethnographic data, identify ethnographic sites of concern to tribes, and develop management recommendations based on tribal input. Contact Amy Horn, Park Archeologist, Amy_Horn@nps.gov (928-638-7742).

Create Ethnographic Use Sensitivity Database and Maps

Grand Canyon National Park recognizes that at least 12 tribes have historic ties and association with the Grand Canyon (Havasupai Tribe, Hualapai Tribe, Navajo Nation, Hopi Tribe, Pueblo of Zuni, San Juan Southern Paiute Tribe, Moapa Band of Paiute Indians, Kaibab Band of Paiute Indians, Paiute Indian Tribe of Utah, Las Vegas Paiute Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation). Currently, information on ethnographic resources at Grand Canyon is incomplete and scattered in various reports and publications. Research is needed to more fully document ethnographic resources associated with each of the tribes through literature reviews and consultation; and to synthesize that information for NPS managers. Contact Amy Horn, Park Archeologist, Amy.Horn@nps.gov (928-638-7742).

Ethnographic Research of Traditional Use of the Coconino Plateau

The Coconino Plateau including the South Rim of Grand Canyon National Park is an area used traditionally over the past few centuries by the Navajo and Havasupai. A better understanding is needed of the use, age and affiliation of known and yet-to-be-identified ethnographic resources such as ephemeral structures, gathering/hunting camps and raw material resource areas for example. A researcher is needed to consult with the Havasupai Tribe and the Navajo Nation and other tribes by conducting field visits and interviews, and summarizing ethnographic literature and archival material covering the area of study. These efforts will help develop management recommendations for ethnographic resources based on tribal input. Contact Ian Hough, VT Archeologist, Ian.Hough@nps.gov (928-638-7659).

10) Historic Structures and Landscapes

Research and Document the Cultural Landscape of Phantom Ranch

Phantom Ranch has been an oasis at the bottom of the Grand Canyon for at least 1000 years. By AD 1000, it was used by the Ancestral Puebloan farmers who built Bright Angel Pueblo. Later, the Paiute and Havasupai hunted and gathered in the area. Historic development began in the early 1900s and most of the extant infrastructure and structures were built in the 1920s and 1930s after the completion of the first bridge crossing the Colorado River for 200 miles. Phantom Ranch now includes cabins, a dormitory, a lodge and restaurant, a mule corral, emergency medical facilities, a ranger station, the Bright Angel Campground, a beach that is frequently visited by Colorado River rafters, and a heliport. Cottonwood trees line the creeks and shade the buildings. The only modes of access to the ranch are foot trails (also used by mules), the Colorado River, and helicopter. Research is needed to document the history of this National Register landscape, its character-defining features, contributing elements, and current condition. Contact Jan Balsom, Chief of Cultural Resources, Jan.Balsom@nps.gov (928-638-7758).

Historic Buildings

Historic Structure Reports are the primary documents used by National Parks to guide historic building preservation efforts. Many important buildings at Grand Canyon lack Historic Structure Reports and a researcher is needed to document building conditions, conduct in-depth archival research, evaluate alternatives, and make detailed recommendations for the future treatment of each of these properties. Historic Structure Reports are presently needed for the following historic properties: Community Building,

Magistrate's Building, Case House, Supai Camp, and Roaring Springs. Contact Amanda Zeman, Cultural Resource Specialist, Amanda.Zeman@nps.gov, 928-638-7906.

11) Historic Studies

Administrative History: A Study of Hualapai, Havasupai, Hopi, and Navajo Relations with Grand Canyon National Park

These four tribes of American Indians have had long and often stormy relationships with federal land management agencies at Grand Canyon, but park managers continue to interact with its neighbors in a veritable historical vacuum. This study would require researching relationships dating to the late nineteenth century through the eyes of European-American residents, federal managers, and tribal members, and to write an administrative history that depicts and explains these relationships through time in an objective manner. The product would be a written history of approximately 300 pages with full footnoting and a comprehensive bibliography. Working with GCA editors, photographs and other illustrations could be collected and the work could be published as a GCA monograph. For information contact Cultural Resource Specialist Michael.Anderson@nps.gov (928-638-7862).

The Civilian Conservation Corps at Grand Canyon National Park

Plentiful written materials, photographs, and structures associated with the CCC exist at Grand Canyon, but they have never been systematically studied, organized, or presented in a manner that effectively aids park managers with resource protection. A graduate student or historical contractor is needed to research the CCC's role at Grand Canyon and write a history in the form of a formal NPS cultural landscape study or administrative history. Most research will be done at the park, but the individual will also travel to regional archives as appropriate and the National Archives at Washington DC to obtain the complete story. Estimated duration is 18 months. Deliverables will include a formal NPS cultural landscape study, or administrative history suitable for publication as a GCA monograph (may also be written as a popular publication). A complete inventory of all CCC constructions at the park; historical photographs; and recent photographs of all extant CCC structures within the park. For information contact Cultural Resource Specialist Michael.Anderson@nps.gov (928-638-7862).

Complete Historic Context Studies

Historic context studies are important tools for park managers and resource specialists to understand the broader circumstances in which historic sites occur. A few of the topics which a student or researcher could explore include:

- Changes in American Indian Land Use

American Indians have subsisted on the resources of the Grand Canyon since the last Ice Age, time enough to have developed relationships with the environment that range beyond simple resource extraction and commodification imposed by European Americans since the late nineteenth and twentieth centuries. A historic context study or administrative history that explores the many and varied ways earlier peoples viewed and used park resources will benefit both cultural and natural resource specialists as we try to maintain, or regain, a sustainable environment. Graduate students in anthropology, history, or biology would be candidates to write this history

as a master's thesis or doctoral dissertation. Research will begin with prehistoric hunters and gatherers but focus on the historic tribes, how they once viewed and used the land, and how those uses have changed since the arrival of European Americans, and will be weighted toward interviews with modern tribal members. This may be written as a park context study or possibly as an administrative history. Estimated duration is 24 – 36 months. Deliverables will include a formal historic context study or administrative history suitable for publishing as a GCA monograph or popular work.

- Ranching on the North Rim/Kaibab Plateau.

Mormon ranchers began using the meadows of the Kaibab Plateau in the 1870s as summer pasture. They continued to graze sheep and cattle there until the park was created in 1919. This research would examine how historic sites such as fences, springs, dendroglyphs, cabins, and historic roads fit within the larger historic context of the time and assist resource managers in evaluating their significance.

- Mining and Prospecting of the Grand Canyon Region
- Mission 66 Development
- Tourism
- Historic Community Development

For information contact Cultural Resource Specialist Michael_Anderson@nps.gov (928-638-7862).