Southern Paiute Participation in the Glen Canyon Adaptive Management Program
A Ten Year Review

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Executive Summary

This report summarizes and evaluates ten years of Southern Paiute participation in the Glen Canyon Dam Adaptive Management Program (GCDAMP). The Southern Paiute Consortium (SPC) is an entity created in 1993 by and for its member tribes – the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah – to improve the participation of those federally-recognized tribes in the GCDAMP. The purposes of this summary are to (1) provide a comprehensive review of SPC participation in the GCDAMP; (2) evaluate whether the SPC program has met the needs of its member tribes and addressed concerns of other AMP participants; and (3) review and modify, as appropriate, the SPC's monitoring and education program and protocols.

The traditional lands of the Southern Paiute people are bounded by more than 600 miles of the Colorado River from the Kaiparowits Plateau in the north to Blythe, California in the south. Southern Paiute people were given a special responsibility to protect and manage this land and water and all that is upon and within it. The challenge for the SPC is to translate this general yet unique responsibility into specific ways of engaging with the scientists, land managers, and others responsible for the operations of Glen Canyon Dam and the GCDAMP.

In 1963 the Bureau of Reclamation (BOR) completed the construction of Glen Canyon Dam (GCD) on the Colorado River within the Grand Canyon National Park, creating Lake Powell just upstream from the Dam. GCD was completed prior to the enactment of federal laws that now govern its operation, but it is presently subject to those laws. The Grand Canyon Protection Act requires that GCD be operated with minimal impact to the natural, recreational, and cultural resources of the Colorado River Corridor, the region of the Colorado River between GCD and Lake Mead that is potentially impacted by flows from the Dam. The National Historic Preservation Act (NHPA) mandates that the impacts of any federal undertaking that will negatively affect historic and traditional cultural properties be evaluated and monitored. In 1989, Secretary of Interior Manuel Lujan directed the Bureau of Reclamation (BOR) to prepare an Environmental Impact Statement for the Operation of the Glen Canyon Dam (GCDEIS). The leaders of the SPC tribes worked to be recognized as legitimate cooperating agencies in the GCDEIS and began studies to document the potential impacts of the dam on Southern Paiute cultural resources in the Colorado River Corridor.

In 1994, the tribes of the SPC signed a Programmatic Agreement (PA) on Cultural Resources for Glen Canyon Dam Operations that was written to comply with Sections 106 and 110 of the NHPA. The PA laid out a plan for agency compliance with the NHPA through the development of monitoring and management protocols for cultural resources in the Colorado River Corridor. It directed the BOR and National Park Service (NPS) to develop and implement a plan for monitoring remedial actions and to develop a Historic Preservation Plan for long-term monitoring and management.

In 1995, the GCDEIS was completed. The Grand Canyon Protection Act and the Record of Decision that resulted from the GCDEIS established a program of long-term research and monitoring of the effects of the dam on the resources of the Colorado River Corridor, utilizing the framework of adaptive management. During this transition period to the GCDAMP, all

cooperating agencies were given the opportunity to develop monitoring programs to establish their interests in long-term participation in decision making related to GCD. The SPC began developing a monitoring and education program to ensure that its member tribes would continue to have the information necessary for participating in decisions related to dam management. The SPC program has continued uninterrupted except for in 2006, when its annual river trip was cancelled because a change in contracting with the BOR led to funding delays that seriously complicated river trip scheduling.

In the early years of the GCDAMP, the SPC appointed its first representative to the GCD Adaptive Management Workgroup and implemented its Colorado River Monitoring and Environmental Education program. The SPC expanded its activities to include assessing potential environmental impacts, refining monitoring protocols, and interacting with the BOR and other PA signatories. The goal of the SPC's program is to gather the data necessary for (1) informing its member governments of the impacts of GCD on places and cultural resources of special concern to Southern Paiutes, (2) increasing its effectiveness in the GCDAMP, and (3) assessing whether or not management objectives established under the GCDAMP are being met. Especially important to the SPC are the objectives related to the preservation of resource integrity and cultural values of traditionally important resources within the Colorado River Ecosystem and the protection and maintenance of physical access to traditional cultural resources.

The SPC is managed by a Director/Coordinator, an individual enrolled in one of the SPC member tribes, and is under the direction of the chairpersons and councils of the Kaibab Band of Paiute Indians, Shivwits Band, and Paiute Indian Tribe of Utah. The Director/Coordinator is guided by tribal elders and the cultural resource committees of its member tribes and is supported in part with funds from the BOR. The SPC also employs additional personnel and technical consultants as needed and receives financial and material support from its tribes and their members, researchers from the University of Arizona, a consulting ethnobotanist, and other resource specialists.

For this evaluation of Southern Paiute participation in the GCDAMP, the SPC sought the assistance of researchers from the Bureau of Applied Research in Anthropology (BARA) at the University of Arizona and its consulting botanist, Dr. Arthur Phillips III. The information presented in this report was gathered using a mixed methods approach common to research on communities, organizations, and stakeholder involvement. Researchers reviewed written documents created for and by the GCDAMP and the SPC and the scientific literature on adaptive management, its goals and objectives, and its various manifestations. They conducted participant observation in the activities of the SPC, its member tribes, and the various workgroups and committees of the GCDAMP with regard to decisions about the operations of the GCD. In addition, they conducted formal and informal interviews with individuals who were members of and had participated in one or more of these groups

This review has found that, despite numerous challenges, the SPC has successfully established and maintained participation in the GCDAMP since that program's inception. In general, the SPC's program has operated as it was designed. The SPC representative to the AMWG – usually the SPC Director/Coordinator – gains information about GCD operations and their effects

through participation in committees, its own monitoring and education program, and other projects and studies in which Southern Paiutes become involved. That individual shares information with leaders, elders, and other interested persons from its member tribes. Still, this review has identified several areas that require attention to improve the SPC's program and increase the effectiveness of the SPC participation in the GCDAMP.

Attempts to resolve differences between Western scientific and Southern Paiute traditional knowledge and ways of understanding the Colorado River ecosystem have been unsuccessful, in spite of several efforts to integrate them. Significant improvements in the integration of Southern Paiute and other Native American perspectives are unlikely to occur without major changes in the organization and function of the GCDAMP. The scientific and tribal programs should continue in parallel, as equal partners with the responsibility for monitoring the impacts of the operations of GCD on the Colorado River ecosystem and providing that information to the GCDAMP, while attempts to find philosophical and practical common ground continue.

The SPC monitoring and education program has been in continuous operation since 1995 and should continue so that the long-term impacts caused by dam operations can continue to be monitored and can be better understood. To assess the impacts of the operations of GCD, at that time the SPC identified 20 sites that were both of particular cultural significance to Southern Paiutes and potentially impacted by the operations of the dam. Of those sites, the three between the dam and Lees Ferry have not been monitored since 1998, so the SPC should develop and implement revised and updated monitoring protocols for them. The other SPC sites are impacted by dam operations through (1) continued loss of sediment over time, (2) inundation, and (3) input of sediments at high flows. Consequently, these sites also show changes in vegetation and animal habitat, and impacts caused by changes in the movement of human visitors. Though monitoring activities at some sites have required modification due to the challenges of monitoring in a dynamic environment, the SPC program has generated data that are consistent and comparable from year to year through a range of climatic and flow regimes. To ensure that useful data are collected over the long term, the SPC should continue to investigate alternative approaches to monitoring the impacts of dam operations at highly dynamic sites, while ensuring that long-term consistency, a strength of the SPC monitoring program, is maintained.

In general, GCD has become a significant feature in the Colorado River ecosystem and, along with other features such as drought, has influenced the functioning of that system. The plant and animal communities within the ecosystem show continued adjustment to the changes wrought by the dam, though the maintenance of modified low fluctuating flows has created a more stable environment within which certain native plant species, such as *Salix exigua* (coyote willow) and *Tessaria sericea* (arrowweed), have been able to gain advantage over those species such as *Tamarix chinensis* (tamarisk), which thrive in disturbed environments. The SPC monitoring program has also enabled Southern Paiute researchers to observe that visitor movement, too, has become systematic based on the predictability of the flow regime. The regular patterns of visitor behavior have led the NPS to manage heavily visited sites through trail improvements and the SPC to tailor its education and outreach efforts to those sites as well. Consequently, based on the data collected to date, the SPC supports continued operation of GCD under the existing flow regime.

Lack of effective communication – with tribal leaders and members, other GCDAMP participants, and members of the public – has been a major problem for the SPC and has been exacerbated by changes in leadership within the SPC and the agencies responsible for managing the operations of GCD. Specific efforts should be made to address this problem. Within the GCDAMP, the development of an orientation packet for new AMWG members and key agency personnel would provide a first step in acknowledging the complexity of the program and the need for developing a working knowledge of all the program components, the basis for their existence, and the information generated since the program began. As indicated during the research conducted for this review, such a packet would also prove highly useful to all existing GCDAMP participants, as a means of increasing common understanding about GCDAMP goals and processes.

The SPC should develop an information packet for newly elected tribal council members and should update its *Southern Paiute River Guide,* which was created in 1996, with information gained through participation in the GCDAMP. The SPC should also develop a website and outreach materials about Southern Paiute concerns in the Colorado River Corridor, the SPC program, and the findings of its first ten years of operation. These should be made available to GCDAMP members and also members of the general public. The SPC Director/Coordinator should continue to participate in training sessions for river guides, NPS personnel, and others with direct responsibility for managing visitors in the Corridor and seek additional means of communicating with those audiences.

Since the Colorado River and its canyons were first recognized by Euroamericans for their potential – as sites for mining, dams, a railroad, and recreation – Southern Paiutes have been forced to adapt to the policies and practices of people whose interests have often been diametrically opposed to their own. Still, they take very seriously their traditional and contemporary right and responsibility to manage regional resources. Therefore, they have persisted in trying to be recognized and given the opportunity to fulfill their cultural and legal mandate to protect this region which is central to their lives and understanding of who they are. By participating in the GCDAMP, the SPC continues this tradition.

Introduction

The Southern Paiute Consortium (SPC) is an entity created by and for its member tribes – the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah – to improve the participation of those federally-recognized tribes in the Glen Canyon Dam Adaptive Management Program (GCDAMP). The Kaibab Band of Paiute Indians is headquartered in Pipe Springs, Arizona. Though its present day reservation is located on the Arizona Strip at the Utah-Arizona border, the tribe's traditional lands bordered the Colorado River from the Paria Plateau in the east toward the Shivwits Plateau in the west. The Paiute Indian Tribe of Utah is a composite tribe comprised of five Southern Paiute bands: Shivwits, Cedar, Indian Peaks, Kanosh, and Koosharem. Each of its separate bands is governed by a band council, and the chair of each band also serves as a member of the tribal council of the Paiute Indian Tribe of Utah. Of the five bands, the Shivwits Band has the most direct interest in the GCDAMP because its traditional lands included the Shivwits Plateau and lie within the area impacted by Glen Canyon Dam (GCD).

The SPC is managed by a Director/Coordinator, an individual enrolled in one of the SPC member tribes, and is under the direction of the chairpersons and councils of the Kaibab Band of Paiute Indians, Shivwits Band, and Paiute Indian Tribe of Utah. The Director/Coordinator is guided by tribal elders and the cultural resource committees of its member tribes and is supported in part with funds from the Bureau of Reclamation (BOR). The SPC also employs additional personnel and technical consultants as needed. Since its inception, the SPC has at various times included tribal monitors, an education and outreach coordinator, a consulting ethnobotanist, and an archaeologist. The SPC also receives technical assistance from researchers at the University of Arizona's Bureau of Applied Research in Anthropology (BARA) who help gather information, train SPC monitors in cultural preservation policies and practices, and translate data into information that is meaningful for tribal members and leaders so they are prepared to participate fully in decisions regarding GCD.

In an effort to participate effectively in the GCDAMP, the SPC attends meetings of several committees and workgroups associated with the program, implements a monitoring and education program, develops outreach materials and activities, and contributes to projects and studies developed by scientists and stakeholders involved in the program. As part of its monitoring and education program, the SPC develops five-year plans that provide direction about where, when, and how to conduct monitoring activities at sites within the Colorado River Corridor, the region of the Colorado River between GCD and Lake Mead that is potentially impacted by flows from the Dam. In 2000, during discussions about its second five-year plan, SPC leaders and BARA researchers agreed that, as the program entered its fifth year, it would be valuable to conduct a more comprehensive review and assessment of both its monitoring and education functions.

The timing also coincided with Grand Canyon Monitoring and Research Center (GCMRC) efforts to achieve integration across its program areas and an expectation that tribal participation in the GCDAMP would expand. In June 2000, a Cultural Resource Program Assessment was produced by a Protocol Evaluation Panel (PEP) convened by the GCMRC and supported by the BOR. The PEP recognized both the need and desire for meaningful tribal involvement when it decided to include as its three core recommendations: "Complete and adopt a Historic

Preservation Plan (HPP) as a top priority. Expand Native American involvement at multiple levels. Improve coordination and integration of a complex program" (PEP 2000: 2; emphasis in original). Recognizing that addressing these recommendations would require a careful and thorough assessment, a BARA researcher began preparation of a description of an assessment of tribal participation in the GCDAMP (Austin 2000) and suggested to GCMRC leadership that such an assessment would be valuable. The researcher received no response, and no further action was taken with the GCMRC at that time.

Development of this Study

In 2004, in anticipation of the development of a third five-year plan, SPC leaders and BARA researchers revived their earlier discussions about the need for a review of tribal involvement in the program but decided to focus only on Southern Paiute participation. The leaders reiterated earlier concerns about whether the SPC program was effective in meeting the needs of its member tribes and whether it was responsive to the concerns of other AMP participants. Renewed questioning of tribal participation in the GCDAMP, which had surfaced with the arrival of a new cultural resources manager at GCMRC in June 2003, prompted the SPC to begin planning for this review. Shortly thereafter, the GCMRC announced that it would provide resources to tribes to develop tribal monitoring programs. The SPC used the opportunity to prepare a proposal to conduct a ten-year review and assessment of its program and to plan for the next ten years. The SPC coordinator worked with BARA researchers to develop a proposal that was shared with the chairs of the Kaibab Band of Paiute Indians and the Shivwits Band and with the Kaibab Paiute Tribal Council, the fiscal agent for the SPC, and then submitted to the GCMRC in December 2004. The proposal was organized to respond to Goals 11 and 12 of the GCDAMP and, specifically, the following four Management Objectives.

Goal 11: **Protect, Manage and Treat Cultural Resources**.
MO 11.2. Preserve resource integrity and cultural values of traditionally important resources within the Colorado River Ecosystem.
MO 11.3. Protect and maintain physical access to traditional cultural resources.

Goal 12: **Maintain a High Quality Monitoring, Research and Adaptive Management Program**.
MO 12.7. Attain and maintain effective tribal consultation to ensure inclusion of tribal values and perspectives into the AMP.
MO 12.8. Attain and maintain tribal participation in the AMP research and long-term monitoring activities.

No decision was made on the proposal in the early part of 2005 as both the GCMRC and BOR were undergoing staff and organizational changes at the time. To maintain momentum developed during the 2004 planning period, in the spring of 2005 BARA researchers identified potential support from BARA for a graduate research assistant and from the University of Arizona Social and Behavioral Research Institute (SBSRI) for a small grant to begin the study in the summer and fall of 2005. In June 2005, the SPC Director and a BARA researcher presented the results of their initial efforts and their plans for the study to the Kaibab Paiute Tribal Council and received support for continuing to seek resources to conduct the study. Using the university resources,

they began work in July 2005. Delays associated with the agency funding continued into 2006. After the small SBSRI grant ended, the SPC and BARA researchers continued their study and their efforts to seek additional resources, modifying the original GCMRC/BOR proposal several times in response to changing guidelines issued by those two entities. In the spring of 2006, BARA renewed its support of the review and assessment by promising a second year of funding for the graduate research assistant for the 2006-07 academic year. Finally, in August 2006 the SPC proposal was accepted under the AMP budget category of "Development of Tribal Monitoring Protocols" and funded by the BOR, providing resources for expanding the study.

SPC participation in the GCDAMP is many-faceted, as are the research methods appropriate to its review and assessment. The information presented in this report was gathered using a mixed methods approach common to research on communities, organizations, and stakeholder involvement. These methods include a thorough review of written documents created for and by the GCDAMP and the SPC, and of the scientific literature on adaptive management, its goals and objectives, and its various manifestations. They also include participant observation in the activities of the SPC, its member tribes, and the various workgroups and committees of the GCDAMP with regard to decisions about the operations of GCD. Such activities include a GCMRC-sponsored tribal workshop, an SPC river trip, tribal council meetings at which SPC activities were discussed, meetings of tribal cultural resource advisory committees, day-to-day activities of the SPC Director, and meetings of the Adaptive Management Work Group (AMWG), Technical Work Group (TWG), Science Planning Group (SPG), Cultural Resources AdHoc Group (CRAHG), and PA Signatories. In addition, BARA researchers conducted interviews with individuals who had participated in one or more of these groups. Due to the sensitivity of the information being gathered and complexity of the program, participant observation and some interviews were conducted by a BARA researcher with considerable experience working with the SPC. At the same time, to address the bias associated with years of participation in the program and with the people involved in it, participant observation and additional interviews were conducted by a researcher with little or no history with the program.

The data gathered for this assessment were analyzed following standard qualitative research methods. As soon as the research began, text documents and written notes from observations and interviews were read and coded to identify major themes and issues requiring further attention. These themes then served to guide additional interviews and discussions that took place at meetings of the various assessment participants. The analysis was then revised based on the feedback and new information gathered and the results were summarized in the form of a report. The draft report was then shared with cultural resource specialists and other individuals from the member tribes to ensure that the information being shared was appropriate for a general audience. Written and oral comments on the draft report were incorporated into the final version.

Structure of this Report

This report summarizes the findings of the two-year study of Southern Paiute participation in the GCDAMP. Chapter One provides a brief overview and assessment of SPC program, describing its history and evolution, successes and challenges, and the resources that support it. Chapter Two describes the Colorado River monitoring program developed by the SPC in 1995, reviews the findings of ten years of program operation, and suggests modifications for improving the

program. Chapter Three examines SPC participation in the GCDAMP and looks carefully at the interactions between Southern Paiutes and others involved in the program. Chapter Four focuses on the education and outreach components of the SPC program, including efforts to educate and train Southern Paiutes to participate in the SPC program, to educate and inform scientists and stakeholders involved in the GCDAMP, and to educate and inform the general public about Southern Paiutes, their culture, and their ties to the Colorado River Corridor. In Chapter Five, Southern Paiute participation in the Terrestrial Ecosystem Management program developed by the GCMRC is reviewed and discussed as a case study of SPC interaction with and integration into specific initiatives of the GCMRC and GCDAMP. The report ends in Chapter Six with conclusions and recommendations for the future. Relevant documents are included in appendices at the end of the report.

Chapter One
The Glen Canyon Dam Adaptive Management Program and Programmatic Agreement on Cultural Resources for Glen Canyon Dam Operations : A Brief History and Assessment of Southern Paiute Participation

Diane Austin

In 1963 the Bureau of Reclamation (BOR) completed the construction of Glen Canyon Dam (GCD) on the Colorado River within the Grand Canyon National Park, creating Lake Powell just upstream from the Dam. In 1972, the Glen Canyon National Recreation Area was created by Congress to include Lake Powell and lands adjacent to the lake in the states of Arizona and Utah, including the stretch along the Colorado River from the dam to Lees Ferry. The BOR is responsible for administering water releases from the dam.

GCD was completed prior to the enactment of federal laws that now govern its operation, but it is presently subject to those laws. For example, U.S. federal law (Section 1802 of the Grand Canyon Protection Act) requires the Secretary of Interior to establish and implement long-term monitoring and research programs and activities to ensure that the dam is operated "in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established." The law requires that GCD be operated with minimal impact to the natural, recreational, and cultural resources of the Colorado River Corridor, the region of the Colorado River between GCD and Lake Mead that is potentially impacted by flows from the Dam. The National Historic Preservation Act (NHPA) mandates that the impacts of any federal undertaking that will negatively affect historic and traditional cultural properties be evaluated and monitored.

In 1989, in response to a decision to increase flow through the generators of GCD, Secretary of Interior Manuel Lujan directed the BOR to prepare an Environmental Impact Statement for the Operation of the Glen Canyon Dam (GCDEIS). Beginning with the BOR and then the National Park Service, and finally including state agencies and eight tribes, the EIS became the second largest in the country. Initially no tribes were directly involved in the EIS, but a representative from the President's Council on Environmental Quality notified the BOR that it must include tribes in the process and, with support from the Bureau of Indian Affairs Phoenix Area Office, eventually both tribes with reservations within the Colorado River Corridor and those with traditional ties to the region elected to become cooperating agencies in the EIS (see Austin and Bulletts 1996a, 1996b). The Bureau of Applied Research in Anthropology (BARA) at the University of Arizona became involved in the GCDEIS when Richard Stoffle was awarded a contract from the National Park Service to design and conduct a study investigating the potential impacts of the dam on Southern Paiute and Havasupai cultural resources in the area. In the first phase of the research, the Havasupai Tribe withdrew its participation, so from 1992 to 1995 BARA researchers worked with Southern Paiute tribal leaders and members to document the impacts of GCD on their people and the land and resources[1] to which they maintain ties (Stoffle et al. 1994; Stoffle, Austin et al. 1995; Stoffle, Loendorf et al. 1995).

[1] In the past, Southern Paiutes did not consider water, plants, rocks, or any other such features to be "resources;" the adoption of this framework for thinking and talking about these features is one result of interacting with Euroamericans and their governing bodies (Austin and Jake 1998).

The traditional lands of the Southern Paiute people are bounded by more than 600 miles of the Colorado River from the Kaiparowits Plateau in the north to Blythe, California in the south (see Figure 1.1). Southern Paiute people were given a special responsibility to protect and manage this land and water and all that is upon and within it. For this reason, in 1991, three federally recognized Southern Paiute tribes – the Kaibab Band of Paiute Indians, the Paiute Indian Tribe of Utah (representing the Shivwits Band), and the San Juan Southern Paiute Tribe – agreed to participate in the EIS-driven studies to identify cultural resources impacted by GCD and to recommend strategies for their protection. In 1993, the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah created the Southern Paiute Consortium (SPC) to ensure more effective government-to-government interactions between the tribes and the BOR. The SPC took over the cultural resource studies being conducted under the GCDEIS.

Before the completion of the GCDEIS, the Advisory Council on Historic Preservation, with the BOR, National Park Service, Arizona State Historic Preservation Office, Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, San Juan Southern Paiute Tribe, and Zuni Pueblo, developed the *Programmatic Agreement on Cultural Resources* (PA) for Glen Canyon Dam Operations to comply with Sections 106 and 110 of the NHPA. By August 30, 1994, the PA had been signed by all groups except the Havasupai and San Juan Southern Paiute tribes. The PA laid out a plan for agency compliance with the NHPA through the development of monitoring and management protocols for certain cultural resources in the Colorado River Corridor. It directed the BOR and NPS to develop and implement a plan for monitoring remedial actions and to develop a Historic Preservation Plan for long-term monitoring and management.

In 1995, the GCDEIS was completed and the transition to long-term management was begun. During this transition period, all cooperating agencies were given the opportunity to develop monitoring programs to establish their interests in long-term participation in decision making related to GCD. During this period and subsequent establishment of the Grand Canyon Monitoring and Research Center (GCMRC; the Center was first administered by the BOR and then transferred to the U.S. Geological Survey (USGS)) "to provide credible, objective scientific information to the Glen Canyon Dam Adaptive Management Program on the effects of operating Glen Canyon Dam on the downstream resources of the Colorado River ecosystem, utilizing an ecosystem science approach" (USGS nd)**,** the SPC began developing a monitoring and education program to ensure that its member tribes would continue to have the information necessary for participating in decisions related to dam management. The basis for the SPC program and the results of its initial development and implementation are described in Stoffle, Austin, Fulfrost, Phillips, and Drye (1995; see also Chapters Two and Four, this volume).

Particularly challenging for the SPC, as for other cooperating agencies, has been the need to distinguish impacts from GCD from other impacts to the Colorado River Corridor. First, the entire Colorado River Corridor as well as specific places within it are integral to Southern Paiute culture and the understanding that Southern Paiutes have about who they are, where they come from, and where they go when they leave this life. These places have been accessed over centuries from points throughout Southern Paiute territory, and they are connected through songs

and stories. They are not tightly bounded as “sites” and do not recognize the boundary that marks the historic high floods occurring at 300,000 cfs. Second, because GCD has caused

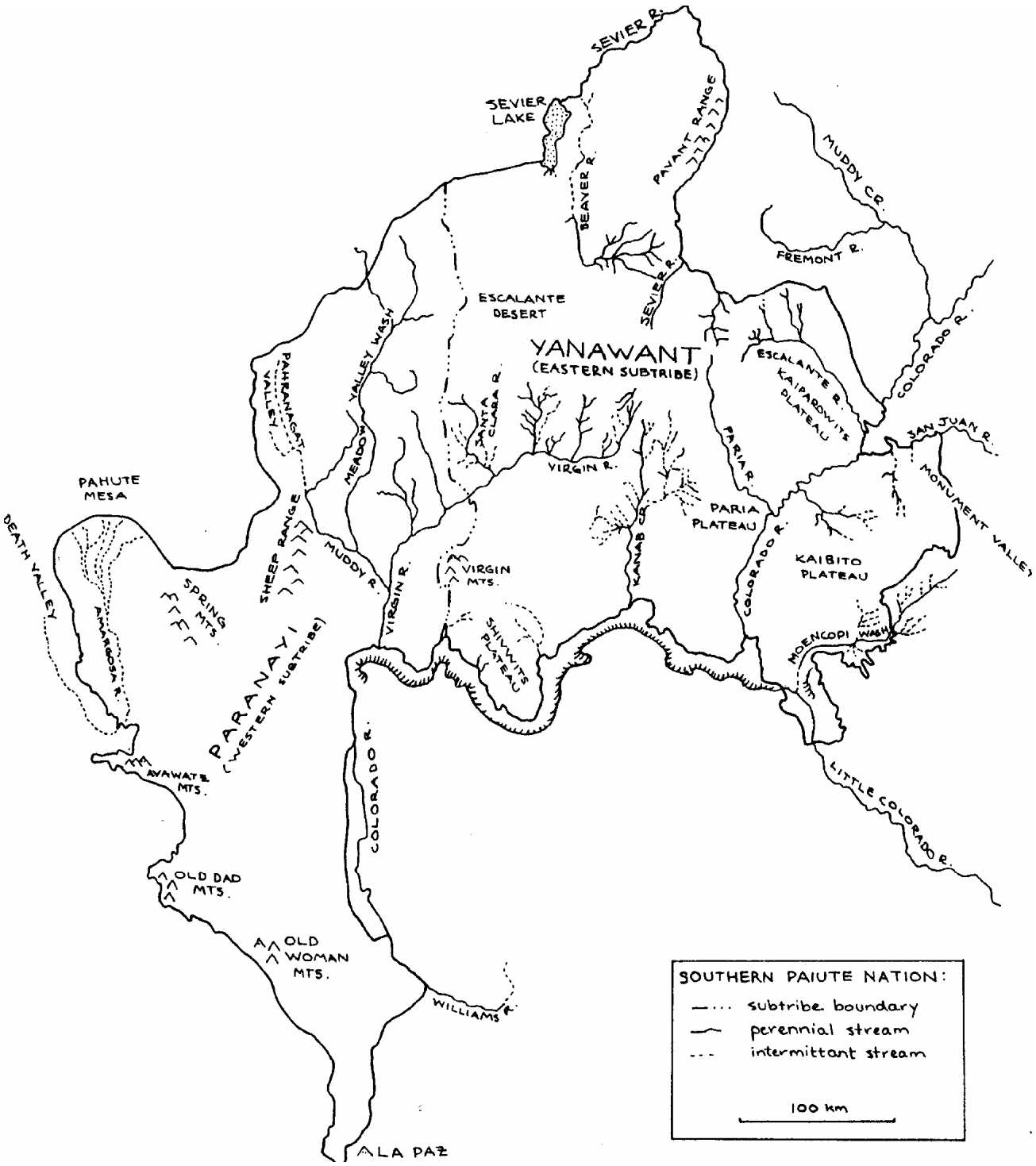

Figure 1.1. Southern Paiute Territory at European Contact

tremendous changes to the Colorado River and Corridor, including increasing the predictability of the river flows to make it possible for commercial and private river trips to take approximately 20,000 people per year through the Corridor, it is impossible to ignore visitor impacts as a significant impact of GCD. At sites where visitors can come in from the rim as well as from the river, it is generally not possible to distinguish the impacts of one group from those of the other. Also, because visitors that come in from the river do not restrict their movement to within the 300,000 cfs line, the impacts of the dam are not limited to that zone. Figure 1.2 diagrams the impacts of GCD on the Colorado River Corridor.

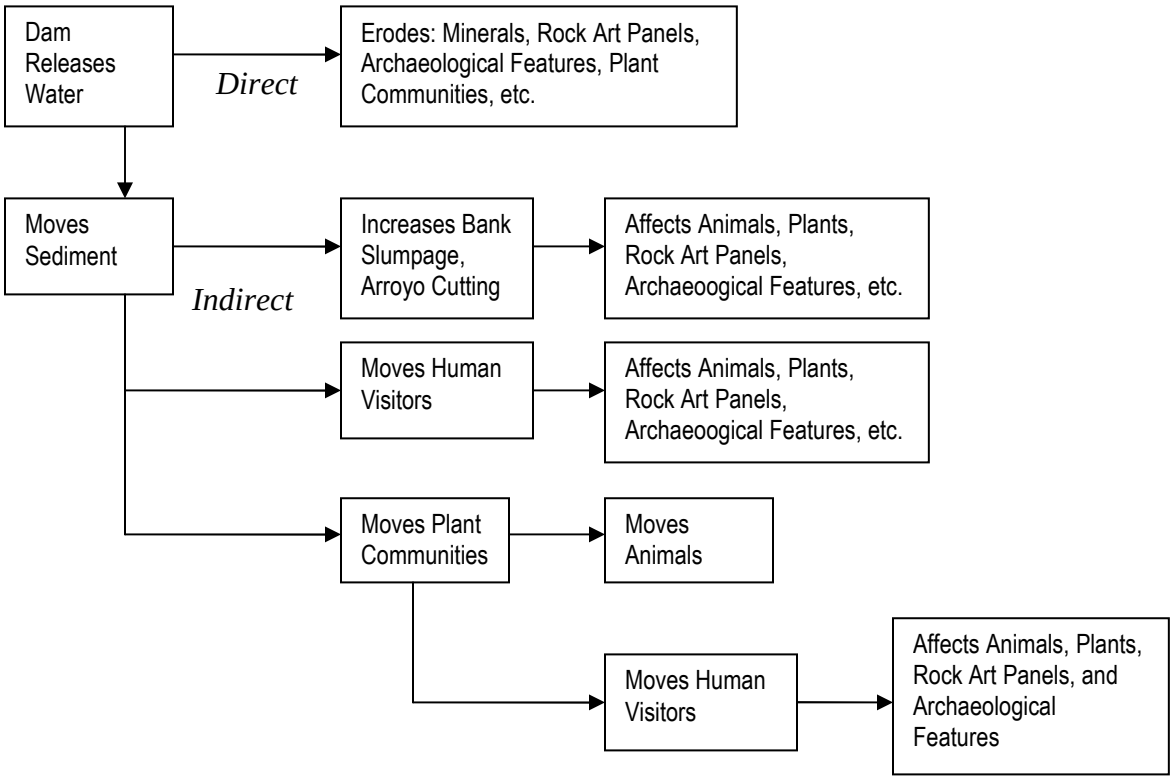

Figure 1.2. Impacts of the Glen Canyon Dam in the Colorado River Corridor

Adaptive Management

The Grand Canyon Protection Act and the Record of Decision that resulted from the GCDEIS established a program of long-term research and monitoring of the effects of the dam on the resources of the Colorado River Corridor, utilizing the framework of adaptive management. Adaptive management emerged in the late 1970s as a new approach to the management of complex ecosystems that considers both policy and management as experiments through which interventions are made at several scales to increase understanding (Holling 1978; Walters 1986; Walters and Holling 1990; Lee 1993; Gunderson et al. 1995). After almost three decades, success in adaptive management remains elusive, and analysts note that even the best-known programs such as the Columbia River Basin and Everglades continue to struggle with establishing clear goals and objectives, identifying appropriate indicators, and modeling complex systems. “A leitmotiv in the literature and our interviews is the multiple, negative impacts of

agency and stakeholder fragmentation, turf battles, and preoccupation, along with narrow or conflicting bureaucratic mandates on ecosystem management, including adaptive management" (Eeten and Roe 2002:66-67). In response to the poor outcomes associated with adaptive management, Eeten and Roe suggest that there are multiple management regimes and that adaptive management is only appropriate for some of them (see Table 1.1). Their framework is less-than-perfect. For example, their focus on the Endangered Species Act as the driving force for ecosystem management and on the goals of ecosystem restoration and rehabilitation leads them to ignore concepts such as cultural resources that specifically address active human participation even in ecosystems they consider to be relatively untainted by humans; the notion of protection, restoration, and rehabilitation of human heritage sites; and the legal framework that supports these. Nevertheless, it helps explain the ongoing challenges faced by the GCDAMP.

Table 1.1. Framework of Ecosystem Management Regimes (from Eeten and Roe 2002)

Self-Sustaining Management	Adaptive Management	Case-by-Case Management	High Reliability Management
e.g. "wilderness areas"	e.g., national parks, consumptive use of ecosystem services such as recreation	e.g., zones of conflict where population, resources, and the environment increasingly compete	e.g., urban ecosystems, pastoralist ecosystems

Human colonization of an ecosystem — Human domination of an ecosystem — Human control of multiple ecosystems for high reliability

Preservation → Restoration → Rehabilitiation →

The conflicts that underlie the use of an adaptive management regime for the Colorado River Corridor are obvious from this perspective. According to Eeten and Roe (2002:113, 115), "Adaptive management has its greatest salience and applicability in these human-colonized but not intensely dominated ecosystems… (A)ctive adaptive management is best suited to ecosystems where the human footprint is evident, but not deep; namely, the humanly colonized but not dominated ecosystems." They note the lack of conceptual frameworks for guiding decision makers working in "zones of conflict" and in dealing with the tensions and synergies between high reliability management and adaptive management. The Colorado River Corridor is clearly one of those "zones of conflict." Thus, as indicated in their framework summarized in Table 1.1, the Grand Canyon National Park as a separate region would appear to be well suited to an adaptive management regime. However, at the same time, the presence of GCD and the need to manage water flows for both power and flood control for urban areas points toward high reliability management as the more appropriate regime. The failure to recognize these fundamental conflicts and effectively manage them has contributed to the problems that pervade the GCDAMP. It was not the task of the authors of this assessment to examine the overall GCDAMP and its effectiveness, but it is important to note that it is within this muddled framework that the Southern Paiute Consortium and its member tribes are attempting to operate. SPC participants, though not familiar with the particular framework developed by Eeten and Roe, understand the conflicts. As one former coordinator noted, "It's always been money and it always will be money. Because they have these blackouts in California and some of the

stakeholders that are the bigwigs and wanting WAPA [Western Area Power Administration] to get their money back from these states."

Like other ecosystem management frameworks, adaptive management explicitly recognizes that humans are integral to ecosystems. Central to adaptive management is the involvement of stakeholders with a vested interest in the decision making process. Unfortunately, despite regular mention of the need for stakeholder involvement in the development or evaluation of adaptive management programs, little attention is paid to effective mechanisms for bringing in and incorporating diverse people and interests. To the contrary, with its basis in scientific experimentation, adaptive management privileges professional experts such as natural scientists, who are charged with describing and explaining ecosystems, and includes others such as engineers and economists to utilize the scientific findings in their decision making (Daily, Ehrlich, and Alberti 1996; Eeten and Roe 2002). Despite repeated references to uncertainty and the complexity of ecosystems, adaptive management nevertheless requires adherence to discrete experiments and establishes expectations that stakeholders can and will integrate the results of such experiments in ways that lead to clear management actions. Furthermore, perilously absent from most discussions of ecosystem management, especially in places that are widely perceived to be "wilderness" or "pristine," are the poignant historical narratives of displacement, depopulation, and suffering that describe how those places came to be without humans and how the affected populations should be integrated into processes that are based in large part on assumptions that they or their ancestors were essentially irrelevant to the ecosystems that exist today.

The GCDAMP and Southern Paiute Participation

During the first several years of the GCDAMP, numerous stakeholders and six tribes stepped forward to participate. Among other early tasks was the development of a set of goals and management objectives that were linked to specific research information needs (see Appendix A for the complete list of goals). From the beginning, the process was framed as one of science versus management with a principal concern being whether and how science would influence management. Within both the GCMRC and GCDAMP, the definition of and relative attention to cultural resources as compared to other resource categories has fluctuated according to the interests and relative power of personnel within the federal agencies responsible for those programs. Tribes have been encouraged to participate by helping to translate their concerns about the impacts of GCD into testable hypotheses, a process that continues to this day (see Appendix B). Consequently, from the start they were faced with deciding whether they were best represented by individuals with expertise in their culture and traditions or by PhD scientists who could communicate in the language of the more prominent stakeholders.

In the early years of the GCDAMP, the SPC appointed its first representative to the GCD Adaptive Management Workgroup (AMWG; see Chapter Three for more information on the AMWG and the structure of the GCDAMP) and implemented its Colorado River Monitoring and Environmental Education program (see Chapters Two and Four). The SPC expanded its activities to include assessing potential environmental impacts, refining monitoring protocols, and interacting with the BOR and other PA signatories. The goal of the SPC's program is to gather the data necessary for informing its member governments of the impacts of GCD on

places and cultural resources of special concern to Southern Paiutes, for increasing its effectiveness in the GCDAMP, and for assessing whether or not management objectives established under the GCDAMP are being met, especially those related to the preservation of resource integrity and cultural values of traditionally important resources within the Colorado River Ecosystem and the protection and maintenance of physical access to traditional cultural resources. The history, development, and goals of the SPC program were described during its first couple of years (Austin and Bulletts 1996a, 1996b; Austin 1997a, 1997b). The results of each succeeding year's activities have been reported in annual reports to the BOR (SPC and BARA 1996-2006).

Review of Southern Paiute Participation in the GCDAMP and PA Activities

The SPC has participated in the GCDAMP through the AMWG, Technical Work Group (TWG), and various specialized groups such as the Cultural Resources Ad Hoc Group (CRAHG) and has participated in meetings and other activities associated with the PA for Cultural Resources. The SPC has maintained its monitoring and education program since its inception in 1995, even during periods when it was waiting for an agreement with the BOR, such as occurred between October 1, 2004 and July 20, 2005. Except for 2006, when the SPC determined that it would cancel its annual river trip due to a change in contracting with the BOR and delays that seriously complicated planning, the SPC has conducted at least one monitoring and education trip into the Colorado River Corridor each year to provide the opportunity for its member tribes and representatives to observe and experience firsthand the conditions within the Corridor and the impacts of GCD there. The SPC also participates in education and outreach activities for its member tribes, other Southern Paiute tribes, members of the general public, schoolchildren, and specialized groups such as the Grand Canyon River Guides (see Chapter Four). The SPC submits an annual report of its activities to the BOR, with copies to the NPS and other interested parties.

Defending the Right to Participate

Despite its ten-year history in the GCDAMP, leaders of the SPC and its member tribes are regularly called to defend their right to participate in the program (see Bulletts 1994 for an early example). In an interview conducted for this assessment, one GCMRC staff member exclaimed, "Tribes need to clearly articulate their reasons for being involved at all." This section is intended to articulate once again Southern Paiutes' perspective on the program and their role in it.

The basis for Southern Paiute participation as a PA signatory and in the GCDAMP is twofold, driven by both cultural and legal mandates. Initially written as part of an assessment of water resources on the Kaibab Paiute Reservation, the following paragraph summarizes Southern Paiute beliefs about their relationship to the lands and water within the region they occupied when the Europeans first came in contact with them:

> "According to traditional Paiute beliefs, Southern Paiutes were created in these traditional lands, and the Creator gave us a special responsibility to protect and manage the land and all that is found upon it... When the lifegiver arranged for the Paiute people to occupy the lands wherein we have been placed and have continued to live since time immemorial, the land, the plants, the animals, as well as the other life forms, including

> water, were already here. The Creator's instructions were to occupy the land and to care for the resources being provided for the Paiutes. The care was to benefit all living things, as all living things are interrelated and co-exist on the planet. The land has provided much. The plants have depended on the soil and water. The animals depend on the plants and fish in the waters and other animals for their sustenance. The people always depend on all living things and remember the teachings that tell us to co-exist, communicate, and respect all life forms throughout all time" (Austin and Jake 1998:1).

The particular importance of the Colorado River Corridor and surrounding environs is described in the following:

> "The Colorado River Corridor and surrounding plateaus, a land that some people consider to be desert, isolated and containing little life, is the home of the Southern Paiute people. It is the place of the creation of the Southern Paiute people and the place that individual life cycles end… Evidence of Paiute presence within the Colorado River Corridor is marked by *ompi*, or hematite, sowing the path of the People and physically marking their journeys. Throughout Paiute history, the Grand Canyon and the areas surrounding it have been a place of prayer, of everyday living, and, in the end, a final refuge for people who were being squeezed out of their traditional lands by newcomers… One of the most primary and innate responsibilities of the Southern Paiute people is to care for and nurture the land which feeds, cures, and clothes the People. Cultural knowledge can be employed in a way that maintains, utilizes, and enhances the land. For instance, plant resources are at a maximum when they are pruned by utilization, and this use causes them to reoccur in their most advantageous state. In a traditional context, it is said that if plants aren't used, then they will disappear and be gone from the People forever" (Austin and Bulletts 1996a:1)

The challenge for the SPC is to translate this general responsibility into specific ways of engaging with the scientists, land managers, and others responsible for the operations of Glen Canyon Dam and the GCDAMP. As noted by one SPC leader, "I guess the hardest part too is having to agree with stakeholders knowing from my Paiute side how the canyon is suffering. That's the hardest part is having to step a little bit back from my Paiute beliefs and having to go into this world of decision making, especially when our beliefs are so different."

Southern Paiute attempts to educate others while taking care not to divulge sensitive information or communicate information that would attract even more visitors and cause greater damage are discussed in greater detail in Chapter Four. During both meetings and interviews, tribal representatives expressed frustration at trying to capture and explain the immense significance of the Colorado River Corridor to their people and culture and the myriad ways that the Glen Canyon Dam and all it has wrought have affected their homeland. They especially commented on the challenges of participating in the GCDAMP in ways that are accepted within that program. As one individual who had participated in outreach efforts noted, "Even the runoff comes from Kaibab and goes to the river. It changes the water pressure, the whole creek itself. To me it's hard to put into words. The sensitivity area. I told them that culturally it belonged to the Southern Paiutes and it's something that's in our own end life."

From a U.S. legal perspective, Southern Paiutes and other Native Americans whose traditional territories include the area that is today referred to as the Colorado River Corridor are granted the right to participate in the GCDAMP because of their historic and ongoing ties to the region. The question of tribal participation in the program was settled during the studies being conducted as part of the GCDEIS during the early 1990s, and the SPC and its member tribes have participated since that time. In addition, as discussed above, in 1994, the member tribes of the SPC signed the PA on Cultural Resources for Glen Canyon Dam Operations and then developed the SPC monitoring and education program. It is important to remember that tribal participation in the GCDAMP is not premised on special knowledge or a willingness or ability to share unique information, even though members of tribes may in fact possess such knowledge; it is a legal right stemming from the unique relationship between the U.S. federal government and tribal governments. The SPC was developed to facilitate the interaction of its members tribes, the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah, within the GCDAMP. Nevertheless, the SPC is a consortium and not a tribe and cannot enter into legal agreements; an ongoing challenge for the SPC has been educating the leaders and key players in the GCDAMP about its status and function.

The Nature of Southern Paiute Participation

Southern Paiute involvement in programs related to the operations of the Glen Canyon Dam began in 1991 when the tribal leaders of the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah learned of meetings associated with the GCDEIS and attended to learn more about what was taking place. Though they were initially viewed only as "members of the public," the Southern Paiute leaders eventually succeeded in challenging both agency bureaucrats and the leaders of other, larger tribes and persuaded them of their interest in being included in the EIS. The NPS obtained funding for a study to document Southern Paiute concerns related to GCD and its operations and contracted with BARA researchers for an initial three-year study (see Stoffle et al. 1994; Stoffle, Austin et al. 1995; Stoffle, Loendorf et al. 1995). From the onset of their participation, Southern Paiutes expressed difficulty translating their relationship to, interests in, and concerns for the Colorado River Corridor into categories that could be recognized and understood by the scientists and federal bureaucrats involved in the GCDEIS. For instance, they have worked to get others to recognize their interests in more than specific archaeological features (see, for example, PEP 2000). Figure 1.3 provides an overall summary of Southern Paiute attempts to adhere to the dictates of the federal agencies with responsibility for the GCDAMP.

Challenges to Effective Participation

As shown in the Figure 1.3, the SPC has taken a multi-pronged approach to maintain involvement in the GCDAMP and as a PA signatory and to transmit information about Southern Paiute culture and dam impacts on cultural resources to stakeholders and others with an interest in the region. Two significant barriers constrain its effectiveness. First, as illustrated in Chapter Three, federal managers and scientists have distinctly different styles of communication and approaches to decision making than Southern Paiutes. The cultural roots of such differences are well-documented in the literature on natural resource management. As indicated by the following quote from an analysis of the operation of the Canadian land-claim boards, failure to recognize

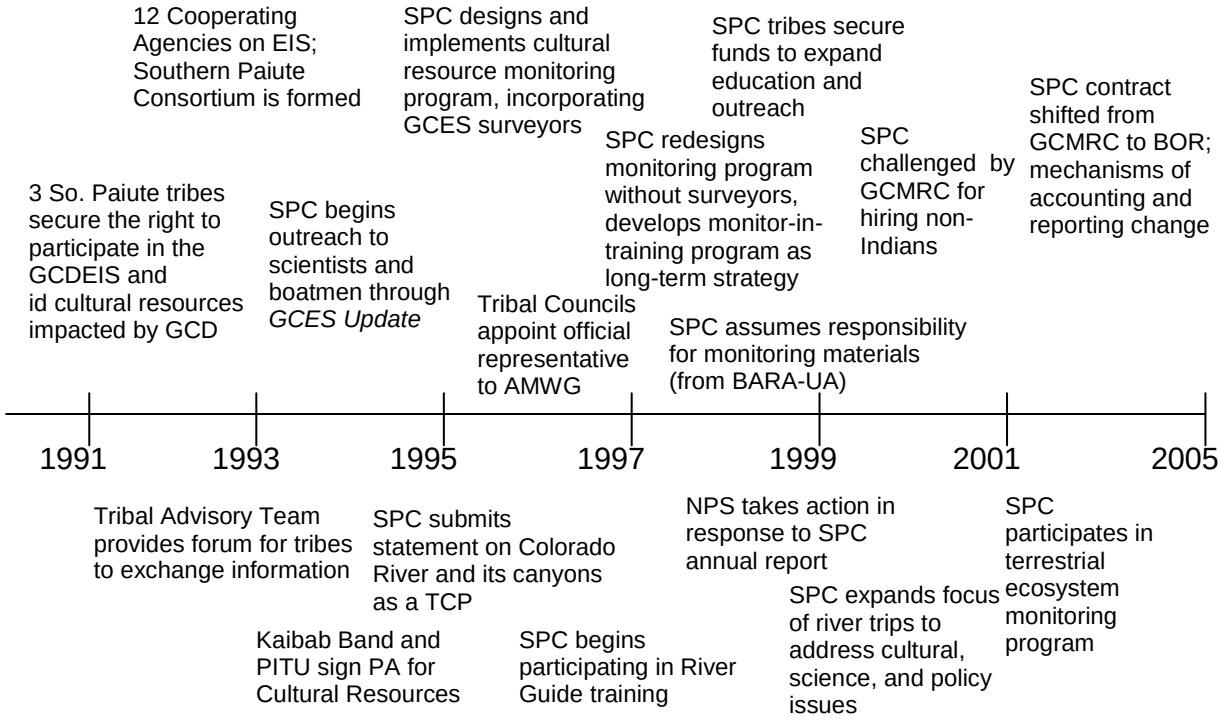

Figure 1.3 Timeline of significant activities in the history of the SPC monitoring and education program

and accommodate these differences precludes meaningful participation by the groups whose styles and approaches are overlooked:

> "In the world of politics and government, how an institution gathers information, processes ideas, reaches decisions, and formulates and implements policies may be just as important, if not more important, than the actual decisions it makes and the policies it develops. (And, of course, the "how" profoundly affects the "what.") Thus Aboriginal influence on the boards depends a good deal on their operating according to Aboriginal principles and values" (White 2006:1; parentheses in original).

Like the Aboriginal groups studied by White, in the GCDAMP Southern Paiutes are forced to communicate and act in the style of western scientists and bureaucrats even though they share neither the cultural nor educational backgrounds of those participants. According to one former SPC leader, "What makes it hard is the bigger language of the English – the non-Indians – that they use and they want you to respond to those words that we don't normally use in our tribe. That's the hard part, and I guess you could say too some of the attitudes that come along with that."

A second barrier to effective Southern Paiute participation in the GCDAMP, the question of what places and resources within the Colorado River Corridor are eligible for special protection as cultural resources, would persist even if the SPC were to appoint PhD scientists to represent

its interests in the program. In 1995, the SPC, on behalf of its member tribes, submitted a statement to the BOR arguing that due to the significance of the Colorado River and its canyons in Southern Paiute culture the entire region was considered a *traditional cultural property* (TCP).

As noted by Tom King in his 1999 report, *Cultural Resource Compliance for the Effects of Operation of Glen Canyon Dam on Downstream Historic Properties: A Report and Recommendations*, the tribes participating in the GCDAMP that are signatories to the PA ascribe cultural values to landscape features and natural resources whether or not those are technically eligible for inclusion in the National Register of Historic Places. King thus concluded (1999:3), "(I)t is probably efficient to treat all such resources *as* eligible for the National Register, whether individually or collectively… The tribes tend not to segregate these resources into discrete, bounded classes, but to see the entire environment as having cultural, spiritual significance."

The following year, the 2000 Protocol Evaluation Panel convened by the GCMRC (PEP 2000:6) concluded, "There is broad concurrence across the panels that the entire Grand Canyon is appropriately considered a Traditional Cultural Property (TCP). It is recommended that all involved agencies accept the designation of the entire canyon as a TCP that is eligible for inclusion in the National Register of Historic Places." Despite these recommendations by two separate outside reviews and initial support from the BOR and the Arizona State Historic Preservation Officer, following the recommendations of a representative from the Glen Canyon National Recreation Area, the NPS rejected the idea of the Grand Canyon as a TCP. Since then, the BOR has attempted to limit the scope of its responsibility under the NHPA and the tribes which can participate in decisions about potentially affected properties. As noted by King (1999:8):

> "[I]f Reclamation and NPS wish to distinguish between those properties to which they have Section 106 responsibilities and all other cultural resources, they can seek a Keeper's determination. On the other hand, they can agree simply to treat the Grand Canyon, its rivers, and its natural resources and historic places collectively as eligible for the National Register. The latter option would almost certainly be simpler than the former. By assuming the whole area to be eligible for the National Register, one can avoid arguments over the eligibility of particular places, and get on to substantive management issues."

Linked to the challenges Southern Paiutes have faced in translating their understanding of the Colorado River Corridor for other GCDAMP participants is the SPC's decision to establish its own monitoring and education program. Under the GCPA, the purpose of monitoring, as an element of adaptive management, is to "identify aspects of dam operations that can be modified to beneficially affect the downstream resources identified as the focus of study" (Solicitor 1999:3, cited in King 1999). Under the PA, monitoring data should serve as the basis for taking remedial action, which may or may not have to do with Dam operations (PA Stipulation 2, from King 1999). In each case, if action is taken, the results of modified operations or agreed-upon loss of a resource should be monitored to the extent necessary to measure the effectiveness of remediation (King 1999). Given the long time scales over which changes in dam operations become manifest in the plant communities and at sites of cultural importance, the SPC has designed and implemented a long-term program. Though Southern Paiutes recognize the entire

region within (and beyond) the Colorado River Corridor as a TCP, they have focused their monitoring and education program on specific places that are important landmarks within the broader Southern Paiute cultural landscape (see Zedeño, Austin, and Stoffle 1997) and are potentially threatened by the operations of GCD. The program incorporates monitoring procedures common to cultural and biological resource monitoring programs (see Chapter Two) but combines these with specific activities that are designed to reestablish Southern Paiute connections to sites and the resources in them (see also Chapter Four).

Significantly, there is ongoing confusion within the GCDAMP and among PA signatories about which activities can be conducted under the GCDAMP and which are PA activities (see also Chapters Three and Five). In the development of the GCDAMP, the assessment of threats to cultural resources – defined as those "properties" that are considered National Register-eligible historic properties, including TCPs – outlined in the PA was distinguished from management concerns about other cultural resources, including biological and other ecosystem functions of concern to tribes, due to a belief among stakeholders that cultural resource issues would be addressed under the cultural program administered by the GCMRC. This distinction has remained problematic throughout the ten-year period under review, at least in part because of reinterpretations of where and for what purposes resources could and could not be used. Though the tribal programs were eventually transferred back to the BOR, initially the GCMRC managed tribal participation under both the GCDAMP and PA and attempted to draw lines between the two. For example, in a December 1997 letter from the GCMRC Cultural Resource Program Manager, written in response to the SPC's proposed Work Plan for participation in the PA and GCDAMP, the SPC was directed to "separate out" tasks according to whether they were PA or AMP activities. Specifically, with regard to the education and outreach aspects of the SPC's program (see Chapter Four), "The focus of the proposal is educational and information dissemination. It appears that some of these tasks relate to PA activities and some are best considered under the AMP. Although these tasks are clearly related, it seems that public education directly lined [sic] with the PA program includes the actual on-river portion of public education/information dissemination program [sic]. Off-river broader community education and information management programs that tend to speak to the entire GCMRC program should be handled outside the PA program. These tasks should be included within a separate unsolicited proposal to the GCMRC" (Lambert 1997). Thus began the artificial separation of activities that take place within the Colorado River Corridor from those that occur outside of that region. In a subsequent year, due to budget cuts, it was suggested that the SPC could continue either participation in river trips or attendance at GCDAMP meetings, but not both. The SPC contended that neither going on river trips without participating in the decision making about GCD nor going to meetings without information about the conditions along the Colorado River would be acceptable and found additional resources to continue its program as it had been designed (see Resources for Participation below).

The GCMRC initially maintained the cooperative agreements with the tribes, but in 2001, the GCMRC terminated its cooperative agreements and the BOR "re-assumed responsibility for funding and managing tribal involvement in the AMP for the purpose of meeting federal requirements for tribal consultation under NHPA and other federal laws… with authority for funding coming from mandated government-to-government consultation, with the implicit understanding that the formal meetings of the AMP serve to fulfill federal consultation

mandates" (Fairley 2004:1). On January 17, 2007, the BOR contracting officer sent a letter to the Chairperson of the Kaibab Band of Paiute Indians stating that, based on a new interpretation of Statute 31 U.S.C. 1345, the Tribe could not reimburse expenses related to attendance at meetings of the AMWG, a federal advisory committee. The letter stated, "Members of the committee serve **without compensation,"** (Postell 2007: 1; emphasis added in letter). The letter also stated that the Tribe could not reimburse travel expenses related to that attendance, though the letter also stated that AMWG members "shall, upon request, be reimbursed for travel expenses…" Many of the AMWG members are salaried employees of state and federal agencies, so they are in effect paid for participating in AMWG meetings. This new interpretation caused concern within the SPC about the intent of this decision; new accounting procedures were put in place so that staff time for attending AMWG meetings was not charged to the BOR. Almost four months later, on May 4, 2007, the BOR contracting officer sent the Tribal Chairperson a letter withdrawing the January 17 letter, stating, "The letter contained conflicting information and I apologize if it has caused the Kaibab Band of Paiutes any concerns."

The Federal government's uncertainty related to the appropriate place for the tribes in the GCDAMP, which agency should manage their contracts and communication with them, and reinterpretation of policies toward the tribes has been a source of ongoing concern. Particularly frustrating for the SPC staff has been the lack of direct communication with the financial officers of the participating organizations. In the midst of uncertainty and ongoing changes in procedures, the SPC and its fiscal agent, the Kaibab Band of Paiute Indians, have attempted to modify proposals, accounting procedures, and styles of reporting to meet the requirements of the BOR and GCMRC. Unfortunately, on several occasions when their efforts have not met expectations, they have not been notified and their proposals or reports have simply been ignored. In these cases, the tribal staff have had to initiate contact with the agency to find out why paperwork has not been processed.

Apart from the bureaucratic hurdles, the SPC faces several significant challenges in maintaining its program and ability to provide effective government-to-government consultation, and also the right to participate in ways that are appropriate for Southern Paiutes. In addition to trying to separate monitoring from education, activities that take place within the Colorado River Corridor from those that take place elsewhere, and impacts from GCD from those derived from other sources, the SPC is regularly called upon to define and present its participation in a manner acceptable to scientists (see Confronting Differences in Worldviews below). In interviews and meetings, GCMRC scientists acknowledged that they can only work within the framework that they define as science. This has led, for example, to a dispute over the design of the SPC monitoring program and the method by which monitoring sites are selected (see Chapter Five).

The practice of grouping all tribes together as if their interests, financial offices, and modes of participation in the GCDAMP are the same has led to additional problems. While there are issues about which tribes participating in the GCDAMP agree with one another, given their different cultures, traditional lands, and current land bases, there is no reason to believe that the tribes will have the same response to all issues that are addressed by the program, any more than Arizona and California share interests simply because they are both states. In a recent interview, one GCMRC staff member remarked, "Some kind of coalition between the tribes would make them more effective as a group." While tribes may benefit from working together, they may also find

that their interests diverge. Though generally the SPC has worked to coordinate its efforts with those of the various tribes that are involved in the GCDAMP, it has at times decided to act on its own. One representative observed, "It was kind of hard in the beginning, meeting with the BOR and the GCMRC, and they were always fighting with each other. So, you're like, 'What is it these guys want from the tribes?' Even when the other tribes said, 'Don't go to the meetings,' I still felt we should go." Like any other members of the AMWG and TWG, tribal representatives have to develop trust in one another before they can work together effectively. Early in this study, one SPC representative noted, "So now I talk pretty good with Hualapai, Hopi, Navajo. They have a new rep for Zuni so we don't know each other very well." The lack of understanding of the differences among the tribal participants is part of a larger problem stemming from poor communication within the GCDAMP.

Ineffective communication is a major factor noted by representatives of all groups that participated in this review, and it is exacerbated by the absence of any explicit mechanism for managing turnover of membership on the AMWG, TWG, or any other body associated with the program. As one tribal leader noted, "I had to kind of figure out the agencies. Then they had their big turnover and it started all over again." Members of the non-Indian groups are not selected because they have experience or training working with tribes or with culturally diverse individuals and groups, just as tribal representatives are generally not selected because of their expertise working with western scientists and bureaucrats; absent any explicit orientation to the GCDAMP, its membership, and its goals and objectives, stereotypes and prejudices prevail. According to one GCMRC staff member, "Tribes could articulate their care and concern for place, and their historical associations with GCMRC, but maybe this doesn't necessarily translate very well." Neither GCMRC staff nor other scientists and agency personnel claim to understand tribal concerns, and SPC participants express frustration at their inability to communicate successfully. Again, this is not a new finding; the 2000 PEP reflects the opinions of both Paiutes and non-Paiutes associated with the GCDAMP: "There is a need for a Native American Consultation Plan. Such a plan involves more than just improved coordination—though that is an expected outcome and benefit. It requires the federal agencies and the tribes to agree to a process for communicating, coordinating, resolving differences, acknowledging roles and responsibilities, and establishing government-to- government relationships" (PEP 2000: 6). At the time of this writing, a draft Tribal Consultation Plan is still being developed (DOE/DOI 2007).

As noted, Southern Paiutes are not the only ones frustrated with poor communication and the lack of a clear direction for the GCDAMP (see Chapter Three). In many interviews, participants commented about not being sure of program goals, being discouraged by the lack of process, and so on. The 2000 PEP identified several weaknesses that were also noted by individuals who were interviewed for this assessment, both Paiute and non-Paiute: "First, the program lacks clarity of mission and vision for the future. This is evident at several levels in both the GCMRC and the PA aspects of the program… Second, because the overall mission of the program is not clear, the program appears to have stalled in place." (PEP 2000:4). Sadly, the findings of this assessment show that little progress has been made in the six and a half years since the PEP.

Confronting Differences in Worldviews

Exacerbating the challenges of participating in the GCDAMP are significant differences in traditional Southern Paiute and western scientific worldviews.[2] At the same time, there are also commonalities in the two:

> "[I]n neither traditional Paiute philosophy nor modern science does it make sense to isolate one part of the environment from the other parts. For example, ethnographic studies of human societies document that people who live in a region for long periods of time come to understand, explain, and deal with most of the natural components of their environment. Southern Paiutes are no exception. We have resided in our traditional lands for many generations" (Austin and Jake 1998: 2).

Under both worldviews, in moving from what is observed directly to what can be understood about places and elements that are not observed, humans must accept certain understandings without being able to prove them. In the Southern Paiute worldview, places have special meaning derived from both human and supernatural activities that occur there, and humans who enter these places must acknowledge that they are not alone there. Ceremonies and prayers can help bring humans into the proper relationship with the life forces that inhabit such places. Because of the absence of a strict religious hierarchy in Southern Paiute culture, there is considerable variation among Southern Paiutes in performing these ceremonies and prayers.

For many scientists, information that is learned about specific places selected through random sampling is relevant for other places that have never been visited. Given the high levels of variation from one place to another within the Colorado River Corridor, there is neither an accepted minimum number of places that must be sampled nor an agreed-upon set of relevant variables that must be considered in order to make claims about the generalizability of findings from one place to another. Consequently, there is considerable variation among scientists regarding the level of confidence one can place in claims of representativeness.

Still, within the GCDAMP, the privileging of a particular view of science, with the emphasis on experimentation and random sampling, has created numerous challenges for Southern Paiute participants. Of particular importance is that the failure to recognize that the difference between science as it is being applied in the GCDAMP – framed in terms of experimentation – and other ways of knowing and discovering things is significant at the level of worldview, not at the level of particular approaches to measuring plant productivity, for example (see Chapter Five for more detailed discussion). Southern Paiutes and program scientists differ in their beliefs about the inferences that can or should be drawn about what cannot be directly observed, not just in what is actually being observed or measured and the way that observations and measurements are carried out.

There are other differences in the two approaches to knowledge and its acquisition. In the GCDAMP, the emphasis is often on the differences, as the rationale for involving tribes is understood by some participants to be tied to their special knowledge rather than to their legal

[2] It is inaccurate to speak of either Southern Paiute or western scientific worldviews as if the members of these groups are homogenous and hold the same views, but the notion provides a basis for examining some critical differences in understanding. It is also important to remember that Southern Paiute worldviews are not the same as those of other Native American tribes that participate in the GCDAMP, though there are some areas of overlap.

and political right to participate in the program, regardless of their knowledge. The failure to recognize and accept this right has led to numerous misunderstandings and frustrations throughout the program. The 2007 Tribal Consultation Plan acknowledges the legal rights of the tribes and also highlights the importance of traditional knowledge, asserting (hopefully) that differences can be transcended.

> The overall purpose of this Consultation Plan (the Plan) is to provide a framework in which the representatives of federal agencies and tribal governments engaged in the Glen Canyon Dam Adaptive Management Program (GCDAMP) can interact in effective, respectful and constructive ways, so that the rights and governmental status of the tribes are honored and so that the traditional knowledge of the tribes can be brought to bear in the design and implementation of the GCDAMP. Although there are some fundamental differences between indigenous and western scientific approaches to the acquisition of knowledge, these differences can be transcended through appropriate consultation and collaboration (TCP 2007:1).

What is still missing is recognition that the fundamental differences lie not only in the acquisition of knowledge but also in the broader worldviews about what can be known, who has the right to know it, and what is the proper place of humans in relation to nature (see also Chapter Four).

Again, such differences have been widely recognized in natural resource management. As noted by White (2006:7), citing Abele (2006), "TK [traditional knowledge] comprises at least three interrelated components: 1) a distinctive political and social perspective, rooted in shared history; 2) local knowledge; and 3) ethical and cosmological knowledge… TK is a far broader concept than TEK [traditional ecological knowledge] (rendered in this way), encompassing as it does analyses and prescriptions for all manner of social interaction among people as well as deeply spiritual and philosophical precepts (often implicit and unspoken)." While human-environment relations have attracted considerable attention, the significance of vastly different conceptions of social relations has been largely ignored. As White later adds, "(I)t is difficult to imagine licencing and assessing the environmental impact of diamond mines and pipelines as having even the remotest links to traditional Dene activities," and "(T)he nature of the modern bureaucratic state, of which they are a part, puts firm limits on just how far such efforts can go" (2006:7).

In Southern Paiute culture, individuals are exposed to fragments of information and, when they demonstrate that they can handle what they have learned, they are given more. Their knowledge comes from other people, but also from being in places and interacting with water, plants, animals, rocks, and other features of the landscape. They are recognized as knowledgeable and wise because of how they use their knowledge rather than any prescribed set of courses or official degrees. They also recognize that there are some things that people should not know and frown upon attempts to reach beyond their place in the order of things. They disdain the efforts of one individual to set him or herself apart from or above others and will find ways to pull such an individual back into the group.

In contrast, Western science privileges formal education and degrees as objective, equivalent markers of knowledge, despite the fact that anyone who has gone through a program of higher education knows that success depends on many factors other than the knowledge of the individual seeking the degree. Likewise, scientists tend to profess that more investigation and study will lead to more complete understanding, that more knowledge is always better, and that information should be widely shared with everyone. They compete with one another to demonstrate that they hold greater knowledge and understanding than others. As one Southern Paiute participant noted, "Dealing with the scientists - Year after year they want more information. Scientists ask these questions. Why? What if?" Another commented, "And it's hard to deal with the scientists because they say science is what makes the world go round. And they've only been in this area, what five to six hundred years now. But it's good when the tribes get up and say what the canyon means. Because there are some stakeholders that really listen…"

Confounding the situation has been the question of who can best represent the SPC in the GCDAMP. The Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah are small tribes with small natural and cultural resource program offices. The SPC utilizes both tribal employees and consultants to operate its programs, depending on its needs at any given time. This practice has been questioned by the GCMRC, as in a 1997 letter to the Kaibab Tribal Administrator, which stated, "The Consortium has relied heavily on consultants in the past and it is preferred that the Tribe move toward administering the program independently" (Lambert 1997:2). The SPC has administered its program since 1993. Follow up meetings at the GCMRC revealed that the concern was more fundamental than where the SPC representatives were employed. At the time, GCMRC staff and other scientists questioned the involvement of non-Indians. During one meeting, the SPC Coordinator was told that only Southern Paiutes should participate on river trips and in the SPC monitoring program. Such interference by a federal entity was unwarranted and inappropriate and also reflected a significant lack of understanding of the goals and nature of SPC participation in the GCDAMP.

The question of who could and should participate in the GCDAMP on behalf of tribes reflects a larger concern of the GCDAMP. On the one hand, tribes are seen to provide a holistic perspective on the Colorado River Corridor; some scientists and managers have interpreted this to mean that this perspective must come through individual Native Americans (see Chapter Five). On the other, the process through which tribes or any other group must participate in the GCDAMP requires a particular type of cultural knowledge. It has become clear to most participants that only western scientists have the credentials and appropriate "knowledge" to get attention in the GCDAMP as it is organized. The SPC has engaged non-Paiute experts to assist in the collection of certain types of information that is then incorporated into its overall program and also to help interpret information that is generated by scientists working for other program participants. Those experts, while respectful of Southern Paiute beliefs, do not need to hold such beliefs to gather and share information that the SPC can use. Some SPC coordinators acknowledged that they would like to have Southern Paiute tribal members who also had PhDs in science, but all recognized that it is not simply a matter of getting a tribal youth with enough interest and the financial resources to undertake the extended course of study necessary for obtaining a graduate degree; some attitudes and beliefs of scientists conflict with those that Southern Paiutes are taught from a young age.

To meet the challenge of working within the narrowly prescribed "scientific" framework of participation in the GCDAMP, SPC coordinators and representatives have made significant efforts to understand scientists and their goals. A key aspect of the program is science education for all participants (see Chapter Four). Yet, confusion about why they are expected to fit into such a narrow framework continues to frustrate those who are aware of scientists' critique of the SPC program. One active participant commented, "I was looking in the dictionary the other day on the word 'science.' All it said is 'knowledge.' It didn't say anything about test sampling or anything. What we had was people who had knowledge. They passed it down through our oral traditions… But then it goes back to those big old egos though."

Throughout the ten year period in which the SPC has developed and implemented its monitoring and education program, there have been few efforts by participants in the GCDAMP to adapt to anything other than western scientific ways of defining what work is legitimate, leading one SPC coordinator to comment, "I know people say native people should be represented by native people, but it's good to have the white people. That […] guy really knows his stuff. [He] and that guy from [tribe] know how to reword some of the stuff that comes up in these meetings… To me it all comes down to those attitudes of who knows more and who has the most education. Ego is the word. They should call this the TWG Ego meeting or the AMWG Ego meeting." Of course, scientists have also become involved in competition over scarce resources and expressed concern that tribal groups receive funds to participate in the GCDAMP.

Resources for Participation

Southern Paiute participation in the GCDAMP is supported with resources from the BOR, the USGS (through the GCMRC), the member tribes of the SPC, and institutions such as the University of Arizona. Support for tribal participation in the GCDAMP has been expressed in every review of the program. The 1999 National Research Council review of the GCDAMP, *Downstream: Adaptive Management of Glen Canyon Dam and the Colorado River Ecosystem*, for example, concluded that "Resources must be secured for full tribal participation in all aspects of monitoring, research and communication in the Adaptive Management Program, without reducing other components of the Cultural Resources Program" (WSTB and NRC 1999:12). Yet, despite these recommendations, the definition of the GCDAMP as a long-term program, and the continued existence of the PA throughout the ten-year period under review, resources from the BOR have declined, both in real dollars and especially when accounting for inflation since 1995. Figure 1.4 shows the total allocated to the SPC each year.[3] As shown, and despite specific recommendations to the contrary, the base budget for participation in the program and related activities dictated by the PA has remained flat since 1998. The apparent change in 2004 is because in that year the BOR began including the costs allocated for an annual river trip ($15,000) in the SPC allocation; up to that point, the funds had been paid to the GCMRC which then provided the boats, equipment, and river guides for the trip. As the costs of the trips increased and the allocation for them in the annual GCDAMP budget did not, the funds were transferred directly to the tribal budgets.[4]

[3] Note that the money allocated in any given year was not necessarily spent in that year due to delays in submitting invoices or getting reimbursed. In addition, the money for 1997 actually did not arrive until 1998.
[4] Since 1997, the SPC, Hopi Tribe, Hualapai Tribe, Navajo Tribe, and Zuni Tribe have each been allocated $80,000.

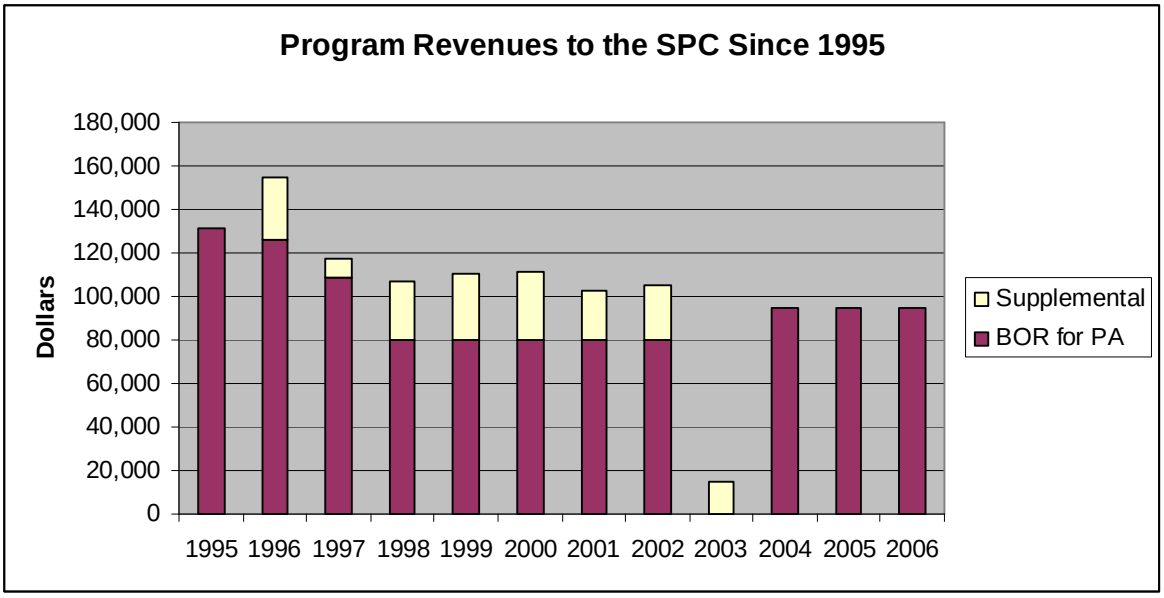

Figure 1.4. Program Revenues to the SPC since 1995
Source: Kaibab Band of Paiute Indians

As shown in Figure 1.4, at several points throughout the ten-year period the SPC has sought and received supplemental funding, through the BOR or GCMRC, for specific activities that address the needs or responsibilities of the PA or the Center. The specific purpose for these additional funds is provided in Table 1.2. Given the declining resources allocated to the program, these resources have also helped stabilize the SPC program at times, helping to support the SPC director for additional months each year or to support a program assistant. For example, in 1999 and 2000 the SPC received funds to expand its educational outreach program (see Chapter Four) and from 2001 to 2003 the SPC participated in the GCMRC's Terrestrial Ecosystem Monitoring Program (see Chapter Five). Due to the declining support, the SPC has had to turn to other sources to maintain its education and outreach efforts. After discontinuing the funding to the SPC outreach program, the GCMRC received funds to develop its own outreach program, a decision which concerned tribal leaders: "We've already done our outreach program. That's another thing they took out without consulting with us. Now they want to do outreach and want our help, but they never talk about putting outreach back in – because of budget cuts."

Table 1.2. Purpose of Supplemental Funding for SPC

Year	Purpose of Supplemental Funds
1996	Impacts of experimental high flow
1997	Impacts of experimental high flow
1998	Ethnographic study
1999	Education and outreach
2000	Education and outreach
2001	Terrestrial Ecosystem Monitoring
2002	Terrestrial Ecosystem Monitoring
2003	Terrestrial Ecosystem Monitoring

Figure 1.5 compares the Total Program Revenues allocated to the SPC to the Cumulative Budget of the GCDAMP. As shown in the figure, the GCDAMP revenues have generally increased over time while the percent of total funds allocated to the SPC have decreased, from a high of 2 percent in 1997 to less than one percent in each year since 2004, even when the $15,000 cost for river trips is included.

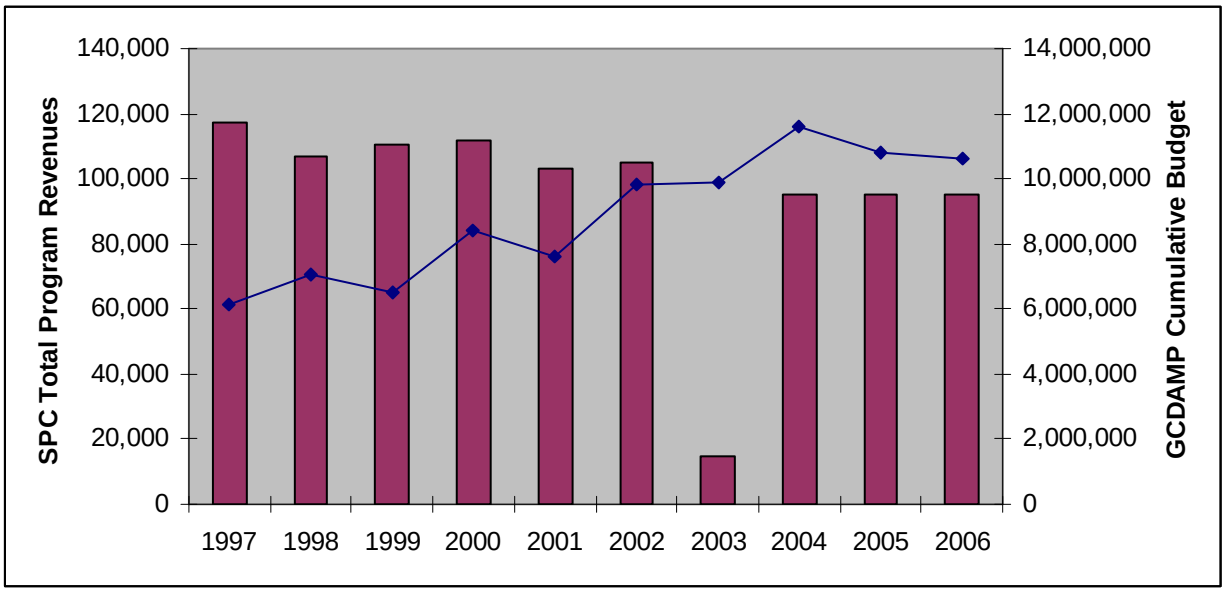

Figure 1.5. SPC Total Program Revenues Compared to GCDAMP Cumulative Budget
Source: http://www.usbr.gov/uc/rm/amp/mtgmin.html, especially the "January 2002 AMWG meeting minutes" and Kaibab Band of Paiute Indians

To maintain its program, especially in the face of uncertain and dwindling resources, the SPC has received considerable support from its member tribes. Resources for the program include contributions to the salaries of the Coordinator/Director and Assistant; dedication of adult community service, workforce development, and summer youth program workers; use of tribal vehicles; use of tribal offices, equipment, and telecommunications; and use of tribal facilities for meetings, workshops, and training sessions. The Shivwits Band has also funded the participation of its youth and adult members on river trips and trips to the University of Arizona to assist in the preparation of the SPC annual report (see Chapter Four); travel of Band members to SPC meetings and events; and use of tribal facilities and equipment. In addition to the tribal resources, the SPC has received considerable support from individuals within its member tribes. Numerous tribal members have donated their annual vacation leave to participate in monitoring and education program activities and have volunteered their time for meetings, training programs, and to provide input to the SPC Coordinator/Director.

The SPC program has also received support from the University of Arizona, including faculty and graduate student salaries, grants for travel and support of activities such as the development of educational and outreach materials, the use of offices and telecommunications, and the use of university facilities (offices, meeting rooms, dormitories, and the recreation center) for meetings, workshops, and visits to the university to prepare the SPC's annual report.

Finally, the SPC has sought and received donations of time, facilities, and materials from Dr. Arthur M. Phillips, III, who has served as the SPC consulting ethnobotanist continuously since the earliest days of the program when SPC conducted an "ethnobotanical river trip" designed to define the scope of ethnographically significant plants occurring within the Colorado River Corridor. As outlined above, this evolved into an ethnobotanical assessment program and monitoring program in the 1995-97 era, all designed and implemented with the assistance and oversight of the SPC. This basic element of the SPC monitoring program, which has consistently utilized a uniform protocol and set of sites since its installation, has become the longest-running terrestrial botanical monitoring program in the GCDAMP, not just a ten-year set of ethnobotanical data. To supplement the payment he has received from the SPC for his time and some of his expenses, Dr. Phillips has donated well over 50 percent of his costs for time and expenses to the program each year.

Summary and Conclusion

Southern Paiute involvement in the GCDAMP began in 1991 and has continued since that time. The SPC was formed to represent the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah in the GCDEIS and later the GCDAMP. Despite ongoing uncertainties in the direction of the GCDAMP, the level of financial and other support for tribal participants, and the most appropriate and effective means of participation, the SPC has developed and maintained a multi-faceted program consisting of education and outreach, cultural resources monitoring and evaluation, and representation on the various committees and workgroups of the GCDAMP. It has also participated in special initiatives of the GCMRC and GCDAMP when solicited. The nature and extent of SPC participation is reviewed and assessed in the remaining chapters of this report.

Chapter Two
Site Descriptions and Review of Ten Years of Monitoring Data

David Seibert and Arthur Phillips III, with the assistance of Kevin Bulletts

"May all the sacred place, through the workings of the Kaibab and St. George Paiutes, be preserved for all to visit, so we are able to find ourselves as individuals where our ancestors before us lived" –Southern Paiute youth river trip participant

Methods and Materials Used for this Chapter

The goal of this chapter is to assess the Southern Paiute Consortium's (SPC's) monitoring program through an examination of the rationale guiding the choices of the sites monitored in the program and the data gathered during the program's first decade. The chapter also examines whether adjustments need to be made in frequency and methods of monitoring at each site, whether any sites should be removed from the monitoring program, and whether sites of concern need to be added to the monitoring efforts. This information has been collected from multiple sources, and through multiple methods. From fall 2006 through spring 2007, data gathered during the initial research conducted between 1992 and 1995 and in the ten SPC Annual Reports submitted between 1996 and 2006 were consolidated. SPC monitoring program review meetings and interviews with the founders of the program and other river trip participants, including youth and elders, provided additional information on Southern Paiute perspectives on the importance of the entire region and of individual sites and the challenges the SPC faces in monitoring and caring for those sites**.** Through descriptions of individual sites, including how and why they were monitored in an integrated manner and SPC recommendations about them, this chapter aims to bridge the gap between the specific monitoring expectations and requirements of the Glen Canyon Dam Adaptive Management Program (GCDAMP), and the holistic understandings that Southern Paiutes have of the region that includes the Colorado River Corridor.

Implementation of the SPC's Monitoring Program: Challenges and Responses

The SPC monitoring program attempts to meet the needs of the GCDAMP, the focus of which is the Colorado River and lands on either side of the river, but within the boundaries of a potential 300,000 cfs (cubic feet per second) flood. This flood level was estimated based on the volume of the highest historical flood on record and also reflects the maximum release level possible from Glen Canyon Dam (GCD), estimated at 256,000 cfs, combined with a hypothetical 40,000-cfs flood event from the Little Colorado River and other tributary streams (Fairley 2005). At the same time, the SPC seeks to address its needs to understand what is happening to the entire cultural landscape of the Grand Canyon area, including that which lies beyond the 300,000 cfs limit (Stoffle, Austin et al. 1995). Any attempt to summarize the myriad variables of concern to Southern Paiutes at specific sites risks oversimplification. No individual site can be evaluated according to a single criterion, for example as strictly an archaeological feature, or simply as an area where culturally important plants grow. Similarly, the Southern Paiutes consider the whole region in and around Grand Canyon as an indivisible Traditional Cultural Property (TCP; see Chapter One). Thus, the SPC monitoring program incorporates sites that illustrate a range of features, impacts, and responses to dam operations; taken together, the data gathered through the program provide information about specific places of concern and also about patterns of effects

that demonstrate the fragility, resilience, and complexity of the Colorado River ecosystem. Because time and funding for monitoring are always limited, the SPC has determined that only sites that are particularly susceptible to impacts or are especially sensitive will be monitored on an annual basis. Other sites, at which changes are likely to occur more slowly, are monitored on a rotating basis, generally every three years. A schedule of which sites are to be visited each year is set up five years in advance and is modified as necessary due to changing impacts or priorities.

The SPC program was designed to evaluate the impacts of sites below Glen Canyon Dam, resulting in the inclusion of sites both above and below Lees Ferry. Selecting sites that lie within the region of impact defined by the GCDAMP presents an ongoing challenge to the SPC as it attempts to decide how to conduct monitoring that contributes to shared understandings—among Southern Paiutes, and between themselves and the other stakeholders in the AMP—of how individual places are impacted both by normal dam operations and, when necessary, by experimental flows. At the same time, the SPC attempts to preserve knowledge of how those places relate to larger processes underway elsewhere in the Colorado River Corridor. This situation necessitates the use of monitoring methods that are acceptable to AMP scientists, while also deemed appropriate by Southern Paiutes.

For the Southern Paiutes, the foci of data gathering activity cannot be disaggregated into a set of constituent parts that have no relation to one another. Each "feature" of a site or landscape can be identified and talked about by Southern Paiute tribal members, just as it can by anyone else. For example, the effects of dam operations on beaches, plants, and former habitation sites can be observed and compared with data from previous years. But for Southern Paiutes, these features cannot be properly considered, nor threats to them mitigated, in strict separation from one another, including from their own human presence at the site, and their own and others' behavior at those places. Plants, geologic features, and water sources often led the early Paiutes and their ancestors to stop in particular places within the canyons formed by the Colorado River. Therefore, all of these are considered when the site is being evaluated. In addition, where necessary to establish the proper relationship with the places where they stop, knowledgeable individuals lead the Paiute monitors in prayers and other activities at the site (see Appendix C for Southern Paiute Consortium Monitoring Program Protocol and sample site checklist).

In trying to develop a monitoring program that would meet the information needs of the SPC as well as other AMP participants, and also the goals of transparency, consistency, and legibility both within and outside the monitoring program, the SPC monitors and program developers tried several approaches. During the initial development of the SPC monitoring program in 1995, for example, several methods were tested for monitoring plants, including belt and line intercept transects. After evaluating the results of those tests, the SPC consulting botanist and monitors concluded that the line intercept method was the most efficient and reliable method for use by the SPC monitors. The number of line intercept transects at each site was increased to three at all sites where transects were used. Such changes provided a significant increase in the amount of information collected at each site while implementing consistent methodology and allowing completion of monitoring tasks within the time constraints imposed by the river trip format. In addition, the SPC included methods of collecting data on site conditions using site-specific monitoring checklists, a composite cultural resource monitoring form, and photo matching (see Appendix D for blank monitoring forms and Appendix E for sample photo log). Of constant

concern for Southern Paiutes is the need to provide sufficient information to meet the needs of SPC and other AMP managers for information while protecting information that should not be shared with wider audiences. Monitors struggle with how to maintain a balance between expressing value and concern without attracting even more attention to specific places. As one monitor put it, "It's hard to put it in words…all sites are sensitive in the Canyon. Why? What if? Scientists ask these questions."

The original list of sites for monitoring was identified through two major factors: (1) sites of critical importance to Southern Paiute culture; and (2) those perceived to be at risk from dam operations. Eighteen sites of greatest critical concern were identified early in the program, and two more sites were added as it became clear during monitoring efforts that they also were impacted by dam operations. Supplemental sites have been visited upon the request of tribal leaders or GCDAMP participants.

Table 2.1. SPC Monitoring Sites 1996-2005

Site	Site name	Years monitored	River Mile
1	Glen Canyon	1996, 1997, 1999	-13.5R
2	Mixed petro- glyphs	1996, 1999	-11.5R
3	Ferry Swale	1996, 1999	-11L
4	Jackass Canyon	1996, 1997, 1998, 2002, 2003, 2004, 2005	8L
5	South Canyon	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	32R
6	Nankoweap	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	52R
7	Lava-Chuar	1996,1997, 2002, 2005	65.5R
8	Tanner Canyon	1996, 2002, 2005	68R
9	Bedrock Canyon	1996, 1998, 2001, 2004	131R
10	Deer Creek	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	136R
11	Kanab Creek	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	144R
12	Vulcan's Anvil	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	178R
13	Whitmore	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	188R
14	Pre-Parashant	1996, 1997, 1999, 2001, 2005	197R
15	Ompi Cave	1998, 1997, 1999, 2000, 2004, 2005	200R
16	Spring Canyon	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2004, 2005	204R
17	Indian Canyon	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	207R
18	Pumpkin Spring	1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005	213L
19	Ledges Spring	1997, 2000, 2003	151.5R
20	Granite Park	1997, 1998, 2002, 2004, 2005	209L

Adaptive Management and Integrated Site Monitoring

Adaptive management is an approach to the management of complex ecosystems that considers both policy and management as experiments through which interventions are made at several scales to increase understanding (see Chapter One)**.** It is predicated on the ability of concerned parties to work together to define a system's conditions and how they change over time, with the idea that through this collaborative work stakeholders can adapt policy and research questions to achieve mutually defined goals (Holling 1978; Walters 1986; Walters and Holling 1990; Lee 1993; Gunderson et al. 1995). Adaptive management depends on systematic and thorough monitoring that provides information for policy decisions, but this can only be effective if the mutually defined goals of consistency, legibility, and transparency of data and methods of data collection noted above are adhered to. Importantly for this kind of iterative and collaborative work, monitoring results of any kind, including the discovery of little or no change at a specific site, contribute in significant ways to an adaptive program that seeks to know as much as possible about dam impacts on the river system (see also NPS 2006).

Before the completion of GCD, flood waters brought sediments into the Colorado River Corridor and deposited sand along the river banks. After these flood deposits dried out, wind transported the sediment farther inland where some of it covered archaeological sites and formed dune fields around plant communities. The completion of GCD changed water and sediment flows to the reaches of the Colorado River below the dam, trapping almost all of the sediment behind the dam and resulting in a decline in sediment and accelerated erosion of terraces that had been formed over the centuries. Following the adaptive management approach selected for the GCDAMP, in 1996 a 45,000 cfs beach/habitat building experimental flow was conducted with the hopes of mitigating some of the negative impacts of GCD on downstream conditions. Proponents of the experimental flow hoped that it would provide system-wide mitigation to archaeological and other culturally significant sites in the Colorado River Corridor by depositing sediment along the river at higher elevations than normally would occur under what had become the accepted flow regime (Balsom and Larralde 1996; Fairley 2005). Like other GCDAMP participants, the SPC conducted monitoring at sites before and after the experimental flow; the impacts at SPC monitoring sites are discussed below.

Fluctuations in water releases from GCD combine with other human impacts caused by visitation, such as trailing, removal or movement of artifacts, vandalism, and the deposition of trash and other human waste. Natural perturbations such as ongoing drought, natural flood events, and other climatic factors contribute to a dynamic system that shows the effects of both human-induced and natural disturbances. Due to the size of and variability across the system, it is impossible to determine or predict the impacts of changes in dam operations at every site along the river corridor. For these reasons, systematic and thorough monitoring of cultural resource sites is an appropriate and necessary activity. The SPC monitoring program accomplishes its objectives through integrated consideration of site features, concerns, impacts, and the potentials for mitigation, in order to serve simultaneously the needs of the GCDAMP and the SPC.

SPC monitoring sites can be divided into two groups: sites 1-3 are upriver of Lees Ferry, and sites 4-20 are below. This is significant in the evaluation of the SPC monitoring program because

the sites exist within two different land management units of the National Park Service (NPS)—the Glen Canyon Recreation Area and Grand Canyon National Park. These units have different missions that complicate the work of the GCDAMP and the SPC involvement in the program. The division of the region into units, and disagreement between Native American tribes and the U.S. government over ownership of parts of the whole region, also pose challenges for permitting, site access, and any monitoring activities that can be accomplished.

Site Overviews, Foci of Data Gathering, and Recommendations

In this section, site discussions summarize ten years of findings at each site monitored during river trips into the Colorado River Corridor, both those conducted on an annual basis and those taken in conjunction with special events such as the experimental flow described above. The summaries include descriptions of beach conditions, plants, rock art, and other archaeological features, plus any recommendations for revisions to the monitoring program or for actions to be taken by management agencies regarding the site. For detailed site descriptions, see Stoffle, Austin et al. (1995).

As a result of what was effectively a reduction in funding in 2000, SPC determined that it was not possible to continue to visit the sites within Glen Canyon national Recreation Area above Lees Ferry (Sites 1-3 and Nine Mile Draw). They have not officially been visited since 1999, so the summaries of these sites are restricted to findings from the late 1990s. According to Fairley (2005:181) in a discussion of NPS monitoring activities, "Currently, archaeological sites above Lees Ferry are not being monitored (Chris Kincaid, Glen Canyon National Recreation Area, oral commun., 2004); only sites downstream of Lees Ferry are routinely monitored." The lack of regular monitoring of those sites by any group requires attention.

Site #1—Glen Canyon Area
Years visited: 1996, 1997, 1999

Overview
Ethnographic data from interviews and site visitation by Southern Paiute elders indicate that the region was actively used for hunting, gathering, prayer, and ceremony, and that there are songs associated with specific panels. As with all of the sites documented in this chapter, and in fact for the entire region now recognized as the Grand Canyon, this site is connected to other locations in ways that fail to emerge when an individual site is the focus of analysis. The area is recognized by the SPC as a shared-use area among the Havasupai, Hopi, Hualapai, and Navajo.

Plants
In February 1996, a 50m segmented belt transect was installed in the plant community upriver from the rock art panel. The transect was photographed and the general condition of the plants within each segment was noted. The belt transect was reinstalled in May to evaluate the impacts of the Test Flow of 1997. In 1997 the 50m segmented belt transect was converted to a line intercept transect and re-photographed with the new established end points, and the general condition of the plants was recorded. Two additional line intercept transects were installed. The transects were read, photographed, and documented on a site map, and the general condition of the plants was recorded. There were no overall natural impacts to plants recorded at this site. In

1997 it was observed that camping impacts were reduced from the previous year. Trailing on the bench below the site had increased and had negatively impacted some plants such as the grass and salt bush. Other human impacts found were some fire rings on the bench.

Rock Art
This site includes a large rock art panel. Initial trip efforts focused on establishing photo points to monitor the condition of the panel. Photographs were taken at the established photo points and impacts were documented. There were no observed natural impacts to the rock art. Human impacts include dust cover caused by foot traffic and graffiti. In 1996 it was observed that "Joe 95" was lightly scratched into the panel. In 1997, "Marilyn (?) McCarty may 30" was observed on the panel. A new line intercept transect was located to incorporate the rock art. The photographs were retaken at the established photo points and impacts documented at this site. The new graffiti markings were brought to the attention of NPS archaeologists.

Recommendations
Due to relatively easy visitor access to this area, the SPC should work with NPS staff of the Glen Canyon National Recreation Area to educate visitors to this area about the cultural significance of rock art panels and the need to protect them. To reduce trailing and erosion along the trail from the beach to the upper bench, steps should be established along the existing trail, and a single trail should be marked along the bench to the rock art site.

Supplemental Site: Nine Mile Draw

Overview
Southern Paiute elders that were interviewed agreed that this location was used for hunting, gathering, and fishing, and that the high cliffs made the area good for trapping animals. Elders indicated that the area is also important for its subsurface minerals and for its location on a series of trails that connect sacred sites. One elder's father used to live here, and the area was used as a stopping place for Southern Paiutes while traveling.

Although not a regular SPC monitoring site because of the significant modifications to the site made by the National Park Service in response to high visitor impacts, this site was visited so that SPC monitors could see the changes that had been made. This site contains a large petroglyph panel that is heavily visited by tourists via boat tours, and entry to the panel has been made easier with a rock trail leading to the site. No natural impacts to the panel have been recorded by SPC monitors, although at a January 2007 meeting of the Cultural Resources Ad Hoc Group concerning a new Programmatic Agreement, NPS personnel reported that bank sloughing has endangered the integrity of the site. The human impact recorded here was the name "Marilyn," which was also scratched into this panel as at Site #1. Photo documentation was completed and shared with the NPS.

Recommendations
Similar to Site #1, SPC monitors observed graffiti at this site. The NPS initiated special efforts to educate, monitor and control visitors within the Glen Canyon National Recreation Area with regard to the proper treatment of rock art panels and archaeological remains, but these efforts

have been reduced in recent years and should be renewed. The SPC remains in contact with NPS about the most recent changes at this site that may compromise its integrity.

Site #2: Mixed Petroglyphs
Years visited: 1996, 1999

Overview
This site includes all of the uses and important features noted in the two sites described above. In addition, elders added that places such as this one were and are used today to teach young Southern Paiutes about their traditions and culture, and that the area represents a network of trading sites between Southern Paiute bands, and between these bands and other Native Americans.

Rock Art
Photo points were established, photographs taken, and impacts documented at this site. No natural impacts were observed. Human impacts include trailing, which has increased dramatically since this site was first recorded in 1994. Visitors were at that time entering the site from downriver and creating serious erosion on the steep bank that provides access to the bench below the panels.

Recommendations
The visitor impact at this site needs to be carefully monitored. Trail work is required to reduce the erosion near the site.

Site #3: Ferry Swale
Years visited: 1996, 1999

Overview
As with all of the sites described here, this location shows how the visible features and physical uses of the cultural landscape combine with less tangible cultural practices that link past and present. This was a place for ceremony, camping, hunting, fishing, farming, and for families to gather socially, especially in winter. One elder recalled his grandparents visiting the site by wagon for some of these purposes, and another recalled that Southern Paiutes continue to use similar sites outside the Colorado River Corridor for the same.

Plants
A segmented belt transect was installed in 1996 at the upriver edge of the swale, and reinstalled in 1999 for re-photographing. The 1996 Test Flow deposited sand but caused no change in plant growth. Trash that had been washed down onto the beach with the flood was collected by monitors. The transect was laid on a steep slope and cannot be monitored regularly without causing significant erosion on the slope.

Recommendations
This site was established to monitor the condition of plants along the Colorado River in the stretch between Glen Canyon Dam and Lees Ferry. The cobble beach at this site discourages visitors and serves as a natural protection for the site. Due to impacts from monitoring, this site

was removed from the regular monitoring schedule. Beach monitoring photos were taken and archived as a baseline for future reference.

Site #4: Jackass Canyon
Years visited: 1996, 1997, 1998, 2002, 2003, 2004, 2005

Overview
This site was established to monitor the impacts of dam operations at one of the major side canyons within Marble Canyon. It was monitored before and after the 1996 beach/habitat building flow and the 1997 high water releases. Due to the ease with which it is accessed on foot, the site is heavily used and impacted by visitors. It is now used primarily to introduce participants to monitoring techniques, and to give them a sense of what is expected of them on the river trip, what they can expect in the way of visitor impacts, the difficulties of working in a harsh environment, and the importance of working together toward common goals that are critical to Southern Paiute interests in the Corridor. Trip participants are divided into three groups and rotate through training in orienteering, photo matching, and plant transects.

Beach and Plants
The beach received a significant amount of sand deposition as a result of the beach/habitat building flow of April 1996. Subsequently SPC monitors noted that the beach had been affected by wind erosion and that the sand had been redistributed. No effects of the 1996 release were noticed at the water's edge, although re-growth of shrubs was notable, and willows had grown 1-1.5 m from the pre-flood root system. Transects were run to provide data for comparison with 1996 to examine the effects of the 1997 high water releases. Vegetation along the shore of the beach was impacted by the high flow, but monitors noted its strong recovery in subsequent years. This site is also affected by visitors who can access the site by boat or by hiking in, resulting in heavy impacts to vegetation on the beach. Although originally installed for monitoring, the transects are now used only for training and data are no longer archived.

Recommendations
Important introductory training sessions that occur here consist of demonstrating the use of a line intercept transect, compass reading, and discussing how photos must be taken and compared. Archival reference photos are used to demonstrate relocation techniques for end points, and reading of the metric tape is also introduced. SPC leaders and monitors have discussed moving the training to another location due to trash often present at this site, but have not yet done so because of time constraints. This site should continue to be visited annually until a substitute training site is established.

Site #5: South Canyon
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This site is accessible both from the Colorado River and from House Rock Valley. In interviews and visits, Southern Paiutes have indicated that there were stories and legends associated with this site and that the rock art boulders were and are visited by Southern Paiute families for specific purposes, including several types of ceremonies. The depth of etching and the presence

of human remains (which were removed years ago) were recognized as evidence of the importance of the site; other significant features include rock shelters, ceremonial tobacco, Indian rice grass, edible cacti, sage, agave, willow, and various teas. There is strong evidence that the area was also used for trade and for river crossings; one SPC member noted that the site was "extremely sacred."

SPC representatives and technical consultants who have participated in monitoring efforts note that South Canyon is a very dynamic location that is subject to many natural and human impacts. It is the first archaeological site along the river that is easily accessible from the river, and as such it is visited by many private and commercial river trips. In addition, because of the trail from House Rock Valley through South Canyon, it is frequently used by fishermen who hike in. As the first site visited on SPC river trips for cultural resource monitoring and proper spiritual orientation, stories and practices are shared in preparation for the rest of the river trip. As one tribal leader put it, "*Many* things happen" at this place. The effects of dam operations, other human impacts, and side canyon floods are all readily visible here, providing an opportunity for integrated monitoring and assessment of the effects of impacts from several different sources.

Beach and Plants

This site continues to exhibit dramatic changes which are recorded with photography and written documentation. Access to the bench is via a steep trail leading from a narrow beach. At the landing for the upper trail, the beach has become smaller and steeper, due to erosion caused by river flows, making access to the site more difficult. A log and overgrowth at the lower trail are preventing use by visitors. The SPC considers this a benefit because that trail was rapidly eroding.

During the 1996 test flow, a significant amount of sand was deposited on the river bank upstream from the mouth of South Canyon, making parts of the beach steep. This dune has remained in place throughout the subsequent ten years, with minor erosion between experimental floods and some sand replacement by test flows. Sand was deposited within the creek bed upstream from the river, and a sand dune was created at the mouth of South Canyon creek. In the ensuing ten years, several flash flood incidents occurred in South Canyon, some of which scoured the creek bed and others that deposited small gravels. The ensuing high releases from the dam (fall of 2000 and 2004) were high enough to deposit a thin layer of sand within the creek bed a short distance beyond the immediate mouth. This is an example of a site which historically saw a succession of deposition events by the river and erosional sequences by side canyon floods, but which now is largely controlled by side canyon flood events. This has become a recurring theme at many downstream monitoring sites throughout the Grand Canyon. As shown in Figure 2.1, a series of photos that are matched annually has documented these changes, along with an increase in vegetation along the sides of the channel.

Vegetation is sparse along the shore of the beach, but tamarisk and coyote willow have increased along the banks upstream from the mouth of the creek, and along the sides of the creek bed. In order to document these changes in response to natural and human-directed flow events, monitors have added additional photo points. The relationships among sediment size and source, deposition patterns, and resulting vegetation patterns continue to be explored and taught to tribal members by Southern Paiute monitors.

Figure 2.1. Changes in the Beach at South Canyon

Rock Art, Archaeological Features, and TCPs

On the ledge above the beach, rock houses show evidence of visitor impact, including the "repair" of a rock wall that had fallen, collections of pottery sherds near the rock wall, and heavy trailing up to the rock houses. Monitoring photos are matched and re-taken and the site map revised and updated every third year to record the ongoing changes. There has been no evidence of significant natural impacts, but visitors are making new trails and artifact collection piles are often found and dispersed. Apparently artifacts in the area are moved or removed by visitors regularly. As one Southern Paiute monitor put it, these artificially piled artifacts "need to go back home," rather than be arranged for public display. There is evidence of on site camping, and trash was found near the camping site. Tribal monitors uncovered graffiti next to one of the rock art boulders. According to a river guide, the graffiti involved the same symbol that appeared four to five years ago near Stanton's Cave. While formal monitoring takes place on a three-year rotation, tribal representatives visit the rock shelters and boulders with trip participants for cultural and educational purposes every year and note any significant changes.

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Recommendations

This is a sensitive and fragile site, subject to the effects of erosion from the Colorado River and side canyon, hikers, river runners, and severe weather. Monitoring of all aspects of this site should continue to be conducted regularly. The existence of human remains and ceremonial considerations sometimes complicate monitoring, but flexibility and methodical recording help ensure consistency in data gathering.

In addition, and much to the horror of Southern Paiute monitors, visitors continue to use this important location in apparent ignorance of NPS regulations regarding human waste and trailing. Trailing on the ledge is extensive, leading off the main trail in many directions. Continued maintenance of the trails both to the river and on the bench, especially to reduce the development of new trails, is recommended. Trash deposition also continues and should be reduced, and collection piles should be dispersed. . Visitors to South Canyon should be introduced to the sensitivity of this site through pamphlets, articles in the *Boatman's QuarterlyReview*, a publication produced by river guides, and in river guide training sessions.

Site #6: Nankoweap
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This site was intensively used for farming, gathering water, and fishing, and similar sites are currently used by Southern Paiutes for these purposes. Food and medicinal plants are abundant here, and these and the creek are important to Southern Paiute cultural practices. This site was also considered to have important cultural connections to other sites. Access to the site and the Colorado River here is fairly easy from the east side of the Kaibab Plateau or from House Rock Valley.

Like other sites in the region, Nankoweap is considered an integrated site where multiple impacts and dynamics between river and side canyon flows, as well as from visitors, can be monitored. The granaries and the area's former use as an extensive farm contribute to its importance for Southern Paiutes. Here the SPC continues the kinds of experiential learning that has occurred historically in a place of abundant plant and animal life, where stories and songs are shared and the interactions between people and place are maintained through the monitoring program.

Beach
At normal dam release levels there is little deposition or erosion of shoreline sediments, but the position of the shore varies by 25 m or more depending on the flow. The upper part of the beach is sandy, while the lower part, which alternates frequently and sometimes daily between being flooded and exposed, is covered with boulders, and has little vegetation except for a few willows. The 1996 test flow had little effect on sediment deposits, but scoured away most of the plant life up to an upper river bank level. This quickly began to recover and increase in density, mostly with coyote willow and arrowweed, both of which probably recovered in part from roots that survived the flood event. During the past eight years the plants on the upper beach have ceased producing new shoots and have begun to senesce and die back from lack of river water recharge and drought. Periodic flooding and scouring are necessary to maintain the health of such riparian communities.

The mouth of Nankoweap Creek was once a very dynamic place, with spring floods depositing river sediment far up the creek and providing fertile benches that were utilized by Southern Paiute farmers for growing crops; the construction of Glen Canyon Dam disrupted the deposition of rich sediments at this location and negatively affected the potential of this site for gardens and agriculture. Today these sandy benches on either side of the creek are characterized by large, spreading, senescent mesquites (*Prosopis glandulosa)* and dense, almost impenetrable stands of prickly pear (*Opuntia phaeacantha*). A major flash flood in late 2004 or early 2005 eroded large amounts of river sediments at the mouth of the creek that had been in place at least 45 years, leaving a broad cobbly expanse where the creek joins the river. The river is unlikely to replace these sediments under current water release regimes. As at South Canyon and many other places, floods in the side canyon now dominate site beach morphology.

Plants

Three plant monitoring elements were established at Nankoweap Creek in 1995 to monitor the impacts of dam operations, all located along or near the Colorado River shoreline. All three monitoring elements were converted to transects in 1998 and each is monitored every three years. The north side of the Creek continues to show effects of drought, allowing for very little plant growth. For example, a large banana yucca plant that is probably decades old and originally washed down Nankoweap Creek in a flood, dies back a little more each year. Other plants are similarly stressed. They depend on rainfall, as they are above the influence of water from the creek or the river, although they grow on old pre-dam river sediments A transect located on the south side of the creek provided a valuable record of vegetation changes due to the dam, but it was lost in 2005 when the entire bank on which it was located was scoured by a side canyon flood and will need to be reestablished (see Figure 2.2). Three individual cottonwood trees (*Populus fremontii*), located upstream along the creek, were also included in monitoring; two of the trees died after being girdled by a 1994 flash flood in Nankoweap Creek; the surviving tree was toppled by the 2004-05 flood but was re-sprouting from its roots in July 2005.

Since dam releases have been consistently low since late 1997, more habitat has been available for plant establishment; however, this area has not become thickly vegetated (see Figure 2.3). The drop in water levels has also left some marsh plants established along the 1997 shoreline without regular water recharge, and some of them, including scouring rush *(Equisetum laevigatum)* and scratchgrass *(Muhlenbergia asperifolia)*, have shown the adverse effects of water stress. The desert plant community of well developed prickly pear cactus (*Opuntia phaeacantha)* continues to flourish.

A great deal of detailed plant information associated with the impacts of various water levels and changes in climate conditions has been recorded at this site and can be used to evaluate future proposals for dam operations. For example, a high level release such as that of 1996, every five to ten years, appears to be beneficial to riparian zone vegetation. Other dynamic effects could be explored here, including the apparent decrease in plant cover since 2001, due to loss of several species and decrease in size of others. Under the current flow options, the area on the south bank of the creek that once contained the plant transect established in 1995, when the program was first developed, will continue to erode.

1996: "The 50 m transect should be monitored yearly because the water level may impact the vegetation of the new high water zone (NHWZ). The individual plant monitoring should continue since some of the species

1999: "Decreased average releases from the dam in the past 18 months have opened up habitat along the shoreline which is gradually being invaded by plants. The transects will continue to monitor these trends and should be run according to the schedule established in 1997. A high level release, such as that of 1996, every five to ten years, is beneficial to riparian zone vegetation."

2005: "A side canyon flood from Nankoweap Creek has cut into the creek bank and eroded the bench upon which the transect was located. All that remains is one remnant to confirm we are in the right spot."

Figure 2.2. Changes in Transect 1 on the downstream bank of Nankoweap Creek.

Archaeology

In addition to their importance as sources of medicine, food, and other benefits to Southern Paiutes, the plants at Nankoweap play a major role in protecting the archaeological features at the site. SPC monitors have attempted to integrate the plant and archaeological monitoring, but this goal has been only partially met; the site continues to require a great deal of time and effort, and adding new elements has not yet been possible. Because of its importance to the SPC, the former Paiute living area located on the lower bench just downriver of Nankoweap Creek was visited and photographed. The sand on the bench that supports a vigorous plant community was deposited by the pre-dam major floods. A BOR archaeologist was consulted on the May 1996 trip about the monitoring already being conducted there. Although the BOR has evaluated the

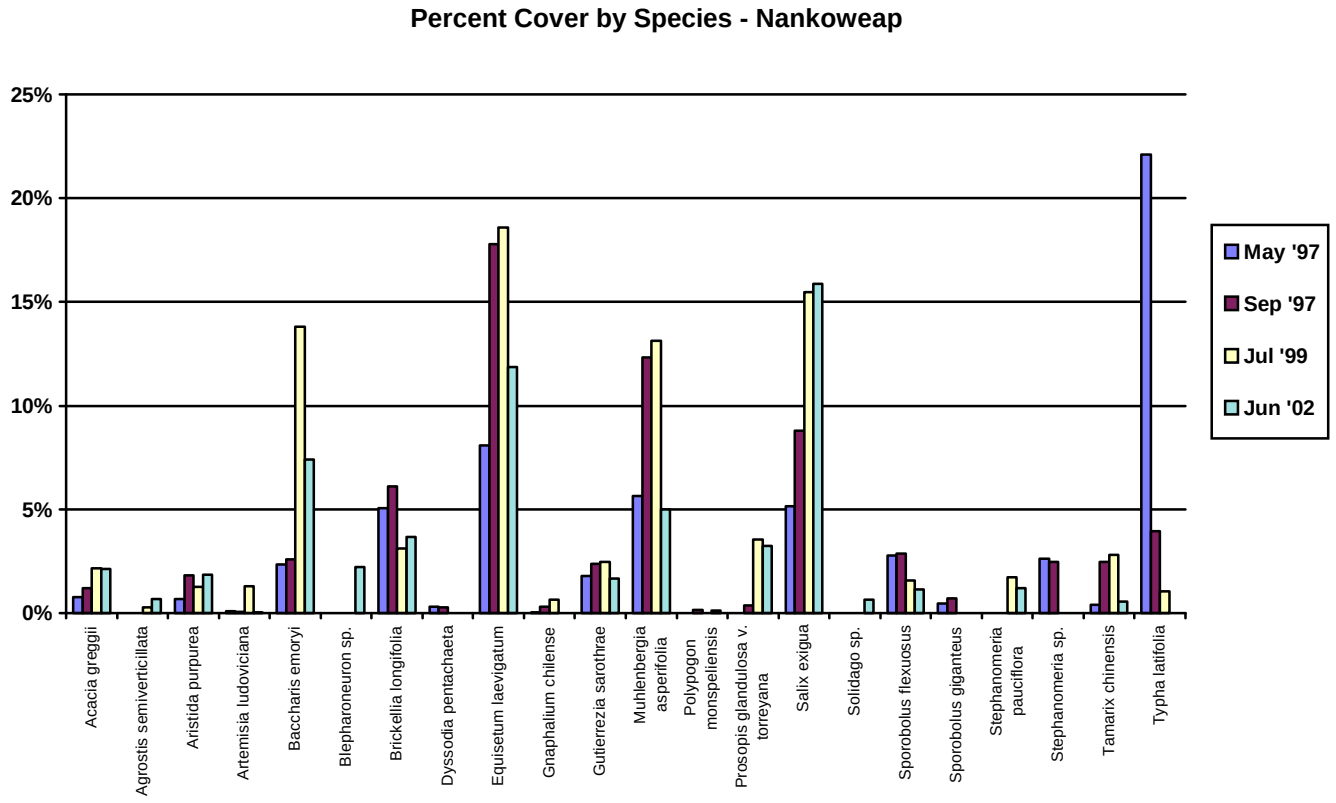


Figure 2.3. Percent Cover of Plant Species along Transect 1 at Nankoweap. Note this transect was lost in 2005.

site as a non-eroding site, because of its relation to the Colorado River and Glen Canyon Dam, SPC monitoring photos show that there is active erosion from Nankoweap Creek at the edge of the site, which could have unknown future impacts. A second archaeology locus on the lower bench was identified for inclusion in the monitoring program prior to the 1997 trip. The location of the site and the overview of the area were photographed for future photo matching. At this time, thick vegetative cover appears to be helping protect the archaeological features, but the ongoing changes in vegetation require regular monitoring.

Recommendations

In consultation with the BOR archaeologist and following a review of the NPS monitoring plan, the monitoring program at Nankoweap was developed to enable the consistent collection of data. With the loss of river sediments to this site, the impacts of flash flooding in Nankoweap Creek are high, so the vegetation at the site should be monitored annually. The archaeology units should be incorporated in further monitoring if changes in vegetation indicate they are being impacted by erosion or visitors, whose trailing has become more evident in recent years.

Site #7: Lava Chuar

Years visited: 1996, 1997, 2002, 2005

Overview
The area was a place for ritual and ceremony in addition to farming, camping, plant collection, as well as communal processing of plants brought down into the canyon from above. In addition, medicinal clay is found here along with special stones used for healing. Willow, mesquite, cacti, and teas were noted as important features here, and because of the connections between this location and other similar ones it remains important to Southern Paiute culture.

Plants and Archaeology
This site was stabilized and effectively closed to entry in the late 1990s by NPS archaeologists. Dense mesquite and brush effectively discourage entry from the downstream edge of the site, which is above a beach that is heavily used for camping by river trips. In 1995, monitors established a series of photo points from the canyon floor. The site was visited briefly before and after the 1996 test flow. Erosion of the bank into Lava Canyon has been a source of concern since 1997. Monitors recorded a new gully cutting to the creek bed, originating on the site itself, which continues to widen. This has begun to impact the site and may have serious consequences if erosion of the unstable bank continues.

Mesquite trees are healthy and protecting the site from the top, though severe drought has adversely affected brittlebush and other shrubs on slope, and some clearly will not survive. Side canyon flooding regularly rearranges boulders on the creek floor. Trails have been made into the site from both the side canyon and the upstream beach.

Recommendations:
The SPC will continue to monitor the gully going into the site. Attention also needs to be paid to the trails that enter the site from both the creek bed and the river trail. The SPC should continue to consult with NPS to find out what is being done at the site. If there is no NPS monitoring in place, SPC monitors will conduct a more careful assessment of the impact of the gully going into the site, and to explore check dam options. If a flash flood should occur in Lava Canyon, this site should be monitored as soon as possible after the flood.

Supplemental Site: Palisades Canyon

This site has been visited on Southern Paiute monitoring trips so that SPC representatives could observe firsthand the use of check dams to slow erosion at sites with archaeological features. As Pederson et al. (2003) observed, check dams function to temporarily slow rates of erosion provided they are routinely maintained; additional data are needed to evaluate the impacts of check dams of various designs and materials such as brush, log, and stone.

Site #8: **Tanner Canyon**
Years visited: 1996, 2002, 2005

Overview
This area has been identified as an important lookout and site of reflection, and as a possible location for birth ceremonies, where rock art panels are still used by Southern Paiutes to connect themselves to traditional stories and legends. Hunters and other travelers would visit the site

where, as one respondent put it, Southern Paiutes would engage in a shared "system of living and protection." Significant features noted at this place include extensive, interconnected canyons, the river channel itself, nearby mountains, and a nearby rock wall and trail leading to it. Many respondents indicate that the area is full of symbols of power and maps that are directly related to similar ones in Nevada and Utah.

Additional archaeological features farther up Tanner Canyon are of concern because of a high degree of visitor impacts there. However, given that days on the river are limited, the SPC has not fully incorporated any additional areas into the monitoring program. Nevertheless, a review of this site should be high on the list for consideration in subsequent years.

Beach and Plants

The beach located at this site has collected a significant amount of sand, building the existing dunes and cutting a sharp embankment along the shore. A major river camp on the beach was destroyed by the 1996 test flow. A smaller camping beach was subsequently utilized downstream, but it is now largely overgrown with willow and arrowweed. Thus there is no longer much camping in this area, although a sand bar remains as a docking place for visiting the rock art and hiking to areas above.

Marsh and riparian plants are flourishing along the shore, but plants away from the influence of the river show severe signs of drought stress. For example, monitors have noticed that the severe drought adversely affected brittlebush, possibly to the point that they will not recover.

Rock Art

This site contains rock art boulders located at the downstream edge of the beach on a narrow rocky ridge above a small side canyon. Monitoring photos are matched and re-taken and the site map revised and updated every third year to record the ongoing changes. Erosion has been occurring in the well-established trail, which is somewhat unstable in some areas. Natural impacts at this site consist of the effects of water and mineral accretion. The rain is eroding the petroglyph on the southwest corner of one boulder due to the placement of the rock. Human impacts at this site consist of dust from foot traffic covering the petroglyphs, and the widening of trails around the petroglyph boulders. Visitation to this site appears to have increased significantly since the monitoring program was established. Possible camping activities, collection piles, and other moved artifacts were noted along the trail on the bench above the petroglyphs.

By 2005 monitors recorded multiple routes that had been established up the face of the ridge, and because they are so steep, soil and rocks are continuously lost (see Figure 2.4). For example, one year while monitors were working at the site, a commercial hiking group led by an inexperienced guide scrambled up the ridge using a variety of routes, tripping and loosening rocks as they went. The intended trail has become indistinct due to the multiple other trails. Higher up, the trail has gotten wider and more distinct. Some photo points had to be retaken due to changes in the rocks and slope.

Figure 2.4. Increased trailing at Tanner Wash

Recommendations
This site requires extensive trail work to reduce the heavy erosion at the rock art boulders. The trailing is a major concern to the SPC monitors and the SPC has recommended that it receive attention by the NPS trail crew. SPC learned that NPS employees visit the site annually and will coordinate with them to determine what is being done, and if some mitigation activity can be developed to slow degradation at this increasingly popular boat stop.

Site #9: Bedrock Canyon
Years visited: 1996, 1998, 2001, 2004

Overview
This is one of the least visited of the SPC monitoring sites and thus serves as a control of sorts separating natural changes from human impacts. Located very close to the river's edge, its main feature is a large roasting pit buried in sand at the top of a talus slope. The pit is being taken over by prickly pear cactus, which shows expansion on every triennial visit. A large rock fell from the cliff above the pit in 2001, damaging plants as it rolled downslope. This was a graphic example of natural effects on a site. A deep drainage with unstable banks bisects the site, and the possibility of site erosion through flash floods is a constant threat to the site.

At this site SPC monitors focus on teaching new participants about the fragility of Canyon resources. Monitors on river trips regularly refer to the cryptogamic soil that can be destroyed with only the impact of a human footprint, and to the ease with which steep, unstable sandy slopes can be eroded. Because the site is so sensitive to all kinds of impacts only a few monitors

leave the boat at this site. The infrequency of visitation at this site makes it valuable for monitoring ongoing and future effects, which can be expected in the Canyon environment.

Beach
Evidence of sand deposition often exists along the beach at the mouth of the canyon where changes are recorded with photography and written documentation. The sand dune along the approach to the pit is unstable and shows evidence of frequent sand movement. In spite of apparently minimal visitation, trash is often found at this site, along with minor evidence of new trailing.

Plants and Archaeology
Some prickly pears protecting this site have been observed growing new pads, though one cluster was reported dead in the center in 1998. Flowering of the cacti appears to correlate with drought conditions. There is a substantial increase of cacti (*Opuntia phaeacantha*) around the roasting pit and just above the rock ring. The cacti in the hearth seem to be concealing the pit.

In 2001 the effects of a rock fall from the talus to the left of the site were photographed and recorded. A trail of damaged cacti and brittle bush, soil disturbance, and pits were fresh on this visit, and there was quite a bit of soil disturbance where it finally came to rest. Damaged cacti were not dead, and some were observed to be re-rooting in place.

It is necessary to walk on unstable sand near the roasting pit to take monitoring photos, so SPC has recommended that photos only be retaken when changes are evident. The best place to observe the archaeology is from the floor of the wash and the opposite bank without going near the roasting pit itself. Some roasting rocks are becoming exposed, but the pit is more protected now than in the past because of prolific growth of cacti in and near it. It does not appear that the site is frequently visited; some of the trailing at this site has been attributed to past archaeological monitoring.

Recommendations
The rock fall recorded in 2001 reminded monitors of the variety of potential impacts to sites, and the continuously changing character of the Canyon. Because this site remains sensitive and environmentally fragile, monitoring is conducted by only a few people every three years. The SPC should attempt to coordinate monitoring and possible mitigation at this site with the NPS to minimize impacts.

Site #10: Deer Creek
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This location is very important in Southern Paiute history and culture. Deer Creek Falls carry water from the Kaibab Plateau to the Colorado River. In addition, for the SPC this place is linked to places within and outside the Canyon. The area was used throughout the year for farming, hunting, camping, gathering, and ceremonies; it served as a region of refuge during European encroachment into Southern Paiute territory, and the perennial stream is considered vital to

Southern Paiute culture. The area's waterfalls are linked to stories, and important plants include cacti, agave, willow, and watercress.

Beach

Access to Deer Creek Canyon from the river is via a steep trail originating at the base of Deer Creek Falls. This site is very popular with visitors, so boats crowd the area. The SPC monitors attempt to reach the site early in the morning, before other river trips arrive, in order to allow for ceremonial activities and quiet time for reflection on the importance of the site.

Plants

Plant plots were established upstream from the chasm where the canyon widens into an open valley. A severe fire burned the above ground parts of plants in 1994, but most plants regenerated vigorously over the following decade. The severe drought that began in mid-1995 and continued into 1996 stunted the growth of the sacred datura (*Datura meteloides)* and initially reduced the number of offsets on the agave (*Agave phillipsiana).* The willow (*Salix exigua*) and cottonwood (*Populus fremontii*) grew vigorously, and the acacia (*Acacia greggii*) sprouted new stems in the following years. Their vegetative growth slowed as these plants reached maturity, and by 2005 the willow was showing negative impacts from competition with the cottonwoods. In addition, beginning in 2004, the plants again showed impacts of drought stress.

Figure 2.5. General view of *Agave phillipsiana* cluster, with flowering stalk from 2002 on left. Site is shaded by dense coyote willow

Work with consulting scientists to determine the agave's taxonomy, systematics, and cultural history has led to its identification as a separate species, one intentionally introduced and farmed for food or fiber north of the Mexican border (Hodgson 2001). The agave was named for Arthur Phillips, SPC consulting biologist, and is one of the rarest of Grand Canyon plants. It is of particular interest to the SPC because of its likely cultural origins through the activities of Paiute people many centuries ago. The agave flowered in 2002, and at least a dozen rosettes within the next few years (see Figure 2.5).

Rock Art and TCPs

Changes in rock art panels are recorded with photography and written documentation. Graffiti and scars are occasionally discovered and reported. Rearrangements of rocks at the base of the upstream panels are considered to have a negative impact on the place, and are dismantled by a designated member of the group on monitoring trips. Because of the complexity of the site, monitors have observed that there is always the potential to find new impacts as well as ancient marks that were not discovered previously.

Due to concerns about the behavior of visitors at this site, Southern Paiute monitors systematically record visitor behavior in two-hour shifts at multiple sites along the trail and in the canyon. Tourists have been observed jumping into the water in the chasm as well as swinging and hanging from ropes. Individuals were also observed picking, discarding, and trampling plants for no apparent reason. Rocks, both large and small, were also being thrown about. Trailing is a concern in this area of concentrated use and disturbance, and discussions overheard from commercial trips raise concern that culturally sensitive information is at times being shared inappropriately.

Recommendations
The site should continue to be visited and monitored annually. The condition of both the vegetation and rock art panels is affected by visitation. Because of the importance of this place to Southern Paiute people, the SPC has requested that visitors stay out of the gorge itself. To this end, visitors should be introduced to the sensitivity of the site and of the rock art panels through the river guides and NPS. Permanent outreach programs with river guides, the NPS, and other members of the GCDAMP should be established. Through the visitor monitoring program, Southern Paiute monitors can continue to learn from visitor behavior and allow it to inform management decisions in this area.

Site #11: Kanab Creek
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This site is significant because Kanab Creek is a major link between the Colorado River and the Kaibab Plateau and has been used for centuries for access into the Colorado River Corridor, serving as the primary pathway for the Kaibab people to reach the river. Trade, farming, gathering, and ceremonies were all important activities at this location, and culturally important plants include tobacco, mesquite, willow, agave, and hackberry. Monitors consistently record new participants' positive responses to a stop in this area, where many Southern Paiutes families have direct ties to people who lived or hunted there before the region became a national park. As one SPC monitor put it, "It hits close to home."

Beach
At the mouth of Kanab Creek is a small beach which is sometimes used by small river parties for camping on the upstream side of the creek. A larger delta on the downstream side consists of boulders from a combination of rockfalls, material brought down Kanab Creek by floods, and cobbles deposited by the Colorado River. SPC monitors developed a series of photo points from which photographs are re-taken on an annual basis on the downstream beach and on the large dune above it. The river extends upstream in Kanab Canyon for some distance at high normal flows, and sand bars at the mouth frequently shift position. Old sand deposits from pre-dam Colorado River floods extend at least a quarter mile upstream from the mouth of the creek.

Plants and Archaeology
Marsh and riparian plants along the shore of the river have increased in number and density as a result of low releases and small fluctuations, as documented by the matched monitoring photos.

A single long transect in Kanab Canyon a few hundred yards upstream from the mouth of the creek runs from the base of the cliff, down a talus and wind-deposited sandy slope, and across an old river-deposited bench to the edge of an unstable sand cliff above the bed of the creek. The transect provides data necessary for monitoring changes in vegetation cover and for establishing trends in erosion and exposure of archaeological sites that can be tied to changes in sediment, water availability, and patterns of visitor behavior. Trailing continues to be a problem in the whole area. A main trail up onto the bench from the canyon floor passes through a hearth/roasting pit on the downstream end. The trail has continued to widen and deepen, which has caused further erosion of the hearth and the exposure of more rocks. As at Nankoweap, the archaeological features at the site are somewhat protected by vegetation. Grasses and herbaceous plants decreased markedly in drought years, but a large patch of prickly pear cactus continually increases, gradually encroaching on the trail. The steep, unstable terrain along the upper part of the transect and the unstable sandy soil create potential for damage to the habitat from accessing and reading the transect, so it is read only every three years using a minimum number of investigators.

Recommendations
The trail across the sand bench crossed by the transect should be diverted to minimize erosion and impact to the hearth/roaster, and current erosion at the trail should be monitored for further impacts to the site. Reading of the transect should continue once every three years. The plant transect at this site continues to provide an important control for examining vegetation changes outside the reach of the Colorado River and should be maintained.

Site #12: Vulcan's Anvil
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
Southern Paiute elders recognized five loci here, extending from the anvil downstream for about a mile to the foot of Lava Falls rapid. These loci are interconnected and include mineral collection sites, rock art and other archaeological features, and plants, all of which have significant spiritual value. Southern Paiute monitoring includes both activities in which only Southern Paiute tribal members participate and those that provide data to be shared with others.

Anvil and Access to the Site
The anvil is visited annually for spiritual and ceremonial reasons; access to the feature is by boat. The left shoreline near the anvil lacks a good docking place or camping beach, so it is infrequently visited by commercial river trips. The right shoreline is protected by dense scouring rush *(Equisetum laevigatum)* along the river's edge, discouraging river trips from stopping. Southern Paiute tribal members believe that coins and trinkets sometimes left on the anvil are inappropriate, and have worked with the river guides and the NPS to educate people about the spiritual significance of the anvil. Such practices have decreased in recent years, and SPC monitors regularly remove objects placed on the anvil by other groups.

Plants, Rock Art, and TCPs
A plant monitoring site on river right on the shore opposite the anvil provides information about visitor activities and impacts on a lightly-used beach. Although it seems to hold sand in place

along the shoreline, Bermuda grass *(Cynodon dactylon)* continues to be a concern at this site because it is a non-native species (see Figure 2.6). Above the shoreline, losses of acacias and some perennial grasses has been correlated with drought. Tamrisk and rabbit's foot grass *(Polypogon monspeliensis)* have been evident in abundance along the shore in the last few years. Young mesquites growing on the lower part of the beach have increased greatly in canopy diameter in the past ten years, a theme noted throughout the lower Canyon. Many of these trees probably germinated following the 1983 flood.

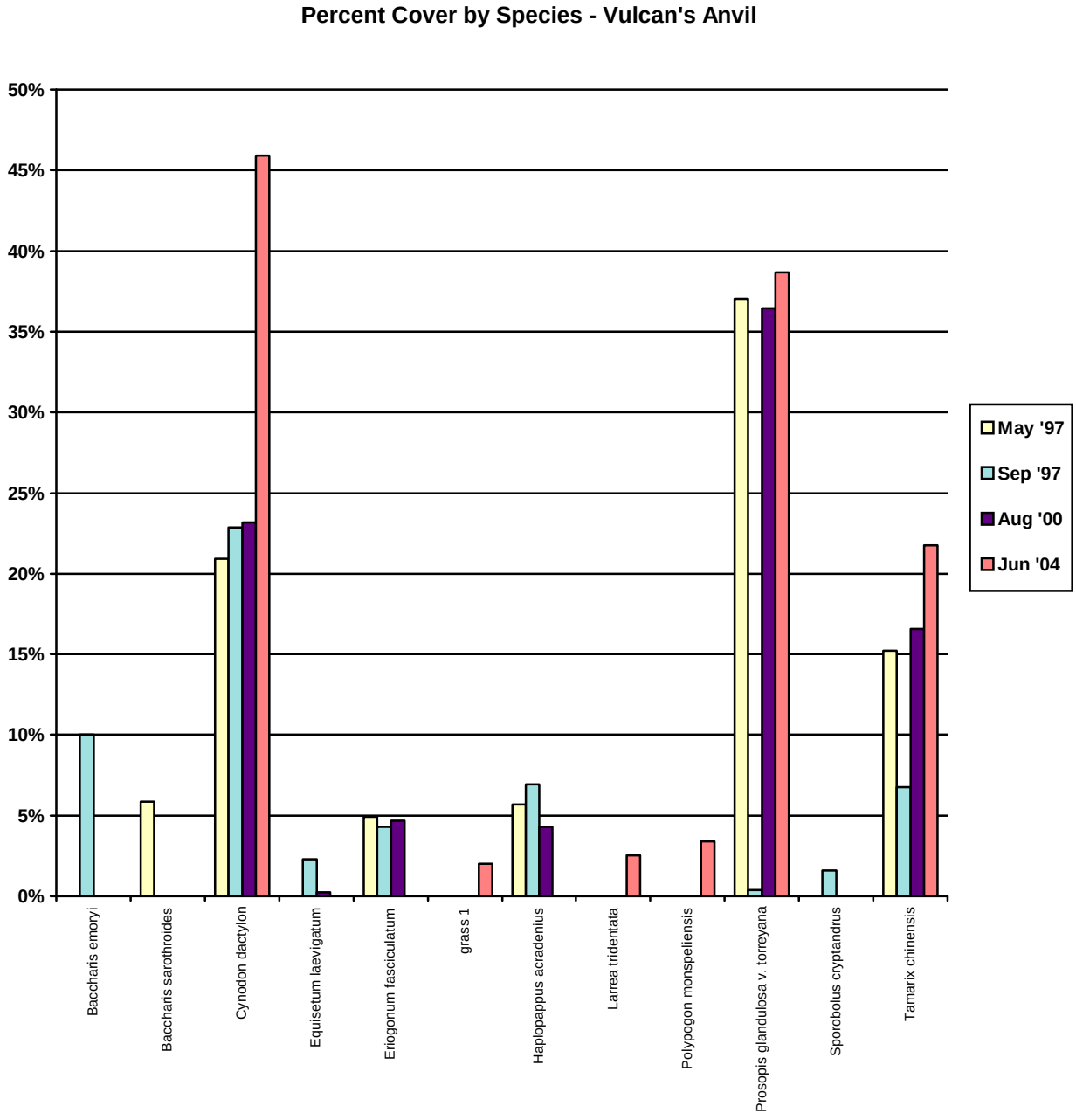


Figure2.6. Plant coverage by species on Transect 2 at Vulcan's Anvil.

Another locus is the spring and pond on river left opposite Lava Falls rapid. This site is periodically visited and its condition is noted through photographs and written documentation. SPC monitors recorded the continued vigorous growth of sawgrass (*Cladium californicum*) which provides a natural barrier to the spring and protection of other features at the site, although a faint trail leading through the sawgrass provides access to the pond. An increase in bulrush (*Scirpus acutus)* within the pond has also been noted.

Recommendations
Monitoring at this site has been reduced over time because there are no major natural or human impacts occurring here, while there is the potential for impacts from monitors, such as sand erosion and soil compaction. The Anvil itself should continue to be monitored to record any type of articles placed on it. Because if its light use, the locus on the shore at the anvil serves as a control or data baseline for monitoring any future visitation increases. The SPC has agreed to investigate the concerns of other cooperating agencies, such as NPS and the Hualapai Tribe, which monitors the spring at this site.

Site #13: Whitmore
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This is an important cultural site for Southern Paiutes because of paint gathered here for ceremonial purposes, and for possible links to the Ghost Dance, and to the snake and butterfly dances. Story-telling, hunting, and gathering also occurred here, and Southern Paiute families remember their relatives' use of the area, and continue to use it because of the rock art panels. Elders responded in interviews that the panels are directly linked to panels at Prospect Canyon and Nine Mile Draw, among other places, and it is likely that the area was used as a special place for medicine people to visit. This has been an area of special concern throughout monitoring efforts because of heavy visitation.

Beach and Plants
During a previous high flood, probably in 1983, a large sandy bench was deposited here, likely in an area that was an eddy at high water. This area was subsequently vegetated by a dense stand of arrowweed, with a few seedling mesquites mixed in. Over the years the arrowweed has become senescent due to lack of water recharge (the river has not since flowed high enough to flood the bench), and the mesquites have thrived, now falling into the pattern of rapidly growing young mesquites on lower canyon beaches. The main change at the site has been a slow erosion of the bank at the water's edge. This unstable sand bank, ranging from 1m to 2m in height, has eroded into the bench during high flows and become temporarily stabilized by wet marsh plants during periods of prolonged low releases. At low flows a large dynamic sand bar protects the bank. With little change occurring atop the 1983 bench except for the growth of mesquite, the main area of interest is the eroding bank. SPC monitors have tried several methods of installing transects to monitor the receding bank, but none have proven satisfactory due to the difficulty of establishing relocatable fixed endpoints. Even an effort to use a Geographic Positioning System (GPS) was unsuccessful because of the narrow canyon and high walls preventing acquiring good satellite signals. Matched photos from across the river have provided a general idea of bank

condition, but more detailed information would be desirable. The SPC will continue to work on developing a satisfactory beach and vegetation monitoring procedure for this important site.

The decline of arrowweed and increase in mesquite are overall important trends. The marsh zone at the base of the bank has increased in diversity as a result of prolonged low releases. Tamarisk seedlings have grown on the low-water sand bar but have generally been scoured away as the bar re-adjusts during moderate flows.

Rock Art
The most notable feature at Whitmore is a large rock art panel located just above the beach. SPC representatives have monitored this panel using detailed photographs every year. Several new images have been identified through consistent monitoring at this site over the course of ten years. No natural impacts to the panel have been observed over time, but graffiti is an ongoing problem at the site. In addition, the dust stirred by visitors walking near the panels continues to affect the site, along with trail widening. Other than slight erosion, there is little sign of natural impacts present at the paint cave, but photo documentation shows that some rocks appear to have been removed from the cave and surrounding area.

Recommendations
This site is a concern to the SPC since it is heavily visited and receives a large amount of graffiti. The trail leading from the docking site to the panel is the source of some erosion, but multiple trailing has been avoided because of the dense arrowweed stand. There is concern that visitors who do not understand the importance of this site and its significance to Southern Paiute culture may cause additional vandalism, so the SPC should incorporate outreach about the site in its efforts to coordinate with the river guides, NPS, and other GCDAMP managers. The SPC has discontinued using plant transects as a monitoring method in the area, and is seeking an alternate method, such as matched photos, for monitoring changes in the unstable bank and associated vegetation. The SPC will also look into using aerial photos to detect changes over time and how those changes articulate with SPC concerns for plants and sediment in the area.

Site #14: Pre-Parashant
Years visited: 1996, 1997, 1999, 2001, 2005

Overview
This site is located on an infrequently visited beach about a mile above the mouth of Parashant Canyon, an important access point for Shivwits Paiutes from the Arizona Strip to the Colorado River. Hunting, gathering, storytelling, and ceremonial practices were important at this location, including the singing of songs associated with hunting mountain sheep, and the connection to Ompi cave (Site #15). The area is often associated with Vulcan's Anvil, described above, and with other sites in the canyon, and Southern Paiute families continue to visit the area because of remembered relatives who used it.

This location provides another opportunity for river trip participants to relate their experiences on the river to their lives "up on top," or back at home, and to the history of their ancestors who lived in the Canyon. This is also a site where monitors can record plant responses to dam operations at a site where few people camp.

Beach, Plants, and Rock Art
As at other sites, vegetation at this site is of cultural significance to the Southern Paiutes and also serves to protect the site. Three transects provide information about vegetation, the width of trails, and the beach. In addition, monitoring photos are matched and re-taken and the site map revised and updated every third year to record the ongoing changes. There has been an increase in trailing leading to the rock art panel, and trailing along the side of the panel has also increased. The mesquite trees protecting the site have been trimmed somewhat, allowing easier access to the site, although they are rapidly increasing in size and spreading over the trails.

The three main themes in vegetation change at the site are increasing size of mesquites and prickly pear, drought stress and dieback of some grasses and shrubs, and increased vigor of dry marsh plants along the shore as a result of favorable water releases. Three plant transects were installed here to monitor these changes. A dense dry marsh of scouring rush along the shoreline at the boat docking point was impacted by people getting off and on the boats, causing concerns about whether SPC monitoring and visitation would lead others to stop at the site. Mesquite has increased here subsequent to Glen Canyon Dam, and other vegetation surrounding one roasting pit area has increased. The monitors recorded black charcoal markings near one rock art drawing.

Recommendations
Monitor impacts to the site are a cause for concern. The site is fragile, and is impacted by monitoring activities, so care must be taken to minimize disturbance. In 2001, monitoring was modified so that all three transects would be read at the same time, every three years, to minimize environmental damage. The timing of monitoring was shifted to 2005 during the development of the second five-year monitoring plan to balance the number of monitoring sites to be visited in any single year. Bermuda grass continues to anchor the sand here, but should be watched for dispersal patterns in relation to climate and dam operations.

Site #15: Ompi Cave
Years visited: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This site is visited for spiritual and ceremonial reasons. Southern Pauites have used the cave for centuries to collect red paint. Offerings of tobacco and prayers and other items are made annually and conditions at the site are noted. Details are not recorded in reports for public inspection. Erosion from the beach on the trail leading to the cave has been reported.

Site #16: Spring Canyon
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2004, 2005

Overview
Southern Paiutes used this site for ceremonies, hunting, farming, gathering, trade, and water collection. It is considered to be connected directly to other similar sites of food gathering and hunting both upstream and down, including Ompi Cave.

This is an important site for monitoring and for teaching participants about ceremonial tobacco use and its importance for Southern Paiutes, and how it differs from commercial tobacco uses. There is also opportunity each year at this dynamic site to monitor side canyon vs. main stem erosion and riparian responses to flood events.

Beach and Plants

The limited beach area at the mouth of the creek is a dynamic area, with gravels brought to the river and deposited by the creek, and sand bars deposited and eroded by the river. This site is subject to severe flash floods, which periodically scour all vegetation in the creek bed and sometimes erode the canyon floor and change the banks. The monitors decided to adjust their methodology in 1999 to accommodate the dynamic nature of Spring Canyon, and shifted from a series of plant transects to the use of photography and written documentation. A series of six photo points were established along the floor of the canyon, with photos taken looking upstream and downstream at each point. The points were located to cover all of the study area from the river to the outcrop with the rock shelter. Since vegetation on the canyon floor changes so frequently due to flooding, making rocks on the floor unreliable for matching photos, features on the canyon walls were utilized.

Species diversity and growth have been observed regularly by monitors at this location. The effects of flooding on seepwillows *(Baccharis salicifolia),* which are the dominant species on the gravelly canyon floor, are most obvious as these plants are removed by floods, then rapidly reinvade and quickly recover. These changes continue to provide data for comparison from year to year, and to variations in climate and dam operations. In 1999, a flash flood scoured the canyon floor deeply and the severe effects reached farther upstream than those of the 1995 flood. Indian tobacco (*Nicotiana trigonophylla*) seems to wax and wane at this site, possibly due to drought stress. This is an important Southern Paiute cultural species, and has been observed to grow vigorously in the gravels, especially immediately following flood events. At times monitors have noted severe insect predation on its leaves.

Rock Art and Archaeology

The archaeological features at this site are well known to commercial river guides, and monitors have recorded their movement from one location to another within the site, reportedly the result of being “hidden” by guides. As in other places, vegetation helps protect the site when it is present, and monitors avoid creating trails to features that have become overgrown, encouraging natural protection of the site. The rock art panel is readily accessed and several trails lead to it; when one becomes inaccessible another is formed. Monitors have recorded evidence of new mineral accretion on the wall near the paintings. A mesquite tree has been observed brushing against a panel, but was deemed a negligible natural impact requiring no mitigation.

Recommendations

In the future, the rock shelter should continue to be monitored from the base. The rock art panel should be monitored in the evening since the lighting on the panel is less bright and the photography is most effective then. Down-cutting and entrenchment of the creek have increased considerably over the years, while the rapid recovery abilities of riparian systems have been witnessed over time, due to the long-term nature of the monitoring program.

Site #17: Indian Canyon
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
This site is readily accessible from the Shivwits Plateau. Trade and large social gatherings were important activities at this site, and Southern Paiutes remember that at this section of the river Paiutes used to swim to the other side. Roasting pits and a rock shelter marked with Ompi figures are of special importance to Southern Paiutes. Important plants include creosotebush *(Larrea tridentata)*, cacti, and willow.

Archaeology and Rock Art
Monitors use photographic and written documentation to record changes at this site. The Ompi markings continue to fade naturally from surface erosion. Graffiti and dust from foot traffic near the rock art have been recorded. The most significant impact has been trailing through roasting pits which was addressed by the NPS when it rerouted the main trail leading up to the site. River parties frequently camp on the opposite side of Indian Canyon from the site, or downriver, so the site receives heavy visitation.

Recommendations
The SPC should continue to consult with the NPS regarding the trails and with both the river guides and the NPS about the need for visitor education at this site.

Site #18: Pumpkin Spring
Years visited: 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005

Overview
Southern Paiute people used to visit this site and others like it for health improvement, and to make ceremonial offerings. In general, mineral springs are significant places of healing, and this site offers an opportunity for Southern Paiutes to practice and teach others about their traditional and current uses as well as appropriate behavior at such a site. As one monitor put it, “That’s where Paiute people’s health is.”

Beach, Plants, and TCPs
Intense trailing from the beach to the spring has been evident at this site each year the spring has been monitored. The viewpoint above the spring has multiple trails, and plants on the bench have been damaged by trampling. As expected, sand deposition along the bank of the river increased during the 1996 test flow. The test flow also cleansed the spring of old mineral deposits and algae, and was perceived by the SPC monitors to be a positive impact. Black markings from boat contact are visible on the edge of the spring itself. Monitors have witnessed visitors removing material from the springs and jumping from the ledges, but not from the fragile edge of the spring itself; although for the Southern Paiutes, any kind of horseplay is inappropriate at this place.

In addition, arroyo cutting at this site has increased over time. The impacts have been exacerbated by the fluctuating water levels since sand was deposited during the 1996 test flow. Monitoring points for documenting changes at Pumpkin Spring have been adjusted to more

accurately account for the effects of spring and summer water flows. The bowl is clogged with algae, and a good scouring by a high test flow would clean it out and clear the water, at least for a time.

Recommendations
The SPC should make stronger efforts to educate river guides about the importance and fragility of this place. Oral histories may be gathered by SPC members about the site, in order to inform youth about its importance. Due to questions about the spring's mineral content, the SPC will research what is known about this and other springs in the area.

Site #19: Ledges Spring
Years visited: 1997, 2000, 2003

Overview
Food gathering and processing and trade were important activities at this site, due to the abundance of watercress, moss, agave, mesquite, Indian tea, and mustard plants. As at other sites, the archaeological features and trails represent important connections between Paiute people and all places in the canyon corridor.

Plants
Monitors use photographic and written documentation at this site. The spring appears to have shifted downriver, and there is less vegetation around its mouth. Drought conditions have resulted in reduced spring flow, and some outlets have ceased flowing. In addition, one tamarisk had been cut down in 2000, and there was some destruction of the living, cryptogamic soil due to trailing. This was determined to be a major negative impact by the SPC monitors.

Archaeology
In 2000, a mysterious impact found at this site was a large hole dug in the middle of one of the roasting pits. It was a huge disturbance, and both the archaeologist and tribal elder tried to determine how it was made. Though it was first suspected that the hole was dug by an animal, the straight edges on two sides indicate possible use of a shovel. There were other small holes at the site that appear to be of animal origin.

In 2003, the hole in the roasting pit first documented in 2000 was no longer there. However, there was increased evidence of human activity at the site in the form of trailing and evidence of camping, and there is some erosion around the site due to the trailing. In one monitoring observation, a group of rocks had been gathered and placed upright and in a circle in a corner of the ledge located below the rock shelter. These rocks were dispersed by the SPC monitors.

Recommendations
This location receives heavy visitation as a campsite, and the SPC should work with the river guides and NPS to remind people that there are places they do not belong, and that respect and care for sites is an ongoing responsibility that involves caring for an area *and* for the people who visit there.

Site #20: Granite Park

Years visited: 1997, 1998, 2002, 2004, 2005

Overview
This location represents a site of inter-tribal interaction that spans many generations. For some Southern Paiutes, the area is the former habitation site and birthplace of close relatives. Trade, hunting, fishing, gathering and ceremonies occurred here, and Paiute and Hualapai people continue to interact, conduct joint ceremonies, interact across the river, and intermarry to this day.

Beach, Plants, and TCPs
Of ongoing historic interest is the SPC and Hualapai Nation's shared effort to monitor the historic Goodding Willow (*Salix gooddingi*) at Granite Park. This tree, which is perhaps 250 years old, appears in photos from some of the earliest river trips, and undoubtedly was a council site when Paiutes and Hualapais inhabited Granite Park in the 1890s. It is perhaps the single oldest living thing along the Colorado River, and symbolizes the shared history of the Canyon for the past 200 years by the Tribes and European river exploration parties. The effects of water fluctuations that wear on the trunk of the tree and constantly alter the surrounding beach area have been closely monitored. Beaver damage to the willow is another concern, along with river guides who tie their boats to the willow at the water's edge.

The popularity of the site complicates monitoring efforts. On some trips, SPC monitors have elected not to stop at the site because of visitors' disruptive activities taking place at the tree, and instead attempted to judge the overall condition of the area while passing by. Overcrowding from other trips continues to make established trails and resting areas vulnerable and sparse in vegetation cover. However, the SPC also recognizes that the site is important to the multiple human interactions that have occurred and continue in the Canyon, and so it provides a rich site for interpretation of shared environments.

Recommendations
The tree needs stabilization and erosion protection work around the base because this is the location where water fluctuation most directly impacts the physical health of the tree. Monitors and trainees have discussed how to go about a collaborative effort to protect the tree, possibly with the Hualapai Tribe, on whose Reservation the site lies. NPS and Paiute spokespeople should remind river guides of the historic and cultural significance [for all parties involved in Canyon work] of the willow on a regular basis.

Summary of Site Discussions

The SPC monitoring program provides information to tribal leaders and members and to managers and scientists involved in the GCDAMP and the *Programmatic Agreement on Cultural Resources*. As demonstrated in the site discussions, the SPC program focuses on sites of cultural significance where the impacts of dam operations, both direct and indirect, are observed and recorded. Due to limited time and funding, neither the SPC nor NPS are currently monitoring sites above Lees Ferry, and this gap should be addressed.

"Tribes originally got involved through the cultural program here, with the idea that there is

more out there than archaeology. This meant a lot of duplication of NPS data… should separate NPS concerns from dam operations."

Prior to the construction of GCD, the combined forces of erosion and deposition from the main river channel and the side canyons determined the conditions of beaches and canyon mouths. In places such as South Canyon, processes of deposition and erosion are still influenced by both side canyon streams and the river. In places such as Nankoweap, experimental floods have not been large enough to deposit sediment. Thus, the mouths of these side canyons continue to erode with no replenishment from river sediments.

Studies conducted in conjunction with the 1996 beach/habitat building flow demonstrated that some erosional channels could be backfilled by periodic high-flow events and that high, sediment-enriched flows offered one potential means of conducting system-wide mitigation of negative effects of dam operations on cultural resources (Balsom and Larralde 1996). As noted in this chapter, evidence from immediately after the 1996 event and in subsequent years indicate that impacts were not uniform, with some areas getting more sand, others being scoured, and others seeing little impact. In general, the program findings demonstrate that changes in dam operations differentially impact the monitored sites, making it necessary to carefully consider each proposed change. Changes in sediment deposition and movement cause effects such as gullying, changes in vegetation, and differential visitor use of beaches. At some sites such as Nankoweap, where the dam prevents the river from carrying and then depositing sufficient sediments to replenish the site, no flow regime will allow it to return to its former dynamic condition. At other sites such as Spring Canyon and Granite Park, low steady flow has caused vegetation within the riparian corridor to increase significantly.

The task of choosing sites and how to monitor them requires that the SPC strike a balance between its own needs for gathering information and reporting it to Southern Paiute tribal members, and the needs of scientists and other stakeholders in the AMP. This balance hinges upon site selection and monitoring methods that honor the continuing significance of those places in Southern Paiute culture, the potential risks that sites face due to dam-induced impacts, and the information that SPC monitoring contributes to an understanding of the whole system that, since 1963, has included Glen Canyon Dam.

Specific SPC concerns revolve around visitation and especially the impacts of increased human use of some sites. Trash, trailing, noise, graffiti, and general access to specific sites are of great concern to the SPC. Mitigation of these activities will require creative approaches that can emerge from SPC monitoring, reporting, and collaboration with management agencies, and some of those approaches are discussed in this report. As noted in the site descriptions above, other impacts such as the prevalence of various animals or plants, artifact movement and theft, the potential effects of monitoring activities on some sites, shoreline conditions where plants are encroaching or receding, and beaches that show the effects of visitors all result from dam operations that occur in the Colorado River Corridor, and are therefore impacts to *cultural* resources.

Rather than focusing on sorting and separating individual site features, concerns about those sites, and the ceremonial or other practices of the people who visit them, SPC monitors and

trainees have created a program that integrates each of these considerations. Monitoring data are collected through photo documentation or line transects at the same time that spiritual practices occur in place, carried from the past and continued for present and future generations. For this reason, SPC monitoring trips require the presence of tribal members who are skilled and experienced at monitoring techniques, and those who are knowledgeable about ceremonial practices and appropriate prayers. The result is a monitoring program that remains open to adaptation as information gained on river trips feeds back into the SPC's work. The SPC continues to maintain that this method of considering the region and the people who interact with it, and who therefore alter the place through their actions, provides for themselves and for the GCDAMP not only the most efficient but the most appropriate ways of thinking about, and acting within, the region as its caretakers.

Chapter Three
SPC Participation in Stakeholder Meetings of the GCDAMP

David Seibert

This chapter examines Southern Paiute Consortium (SPC) participation in stakeholder meetings of the Glen Canyon Dam Adaptive Management Program (GCDAMP). A brief historical background of the GCDAMP is followed by a review of the methods used to analyze SPC involvement in the Adaptive Management Program (AMP) for this section of the report. The chapter then examines how the SPC has coordinated its work with the processes of the AMP. Included for comparative purposes are case studies of SPC and Grand Canyon Monitoring and Research Center (GCMRC) information-sharing meetings. This examination provides a unique perspective on the contexts and processes through which interaction and decision-making occur within the AMP. Unless otherwise noted, quotations used in this chapter were drawn directly from notes taken during meetings and interviews.

Historical Background

In 1994, the *Programmatic Agreement on Cultural Resources* (PA) was signed by the Advisory Council on Historic Preservation, the Arizona State Historic Preservation Office, the Bureau of Reclamation, the National Park Service, and seven Native American tribes – the Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, San Juan Southern Paiute Tribe, and the Zuni Tribe (see Chapter One).

The PA addresses the Bureau of Reclamation's (BOR) responsibilities for operations of Glen Canyon Dam (GCD) under Section 106 of the National Historic Preservation Act (NHPA) and the Section 110 responsibilities of the National Park Service (NPS) for long-term management of historic properties. It is specifically designed to address the *effects* of the operations of GCD on these properties, through the development of monitoring and management protocols for cultural resources in the Colorado River Corridor. Section 106 pertains specifically to properties that are eligible for the National Register of Historic Places, which includes traditional cultural properties identified by individual tribes, and instructs federal agencies to consider the potential effects of management actions on such properties (ACHP nd). The mandate further directs the BOR and NPS to develop and implement plans for monitoring any remedial actions to properties considered threatened by management activities and to develop a Historic Preservation Plan for their long-term monitoring and management. As such, the PA does not cover all management actions of the GCDAMP, just those affecting certain cultural resources.

In 1995, the Final Glen Canyon Dam Environmental Impact Statement (GCDEIS) was completed, a Record of Decision was issued, and transition to the GCDAMP began (see Chapter One). At that time, the SPC expanded the research activities it had begun for the GCDEIS to include 1) assessing potential environmental impacts to cultural resources, 2) developing monitoring procedures, and 3) interacting with the BOR and other PA signatories. More specifically, the goal of the SPC's monitoring program is to systematically gather data to assess whether or not the Management Objectives established under the GCDAMP are being met, and especially those related to preserving access to and the integrity of traditionally important resources (see also Chapter Two).

As outlined in Chapter One, the Goals and Management Objectives (MOs) were developed by the GCDAMP in a series of meetings and workshops held between 1996 and 2003 in order to meet the intent of the Grand Canyon Protection Act and the Record of Decision (ROD; DOI 1996) for protection of resources below GCD. The following are of primary concern to the SPC and this review:

Goal 11: Protect, Manage and Treat Cultural Resources
MO 11.2. Preserve resource integrity and cultural values of traditionally important resources within the Colorado River Ecosystem.
MO 11.3. Protect and maintain physical access to traditional cultural resources.

Goal 12: Maintain a High Quality Monitoring, Research and Adaptive Management Program
MO 12.7. Attain and maintain effective tribal consultation to ensure inclusion of tribal values and perspectives into the AMP.
MO 12.8. Attain and maintain tribal participation in the AMP research and long-term monitoring activities.

According to the 2006 GCDAMP Budget and Workplan, all Goals and Objectives are designed so they can evolve through a process of ongoing review based on stakeholders' responses to resource conditions below GCD. This process depends upon regular communication, primarily through meetings and updates to the groups from each stakeholder, based on research findings and on any changes in desired conditions for the resources of concern.

In addition to sediment dynamics, native and nonnative fish, and endangered species emphases, the GCDAMP to date has also identified the research and monitoring of cultural resources as a primary goal (Gloss et al. 2005:9). But, what undermines the goals from the outset are their breadth of scope and the ambiguous language used to describe them. "Preserve resource integrity and cultural values" in MO 11.2, and "Attain and maintain effective tribal consultation" and "tribal participation" in MOs 12.7 and 12.8 are unspecified though desirable goals that have proven difficult to achieve in the AMP. This observation is corroborated in the Fiscal Year 2007 Annual Budget and Workplan, which outlines areas on which the AMP will focus its efforts in the coming year, based on data collected in the Technical Work Group (TWG) meetings described below. In one section, the 2007 Workplan notes that GCMRC and the GCDAMP have recognized that a "GCDAMP Effectiveness Workshop" is necessary because their collective efforts are "confounded by several factors" (176), including scientists' inability to provide relevant information if managers do not clearly define desired future conditions.

There is also recognition in the document that conflicts based on diverse values, interests, and goals continue to produce challenges to the AMP that have not been resolved to date. However, a shift that was quite disturbing for the SPC and other stakeholders occurred during the June 25-26, 2007 TWG meeting, when GCMRC announced that although it did not understand the reasons behind the decision, it was informed that there would not be an Effectiveness Workshop after all, because GCMRC is not in the "business" of holding such an event.

GCMRC's proposal of a Workshop may not be adequate to the task, but the idea indicates the group's recognition of ongoing conflict. Adaptive management as a strategy is no more immune to the effects of misunderstanding and conflict than any other management paradigm. Further complicating the situation is the location in which it continues to unfold. The entire Colorado River ecosystem comprises a region that stakeholders in AMP meetings regularly describe as "an extremely complex system about which we still know very little." Data gathered for this report indicate that the human relationships and ways of conducting AMP and Work Group business, ways that directly influence management practices in the Colorado River Corridor, are no less complex and deserving of research attention. The dynamics of human relationships often confound the professed goals of the individual Work Groups, forcing participants from tribes and other agencies to wonder aloud—in one case from a voting tribal member seated in the back of the room—"Are we at the [negotiating] table, or aren't we?"

Mixed Methods: A Social Science Research Approach to Complex Situations

Southern Paiute tribal members have participated in the GCDAMP since its inception, often with a University of Arizona (UA) technical consultant to the SPC who is a part of the research team that helped produce this report. In spring 2005, GCMRC enlisted the help of the Center for Sustainable Environments at Northern Arizona University to hold a "Tribal Workshop" specifically focused on tribal monitoring programs in the GCDAMP. This turned out to be a useful, general introduction to the issues surrounding tribal involvement in the AMP. The Workshop provided early indications of some sources of the difficulties that GCMRC and the participating tribes experienced as they attempted to integrate their efforts with those of the AMP. Just as it does for the proposed Effectiveness Workshop, GCMRC's request for assistance indicated at least two things—that there were perceived problems within the AMP, in this case concerning tribal participation; and that GCMRC was willing to make efforts to resolve those problems. Similar themes would recur repeatedly throughout the two-year period of my involvement in the AMP Work Groups and other meetings, and are described below after an introduction to AMP operational processes.

Also in 2005, the SPC decided that a comprehensive review of their involvement in the GCDAMP was warranted. It was agreed by the SPC and the UA research team that a synthesis of the data collected, using an integrated suite of social science methods, would provide a valuable perspective on both the context and effectiveness of SPC involvement in the AMP. The data that inform this chapter specifically, however, emerge from my own role as a researcher of Native American participation in the AMP from 2005 to 2007. In spring 2005 I co-organized with GCMRC a Tribal Workshop on tribal participation in the AMP, and in fall 2005 I began research as a doctoral student at the UA, focused specifically on SPC involvement in the AMP, rather than as a consultant to the SPC. Because my research position was funded through the College of Social and Behavioral Sciences at the UA, I was situated for research as a relatively neutral observer of SPC and others' participation in the AMP. The two-year period reflects accepted social science research requirements for valid qualitative data collection, enabling the identification of patterns of interaction, practice, and processes to the point of redundancy in the data, one of the primary indicators of significance in scientific research (Schensul et al. 1999; Bernard 2002).

A combination of integrated, mixed methods enables researchers to triangulate methods with data as they emerge in context. First, participant observation enables researchers to remain as unobtrusive as possible in order to record human interactions, and in some cases to witness and feel the effects of those interactions, whether on a tribal river trip or at a GCDAMP stakeholder meeting in Phoenix. Historical research provides the context for these interactions and relationships, and semi-structured interviews and follow-ups enable reexaminations of data that expose gaps and areas that require further research (Briggs 1984; Schensul 1999; Bernard 2002).

For this chapter data were gathered from several sources: participant observation at both the Adaptive Management Work Group (AMWG) and TWG meetings because they are the primary mechanisms for deciding upon and recommending GCDAMP actions to the Secretary of the Interior; participant observation on the 2005 11-day Colorado River monitoring trip, at the 2005 GCMRC Science Symposium, and at the SPC 10-Year River Trip Reunion; historical research of SPC involvement in the AMP; semi-structured interviews of selected tribal and agency stakeholders; and follow-up interviews to check the accuracy of collected data and explore patterns. In total, I conducted 13 interviews with agency and other non-tribal stakeholders in the AMP, and 14 interviews with tribal representatives. I also attended meetings of these groups that are described in further detail below: two AMWG meetings, six TWG meetings, four SPC meetings, three Science Planning Group (SPG) meetings, and eight Cultural Resources Ad Hoc Group (CRAHG) meetings.

Data have also been collected from BOR and GCMRC website documents that date back to 1997 and include information on budgets, minority reports, letters to Chairmen about GCDAMP activities, scientific study results, and recommendations made by outside reviewers. Additional data include fieldnotes from participant observation conducted at three AMWG meetings and six TWG meetings, and from interviews conducted with several AMWG stakeholders (most of who also sit on the TWG) whose experience working with the AMP tribes ranged from limited to extensive. Information from documents, interviews, and fieldnotes from observations was coded for its relevance to tribal involvement in the AMP generally—including categories such as budget changes, complaints or recommendations around tribal involvement in the program, cultural resources considerations, Tribal Consultation Plans, and the original GCDEIS. Information from these sources and categories was then coded more specifically for how it reflects or illuminates AMP issues of particular concern to SPC, identified through triangulation with other forms of participant observation and interviews described below. In order to sort and make use of the types and sources of information concerning SPC participation in the AMP, it is necessary to trace the history and contexts of involvement that contribute to the data sets described above.

Work Groups and Ad Hoc Groups of the Adaptive Management Program

A primary goal of the GCDAMP is that information from research conducted in and around the Colorado River Corridor is shared in formal meetings, where stakeholders evaluate the strengths and weaknesses of that information, and vote on what measures should be recommended to the Department of the Interior to alter GCD operations. The AMP is implemented through a set of Work Groups and Ad Hoc groups that coordinate with one another and synthesize information as it is gathered by tribes, U.S. government agencies, and other stakeholders listed below. On behalf

of the SPC, the SPC Coordinator participates primarily in three of the AMP's groups – the AMWG, the TWG, and the CRAHG – and also participates in meetings, river trips, and other activities regarding the PA. Like other stakeholders approved by the Department of the Interior, the SPC designee is a voting member of the AMP, while consultants and researchers who work with the SPC do not have voting privileges.[5]

The GCDAMP is set up with the AMWG at the top of the hierarchy, reporting directly to the Secretary of the Interior's official designee after it receives information from the TWG, which deliberates over the recommendations of the CRAHG and other ad hoc groups that inform it. In principle, management decisions and recommendations made to the Secretary for action depend upon the results of scientific research that contributes to management decisions in an iterative, adaptive manner, enabling all collaborators to have input on policy decisions as situations change over time. Each official stakeholder in the AMWG has been approved by the Department of the Interior, and each has a vote in the recommendations for management actions. A brief description of each group will clarify their relationships to one another and their responsibilities in the AMP.

The Adaptive Management Work Group (AMWG)

The AMWG is a federal advisory group formed through the Department of the Interior in 1997 to advise the Secretary of the Interior how best to achieve the goals of Section 1802 of the Grand Canyon Protection Act. AMWG meetings occur approximately two to three times per year, and its meeting minutes and some GCDAMP-related materials such as appendices, budgets, and letters are usually available online (http://www.usbr.gov/uc/rm/amp/amwg/amwg_mtginfo.html). The BOR/AMP website describes the AMWG's purpose as follows:

> The AMWG continues public involvement in the decision-making process and incorporates those stakeholders with interest in the operation of Glen Canyon Dam and downstream resources. By blending the best science and management practices, the AMWG makes recommendations to the Secretary on how to protect the resources and meet the requirement of the law. (http://www.usbr.gov/uc/rm/amp)

The list of AMWG stakeholders, established by the Secretary of the Interior's decision during the formation of the GCDAMP, indicates its myriad interests (Gloss et al. 2005:10):

Colorado River Basin States
Arizona: Arizona Department of Water Resources
California: Colorado River Board of California
Colorado: Colorado Water Conservation Board
Nevada: Colorado River Commission of Nevada
New Mexico: New Mexico Office of the State Engineer
Utah: Water Resources Agency
Wyoming: State Engineer's Office

[5] As of this writing, the SPC finds its status as a recognized voting member in question by the BOR, where confusion over the SPC as a representative entity of two separate tribes for the AMP continues (see Chapter One).

Nongovernmental Groups
Environmental:
Grand Canyon Trust
Grand Canyon Wildlands Council

Recreation:
Federation of Fly Fishers/Northern Arizona Flycasters
Grand Canyon River Guides

Contractors for Federal Power from Glen Canyon Dam:
Colorado River Energy Distributors Association (CREDA)
Utah Associated Municipal Power Systems

State and Federal Cooperating Agencies
Arizona Game and Fish Department
Bureau of Indian Affairs
Bureau of Reclamation
National Park Service
U.S. Department of Energy, Western Area Power Administration
U.S. Fish and Wildlife Service

Tribes
Hopi Tribe
Hualapai Tribe
Navajo Nation
Pueblo of Zuni
San Juan Southern Paiute Tribe
Southern Paiute Consortium[6]

It is important to note that few stakeholder interviewees can recall in detail how and why the original 24 designees for the GCDAMP were chosen. Some refer to the attempt by the Secretary of the Interior to achieve balance and avoid political extremes, goals that align with the ideals of adaptive management as a platform for consensus-building and democratic resource management. Except for the represented states, these stakeholders comprised either cooperating agencies in the development of the GCDEIS or were highly vocal public entities at each of the cooperating agency meetings during the development of the original GCDEIS.

The designees have remained relatively stable as voting members of the AMWG, although one tribe was invited to become part of the AMWG at its inception, at which time the tribe began efforts to coordinate with the Group but then ended its participation. Another disruption of membership occurred when a nongovernmental group retracted its membership, forcing competition for the position. In a move indicative of some AMP processes for responding to

[6] The above list appears in the 2005 USGS SCORE Report, and was apparently drawn directly from the GCDEIS. This further evidences the continued confusion of the role of the SPC as a representative entity. As noted in Chapter One, the SPC is not a tribe, but represents two federally recognized tribes.

change, the position was eventually assumed by another group through knowledge of “how to play the game,” as many stakeholders have described it.

The Technical Work Group (TWG)

The TWG is a subcommittee of the AMWG, with the mandate to “develop criteria and standards for monitoring and research programs; provide periodic review and updates; develop resource management questions for the design of monitoring and research by the Grand Canyon Monitoring and Research Center, and provide information, as necessary, for preparing annual resource reports and other reports, as required for the AMWG” (http://www.usbr.gov/uc/rm/amp). The TWG meets approximately six times annually and is made up of representatives from each organization represented in the AMWG, plus two members from the NPS, representing Grand Canyon National Park and Glen Canyon Recreational Area. Until the 1990s when the GCMRC was moved from the BOR to the U.S. Geological Survey (USGS), that agency also had a representative on the TWG.

The Cultural Resources Ad Hoc Group (CRAHG)

CRAHG meetings are sometimes called separately from TWG or AMWG meetings as necessary, but they are often appended to AMWG or TWG meetings during dinner breaks, or in the early morning before the other meetings begin. Though in principle, because it is an ad hoc group that reports back to the TWG, any member of the TWG can participate in the CRAHG, the CRAHG has a fairly stable membership. Active participants include representatives designated by Hopi, Hualapai, Navajo, the Southern Paiute Consortium, Zuni, the BOR, NPS, CREDA, and a Group Chair from Western Area Power Association. Each of the non-tribal groups is represented by a professional archaeologist. Within the tribal groups, two of the five representatives are professional archaeologists, and neither is an enrolled tribal member. Participant observation of six CRAHG meetings, interviews with SPC and other stakeholders on the CRAHG—GCMRC, Hualapai, Zuni, Hopi—and discussions with BOR representatives inform the data for this section. Some of the email messages on which so much of the AMP’s work depends were considered for this section as well.

As noted in Chapter One, in 1994 the *Programmatic Agreement on Cultural Resources* regarding operations of GCD was developed for assessment and mitigation of threats to cultural resources from the operations of the dam. The BOR-proposed generator upgrades for GCD and public concern about the effects of dam operations initiated the Glen Canyon Environmental Studies and began the process that led to the original GCDEIS. But, by the time the PA was completed, concerns had shifted to the effects of general operations of GCD, beyond those instigated by generator upgrades alone, and it had become clear that tribal interests extended far beyond concerns with specific archaeological sites. As a result, the GCDAMP, through the GCMRC, was organized to speak to these broader concerns about GCD and the effects of its operations. Consequently, the assessment of threats to cultural resources – defined as those "properties" that are considered National Register-eligible historic properties, including TCPs – outlined in the PA was distinguished from management concerns about other cultural resources, including biological and other ecosystem functions of concern to tribes. This was due to a belief among stakeholders that cultural resource issues would be addressed under the cultural program

administered by the GCMRC; in reality, that program has continued to focus primarily on material features associated with archaeological sites.

The CRAHG exists as the result of ongoing questions surrounding how to address cultural resources concerns in the GCDAMP and, more recently, how to enable tribes most effectively to participate in the AMP. Before the CRAHG was formed, TWG cultural resource sub-groups, comprised of representatives to PA signatory meetings, attempted to set up the cultural program to cooperate effectively with other science programs. But these groups were no longer needed once the draft management objectives and information needs for the AMP were developed. Their work was to address the integration of tribal issues and knowledge into AMP activities, but interviewees involved in those early attempts indicate that the goal of integration was never achieved to the tribes' satisfaction.

The CRAHG was officially formed as a standing ad hoc by the TWG in 2001. This action was the result of a recommendation to the TWG from an ad hoc group designed to evaluate the report of the cultural resources Protocol Evaluation Panel (PEP 2000), organized and funded by GCMRC to review the GCDAMP. Although tribal involvement and representation in the AMP was not the CRAHG's original function, many interviewees note that this has become an expected part of the group's work in the AMP. The shift is significant because many participants in the CRAHG feel that this expectation is more assumed than actually met in practice. Instead, the CRAHG's efforts have primarily involved reviewing GCMRC research designs, data recovery planning, and GCMRC budgets for that work—again, primarily focused on specific work to be accomplished on the material features of archaeological sites. While many participants in the CRAHG and in the AMP agree that this is useful work, it has failed to encompass all of the SPC's cultural concerns, and so the SPC has attempted to express and work out some of these concerns within the other venues provided for AMP participants.

SPC Participation in AMP Meetings

One of the most pervasive features of the GCDAMP is how communication through telephone calls, emails, and document circulation are critical to the coordination of activities and agendas. Partly because the AMP has no physical base, GCMRC has become the primary organizer for many of the AMP's activities, although the BOR and NPS also help organize and coordinate work. Although the AMP's success—and by extension the SPC's successful participation in the AMP—depends upon communication at a distance, participation in the Work Group meetings is also critical for success. Because of the infrequency of meetings, these chances for interaction represent crucial opportunities for stakeholders to meet face to face to discuss and decide upon the success of past efforts, and new directions the AMP should consider recommending to the Secretary of the Interior. Following a description of the meeting environment, this section coordinates three major themes that cut across the data sets—social conduct in and through the AMP; persistent confusion about AMP work processes; and historical contexts for stakeholder interactions in the meeting venues.

The Meeting Environment

A fundamental feature of the GCDAMP is that its business of managing resources is conducted through stakeholder meetings that usually occur in downtown Phoenix, Arizona, most recently in a conference room on the 12th floor of the Bureau of Indian Affairs office of the Arizona Public Service (APS) building. AMWG, TWG, CRAHG and other meetings are all structured similarly in this environment, and are attended by many of the same Work Group members, with minor differences in representation noted in the Work Group descriptions above. Stakeholders arrive at the meetings from throughout the southwestern U.S., stay at least one night in a nearby hotel, and/or park in a nearby parking garage. Although the meetings are open to the public, because most meetings of the highest hierarchical AMP levels (those of the TWG and AMWG) occur in the APS building, participants are required to check in at a security desk where their names are checked against a list of invited participants, and they receive a name tag for security purposes. On leaving the building for the day, participants surrender their name tags to security personnel. While it is not the only place AMP work is conducted, this particular venue has been described as uncomfortable by many AMP stakeholders, not just representatives of the SPC. As one SPC representative put it, this regular entry and re-introduction to the AMP environment is only one indicator of "the way things are done in Phoenix." And as a non-tribal stakeholder pointed out, "…this environment isn't comfortable for any of us!"

The environment seems to be the best available given the GCDAMP's structure and the kind of work it does; but all environments affect how people interact with one another (White 2006), whether outdoors on a river trip, or in a familiar meeting room set up specifically for participants to do a specific kind of work. Inside the usually windowless Phoenix meeting room are several long tables and chairs pulled into a large rectangle for stakeholders, with other tables at the back of the room for the public and non-voting employees of various agencies represented in the AMP. Stakeholders tend to dress midway between casual and formal, and they generally know one another from years of interaction in this context. Documents pertaining to the meeting's agenda are stacked on tables against a wall, where other chairs are aligned adjacent to the central tables for agency employees who arrive in groups and want to remain in close contact with their voting representatives. Stakeholders and voting members are sometimes verbally encouraged to sit at the center tables and sometimes not. Participants sometimes acquiesce to this request and sometimes do not, but without repercussion. Meetings are officially called to order and then the minutes of the last meeting are approved. The meetings then proceed, albeit loosely, according to "Robert's Rules of Order," an idealized means of allowing participants to speak and have ideas considered and permanently recorded in front of the entire group.

Social Conduct and Meeting Participation

That the ideals of such a system remain incompletely realized should come as no surprise. In the case of the GCDAMP, the reasons lie both within and outside the AMP and the conference room proper. Outside the room, a high volume of email messages, phone conversations, and other small meeting forms also influence AMP operations, including meetings between stakeholders who prepare for the meetings on their own initiative in "back rooms" or "through lobbying in [Washington] D.C." before arriving. Like the geography of the meeting room and the rarely heeded requests for only voting members to sit at the table, the practice of meeting outside the official environment points to some of the AMP's built-in limitations as it attempts to control what happens in meetings. A similar phenomenon centers on the regular coming and going of

participants during presentations and voting activities, as stakeholders answer cell phones or talk with others privately in the hallway. The activity does not completely disrupt meetings and process, but it does often force those who remain in the room to wonder, sometimes aloud, sometimes in whispers or to others afterward, what was being accomplished and how the absence of some participants may have affected decisions.

The ubiquity of joking and joking contexts created by both tribal and non-tribal representatives in meetings also points to how stakeholders understand and feel about the meeting processes through which they attempt to collaborate. Like many individuals and groups, Southern Paiutes are well-known as regular exploiters of these features of human communication. Jokes have been used as a way to soften disagreements in Southern Paiute conversation, to deflect a listener's attention from an especially troubling situation, or to turn conversation away from an exasperating GCDAMP meeting and so poke fun at "the way things are done in Phoenix," where "these guys just go 'round and 'round without getting anywhere!" Jokes are used in different ways by different cultures, but they often function as a means of reflecting on a situation in a newly-acknowledged and shared way. Jokes are not always negatively inflected, but those recorded in this study were mostly negative. Formally, they ranged from critiques of the AMP to the ridiculing of individuals, and appeared to be a popular choice for stakeholders to express that they had little hope for positive change. At times the "process" of AMP coordination and decision-making had become so frustrating that stakeholders called the ideals of consistency and consensus in the meetings a "charade" and a "joke." And when meeting processes broke down, for example when voting was perceived as unfair or a disagreement occured, stakeholders with divergent interests regularly laughed and commented to one another, "This is how we do things, isn't it?!" The meeting then continued.

While many SPC and other respondents positively associated discomfort at the meetings' location and processes, they also strongly correlated that discomfort with the argumentative nature of many of the exchanges that take place in meetings. Data from participant observation and from interviews indicate that the most aggressive stakeholders tend to dominate discussions, and therefore stand the greatest chance of influencing decisions. Significantly, a few stakeholders used nearly identical terms to describe how some stakeholders conduct themselves. For example, one non-tribal stakeholder commented that "It's all bully action" in GCDAMP meetings, and another noted that the AMP itself is "set up for bullies…who can take the floor and hold it."

Apart from the obvious challenges the SPC faces in trying to influence and work within a conflict-ridden process that involves multiple viewpoints and perceptions of how the GCDAMP should operate, other less obvious patterns exist that confound SPC participation though they do not receive the attention that they could within the AMP. The SPC has participated in Work Group meetings since the beginning of the AMP and finds it as difficult as any other stakeholder to contribute in these settings. But the SPC representatives also come to Phoenix from a somewhat different cultural place. While it is important to avoid essentializing or romanticizing Native Americans, according to the SPC some tangible effects of these differences deserve consideration. Semi-structured interviews, casual conversations, and participation in SPC river trip planning meetings and the 2005 11-day SPC river monitoring trip provide baseline indications about how Southern Paiutes interact with one another to create social spaces and conditions that resemble those of the dominant culture, but which also differ significantly.

In some ways, these spaces and ways of being with one another resemble those created at GCDAMP meetings. People with shared histories gathered in places for specific purposes, they exchanged stories and frustrations, and they indulged in and were affected by the environment around them through entertaining and more serious activities. But in many ways, the interactions signaled Southern Paiute ways of being together that do not easily align with those of AMP meetings. SPC respondents have consistently expressed discomfort with the volume and acerbity with which many of the communicative exchanges take place in AMP meetings; with the amount of whispering that occurs during meetings; and with the propensity for interruptions that undermine some stakeholders' ability and willingness to express ideas. Much of this is simply an effect of working with different personalities and viewpoints. But it is significant that these observations are corroborated by non-SPC respondents who seem to recognize some of the sticking points, and who express the desire to include "tribal perspectives," even as they wonder how to improve an "obvious problem" with tribal participation in the program, or why tribal representatives don't "speak up more" in meetings.

Confusion over Processes Used to Achieve AMP Goals

The lack of cohesion and consensus also contributes to ongoing confusion over the "process" of meetings (a word spoken regularly by stakeholders). Process questions that recur in meetings and circulated documents include: 1) the exact procedures used historically for decision-making and whether or not the current group is expected to adhere to them; 2) confusion about document circulation via email and who has or has not received documents, including processes of editing and passing along those documents; and 3) the process by which stakeholders are to vote on major management actions for recommendation to the Secretary of the Interior. In short, the AMWG, TWG, and even the smaller CRAHG are constantly embroiled in deciding how to manage their own internal flows of information and the decision making that depends upon it. While this does not paralyze the group, the result is regular confusion expressed by stakeholders through comments such as, "I thought we decided that last year," or, "Are we voting now?," or through questions of what to do about people who have left the room when a vote is required. Email messages that regularly move back and forth between stakeholders—some of which do not reach all participants all the time—encourage further questions about process, inclusion and exclusion, and the varied histories and historical contexts of decisions and decision-making in the GCDAMP. In one example, indecision over how to handle a motion was resolved to no one's apparent satisfaction; in another, one prominent scientist noted that a recent vote was not the only time many voters had poorly understood the terms or consequences of their decision. Significantly, while these situations are recognized by many stakeholders, no one knows how to resolve them, and so meetings continue in their established patterns.

SPC tribal members indicate that their interactions with GCDAMP participants regularly show that confusion and uncertainty remain in the minds of many other stakeholders about the expectations of the SPC, how the SPC is to share information in formats that are valued and recognized by non-SPC stakeholders, and how the process of information sharing among groups is to be carried out. Corroborating this perception is the fact that at nearly every meeting of the TWG, AMWG and CRAHG, including the Tribal Workshop, references to the need to "take a step back" and to "get on the same page" and "clean up these meetings" as they related to AMP

requirements are common. But the best direction for these steps is not apparent to AMP participants. Neither is it apparent that the AMP as it is currently structured is capable of acknowledging each tribe as an independent, distinct governmental entity. The 2005 GCMRC Tribal Workshop, for example, was designed to address persistent misunderstandings about tribal participation in the AMP and to allow each tribe to express its desires for monitoring and research in its own ways. The Workshop has been referenced by CRAHG participants at least seven times in meetings and interviews as a positive attempt to find that direction. The hope was that it would at least begin to describe points of confusion and conflict. However, there are many indications from participants that the ideas surrounding reporting requirements and rationales for monitoring did not seem to "take hold" in that Workshop, for either GCMRC or for the tribes involved. In another example, SPC representatives continue to question, sometimes privately and sometimes publicly in meetings, why their initial research reports and their annual river trip reports "are not read," and why they are not "good enough." SPC members also regularly wonder aloud, "What do they want from us?," while agency representatives continue to feel that they are already describing what they want. While some AMP tribal and non-tribal representatives treated the Tribal Workshop, and a discussion of the PA at a recent CRAHG meeting, as opportunities to begin anew with the PA/Tribal Consultation Plan, SPC and other tribal representatives wondered if anyone had discovered exactly what had changed. Southern Paiutes also wondered why they were being asked to justify and explain their connections and purposes in a place they had until recently occupied more intimately, and for centuries.

It is important to note that in contexts of human interaction and in social science research about them, the perceptions individuals hold of their work and of each other count for a great deal. For many GCDAMP stakeholders, this is true whether those perceptions are backed by empirical evidence or not. Although it may not have always been the case historically with the federal agencies involved in the AMP, there are indications today that at least some GCMRC personnel may read SPC reports (although this in not reflected in the Gloss et al. 2005 SCORE report), and that they would welcome more. But if the perception of the SPC is that their reports are not being read, or that their work is not valued or used as they believe it could be, they face a set of problems that another series of meetings in Phoenix or another inter-agency river trip cannot solve.

Historical Contexts

Emails among Work Group members, documents produced by BOR and GCMRC, and interviews and fieldnotes from meetings indicate that stakeholders remain confused about the historical circumstances of tribes' relationships to both the GCDAMP and to the region. Significantly, this confusion ranges from skeptical and aggressive questions about why tribes are involved in the AMP at all, to seemingly genuine misunderstandings about why tribal participation problems have persisted in the AMP. One government agency official unconnected to tribal involvement asked why the TWG continues to wrestle with delayed funding for tribes, a situation that he thought "had been taken care of a long time ago." This is a common observation that often leads other stakeholders to comment that the individual participants rarely seem to be "on the same page" about what has occurred in the past and why.

Histories of both the short- and long-term continuously inform relationships in the present. They affect the ways in which people interact and the kinds of work they can accomplish together. Within the GCDAMP, most participants have long-standing relationships with one another, some of which began in the period before the AMP was created. These involve resource managers and scientists from multiple agencies who have moved between agencies as they built careers. What often remains consistent within this history of interaction is the type of work in which such people engage. Associations among employees of U.S. government agencies who engage in similar kinds of work are common, and it is not unusual for scientists and managers to shift positions among the BOR, NPS, USGS, or GCMRC, or to move into and out of universities or private groups through contracting work.

SPC tribal members have some familiarity with these processes and procedures through their participation in the GCDAMP and because of their long-term participation in tribal and federal governments. Yet, SPC members consistently cite the lack of acknowledgment by AMP managers and stakeholders of other historical contexts that continue to inform AMP interactions. Attempts to consolidate and delimit Southern Paiutes and their interests—including the uncompensated flooding of farmland in the Glen Canyon region, and the constant threats of violence and forced displacement from influxes of settlers—are persistent features of Southern Paiute history in the region, a fact well-known to tribal members. Persistent effects range from those produced by early Mormon settlers who officially and "legally" claimed Southern Paiute lands as their own, to U.S. government definitions of boundaries for bands and tribes that had little or no affiliation, or who were long-standing enemies (Stoffle et al. 1994).

Southern Paiutes have always been land managers, by choice and by association. They do not consider themselves to be employed as caretakers, but as forever responsible protectors of a Holy Land from which they emerged, and from which they have never departed (Stoffle et al.1994). A January 2007 SPC discussion of which sites would be visited on river trips, and which sites might be singled out for special designation as traditional cultural properties, immediately became frustrating for participants. One tribal member asked how people could possibly put boundaries on what was already theirs. Discussants talked about what it meant to cut out a "manageable" piece for designation and "treatment." The conversation echoes agency requests during the original GCDEIS preparation fifteen years ago (Chapter One). In both cases all participating tribes, which represent several distinct cultures, were asked to identify and effectively separate places of significance from all others in the region. Simplification was the goal, but the task and the methods were unsatisfactory to many. In the TWG meeting in April 2007, GCDAMP managers continued to struggle with defining what they wanted from tribes for monitoring proposals, including the process by which they planned to go about communicating that to the tribes. For Southern Paiutes, the request to identify important sites and establish monitoring protocols has not been impossible to fulfill. What is missing is recognition that any request to separate places and parts from the rest of the region makes as little sense to Southern Paiutes as it would to request that a Western science-trained biologist study only one side of a river and ignore the other.

In the meeting environments that shape most of the GCDAMP's work, the activities and opinions of scientists far outweigh those of laypersons such as boatmen, anglers, or cultural resources groups. Structured, seemingly predictable, measurable, and clearly articulated

"findings" of the scientists, related in a formal register and logically presented, carry the most influence. But they also effectively silence other ways of knowing and speaking about the Colorado River Corridor. Most of the people who participate in the AMP have learned to value the claims of scientists, which seem to connect actions and causes through numerically-ordered data, such as that presented in posters and verbally in the Science Symposium, or at TWG or AMWG meetings. Yet these participants often maintain at the same time that policy and science are separate arenas, and humorously make claims such as, "I don't know who I'm supposed to be today!," evidencing confusion again about process. But the expressions also show a level of political adeptness on the parts of those familiar with such processes, and the possibility of choosing whether to speak and conduct themselves as scientists or as policymakers. Some non-tribal scientists have expressed frustration and "shame" at the AMP as a scientific body. This is partly because of its tacit approval of some participants' "bully action" noted above, but also because the AMP does not always adhere to the tenets of "good science." According to these scientists, good science requires some procedures not accomplished often through the AMP: publishing research data, organizing meetings in a logical manner by creating a standard set of homework for stakeholders before meetings, and sticking to written agendas and limiting lunches and breaks.

Confidence can be shaken under such circumstances. At one TWG meeting, a few stakeholders began to get indications that their decisions would not alter a potential AMWG decision to conduct a flow experiment that many opposed. One stakeholder wondered aloud, "Why are we here?," indicating that if the AMWG were going to proceed with a given decision in spite of TWG recommendations, there was no reason for stakeholders to continue participation. This frustration and lack of trust causes stakeholders to feel that they have no alternative but to sometimes circumvent the AMWG/TWG process. For example, some stakeholders feel that they must write letters directly to the Secretary of the Interior to point out concerns. The effect is to remind all groups that legal action is an option if the GCDAMP does not work toward its goals by adhering to federal law, and according to agreed upon forms of interaction. Importantly in this context, a threat to sue upsets other meeting participants and the process of the meeting itself is interrupted by scornful looks and incredulous gasps, as if the person making the threat were not playing by established AMP rules, whatever they may be.

Similarly, by asking aloud at an AMWG meeting questions such as "Are we at the table or aren't we?," a SPC representative challenges the status quo by pushing for a form of recognition that accords with what is expected, but the move also confounds those expectations at the same time. Individuals do not know what to do with such responses because they upset expectation and perceived order. The GCDAMP provides no guidance for how to value other forms of speaking and perception, including those of non-tribal participants who seek to be effective in alternative ways. The effects of these kinds of misunderstandings can be subtle but pernicious. Although no stakeholder in the AMP made such comments in interviews, one high-ranking agency official mistakenly mentioned in an AMP meeting that the funding of tribal participation in the AMP amounted to "entitlement." The fact that this was especially shocking to tribal participants emerged when they observed that some stakeholders and representatives receive money for per diem, travel, and hotel expenses, and are paid by their agencies to attend meetings. They further observed that those meetings are held during the week so that agency officials do not have to use personal time for travel over a weekend. This is in direct contrast to SPC meetings, for example,

which are held on weekends when tribal representatives are off work, forcing SPC representatives to make difficult choices about how to spend personal resources.

Information-Sharing Contexts: SPC and GCMRC Communicate River Corridor Research

Two case studies further exemplify some of the similarities and some of the differences that make SPC participation in the GCDAMP challenging and different than that of other stakeholders. The following section compares data collected at two events at which research about the impacts of the operations of GCD was disseminated—the 2005 GCMRC Science Symposium in Tempe, Arizona, and the SPC River Trip Reunion meeting in 2007 on the Shivwits reservation outside St. George, Utah. This comparison brings together participant observation data on the perspectives and information-sharing practices of the two different groups, each of which used the meeting to share information on trends and its most recent findings from within the Colorado River Corridor. In accordance with the expectations of the AMP, each group collected and organized its research from the previous year's work within the region, but in both cases each group also articulated those experiences and findings in the context of the previous ten years of work there. For GCMRC, constituents included stakeholders in the AMP, GCMRC managers of science programs, contributors to early adaptive management theory, and other scientists who have worked on Colorado River Corridor science research through contracts with GCMRC. For the SPC event, constituents comprised participants in the SPC's monitoring and education program, including adults, youth, elders, their families, prospective river trip monitors, and selected scientists (invited) with whom SPC has interacted over the years through the AMP.

The Colorado River Ecosystem Science Symposium, October 2005

Participation in science conferences is a way for stakeholders to keep abreast of research and monitoring results alongside changes in the policies and direction of the GCDAMP. It also provides a venue for keeping Southern Paiute interests alive in the minds of scientists and policy makers. At the biannual Science Symposia GCMRC, scientists share data collected over the previous years in a formal setting. As they do in other AMP meetings, scientists are expected to summarize data in 15-minute talks, usually using Powerpoint presentations. Scientists also participate in poster sessions and public panels for discussion of their data and results. Though the SPC program involves more than science (see Chapters Two and Four), Science Symposia are a primary venue for sharing information with AMP stakeholders and other interested parties. For this reason, in 2005 the SPC Coordinator decided to participate in the Symposium along with two SPC river trip monitors. Because this Summary report centers on SPC involvement in the AMP, SPC representatives' interactions with other participants at the Science Symposium are included in this section of analysis.

Participant Interactions at the Science Symposium

The 2005 meeting took place at the Fiesta Inn Resort, a mid- to high-end small resort in Tempe, Arizona. Meeting activities occurred in a formal conference room equipped with a public address system and podium and technologies for Powerpoint presentations, and continuously well-stocked with an array of snacks and drinks. "The State of the Colorado River Ecosystem in

Grand Canyon" (SCORE report; Gloss et al. 2005) and other technical reports and materials covered large tables at the back of the conference room. Technical posters for the evening Poster Session nearly covered the walls, depicting multiple monitoring and research methods and results. People entered and exited the room freely during and between presentations.

The meeting represented a coalescence of past efforts to understand the often-bemoaned "complexity" of the system within which the scientists work. The 2005 meeting saw many of the same stakeholders who attend TWG and AMWG meetings, and many were scientists who continue to conduct research in the Colorado River Corridor. It was clear from the familiarity of interactions that the members of this group knew each other well, and exuberant greetings and smiles all contributed to a celebratory atmosphere. For the three Southern Paiutes who had been involved with this program for years, the event elicited laughter and responses such as "Here we go again," referencing the specific kinds of technical data that they knew would be presented at the venue. But SPC members were recognized and well received by several of the GCDAMP participants, and the atmosphere was positive and upbeat from the beginning.

Early in the program, the Western Area Power Administration (WAPA, U.S. Department of Energy) representative presented revenue data from GCD, emphasizing that the dam was a part of the Bureau of Reclamation's greater task of "saving the West." He went on to note that it was built to reclaim the deserts of the U.S. southwest and noted that WAPA works toward "bettering the lives of our country in general," something that "most of us often lose sight of." During breaks and after the meeting, the three SPC tribal members expressed frustration with hearing in these kinds of descriptions the "same old things" again at meetings. The conclusion that more study is required was a common finding of specific projects, and was frequently noted regarding the state of scientific work in the Colorado River Corridor in general. After several more technical presentations of data collected during research, the director of GCMRC activities reported a startling conclusion of an evaluation of how scientists can predict what will happen to various resources under different flood regimes. It was clear from the exclamations and "guffaws" in the room that his conclusions shocked most of the crowd—to date, according to statistical calculations summarized in a table, the GCDAMP had achieved the same results through adaptive management as it would have achieved by "rolling dice."

The presenter quickly asked the now-noisy audience, "Does this mean that Adaptive Management was failure? NO!!!" He claimed that important data have been gathered through AMP-directed work, and made another reference to the immense scale and "complexity" of the system. He continued to emphasize the decades-long life spans of some animals, and the thousands of years of natural history against which GCDAMP scientists' 10-year presence pales in comparison. He concluded by noting that there are many gaps in knowledge and that a significant outstanding research question remains: "How do differing flow regimes affect archaeological sites?" There was no answer from the audience.

In the day's closing Panel Discussion—wherein scientists representing recreation, sediment, hydrology, cultural resources, and biology responded to questions from the audience—a director in the GCDAMP closed with the admission that the program is not perfect, given the conditions under which it has to work. But he also made an appeal to the AMP as the best model, in spite of its flaws. A member of the audience asked the Panel about deteriorating beaches and uncertain

sediment flows, and a recreation expert responded with a statement about the AMP's inefficiency, its often conflicting goals, and the unequal representation for AMP stakeholders. No one responded to his statements. Another participant suggested that the AMP stop hiding behind the "complexity" excuse for not knowing what's going on, and respond to it. A few scientists replied that that would be a "dangerous" tack, with too many assumptions that are uncomfortable to scientists who want to be sure of what they say, especially in front of groups such as this one. Laughter followed this comment.

The evening poster session concluded the first day of the Symposium, and more than ten of the estimated 30 people in attendance paused at length to read the SPC poster. In collaboration with UA technical consultants, representatives from the SPC had prepared its poster to summarize ten years of SPC participation in the GCDAMP, for presentation at the 2005 Science Symposium and at other venues as well. Through a graph, table, matched photographs, narratives of monitoring recommendations and the history of the program, and the mechanisms for training, education, and knowledge transfer from elders to youth, the poster depicts plant density and beach changes alongside Southern Paiute responses to those changes. Although no one mentioned it directly, it was evident from comparisons with other posters in the room—which made use of technical depictions of collected data, creative graphics, and extensive citations—that the SPC poster was different in ways that were significant to viewers. Most asked questions of the SPC representatives and showed surprise at what had been accomplished in the program. Other questions referred to the monitoring and training aspects of the program, which the SPC representatives emphasized most in their explanations. Questions about the evident changes brought out by photo-matching techniques and about youth involvement in the program were also common.

The next day of the Symposium, a key figure in early adaptive management work addressed the group. He said he would like to comment because "something's gotten lost here." Silence quickly filled the room until the man went on to explain that originally, adaptive management was supposed to use scientific methods to feed back into and evaluate *policy*, through testing and comparing actions taken on an ecosystem. But he also praised scientists for what they had learned over the last ten years of GCDAMP work, noting that they "should be proud" of what they had accomplished thus far. He further explained that "command and control" approaches that do not learn often treat change as a threat, and the AMP might be falling into the same fear-laden trap that confuses and paralyzes both managers and scientists. In his opinion, adaptive management to this point had been running on "serendipitous results" rather than a solidly-planned experimental design—aligning closely with a manager's earlier comments that data collected through the AMP to date was the equivalent of a roll of the dice. He concluded that adaptive managers need to beware of a typical "adaptive management pathology"—wherein management systems focus too closely on what they can do successfully, at the expense of the ecosystem as a whole. The worst case result, according to him, occurs when such groups give themselves credit for demonstrating small, easily measured successes, while the whole of the system is slowly, imperceptibly "getting screwed up." According to this expert, the danger is that scientists and managers are bent so closely over their desks that they "don't realize the building is on fire"—a small fire perhaps, but destructive all the same because they won't know the damage until it has been done.

Confusion over the roles and responsibilities of scientists and managers, reticence in the face of uncertainty, hesitation when the status quo is challenged, and uncertainty about roles and responsibilities and expectations of the GCDAMP appear repeatedly in AMP meetings, in spite of the large amount of data collected over the past ten years of research and monitoring. As shown throughout this report, stakeholders who work within a complex system and program designed to meet that complexity, are likely to disagree with one another even though they are considering the same place. The next section examines the dynamics of an SPC meeting in which the results of river monitoring and research over the past ten years are shared. The meeting brings into relief some of the similarities and differences between the ways work gets done in meetings in and around Phoenix, and among scientists primarily, and how it gets done through the Southern Paiute Consortium.

Participant Interaction at the Southern Paiute Consortium River Trip Reunion

Each SPC river trip reaffirms that Southern Paiutes consider themselves responsible and active participants in helping to maintain the health of the river ecosystem (Chapter Three). This responsibility requires simultaneous consideration of the physical and spiritual conditions of so-called resources and people at once. On the 2005 SPC river trip and in the planning meetings that preceded it, for example, serious concerns were expressed about the disrespect shown when alcohol is consumed on the river by some boatmen, the potential visitation effects to sites by recreationists and monitors, and the importance of consistent monitoring records.

The April 2007 Ten-Year River Trip Reunion sought to bring together past monitors and other adults, youth, and elders who had participated in the SPC's monitoring and education program, or who might in the future. The Reunion was the first of its kind and so was considered a special event by organizers and participants. During planning meetings for this event, participants from the Shivwits and Kaibab bands, including Chairpersons and other officials, spoke about their concerns about the collaboratively written SPC/BARA reports under preparation for review, about the Reunion, and about SPC participation in the program generally. When disagreements occurred, conversation usually continued until some form of compromise was reached, although that compromise was often attended by a joking reference (as in some TWG and AMWG meetings). This turned the conversation to more important matters that the group shared as concerns. When meeting participants needed to depart before a meeting ended, or when they arrived late, the meeting stopped, a brief summary ensued, and words of gratitude and greeting attended the person who had disrupted the meeting activities.

The Ten-Year River Trip Reunion was held at the Shivwits Band Community Building in April 2007, on the Shivwits reservation outside St. George, Utah. Tribal leaders, people who had participated in SPC river monitoring trips and their families, representatives of the BOR and GCMRC, and any interested tribal members were invited. Lunch was provided through collaboration between the Shivwits and Kaibab Bands of Southern Paiutes. Advertising of the Reunion circulated via tribal newsletters, contacts to tribal offices, and in announcements posted in the tribal administration and community buildings. Turnout was expected to be high, but family obligations and other scheduled community events prevented the arrival of 200-300 expected participants, keeping the total throughout the day to a maximum of approximately 60 people at any given time, and 100 people total. The community building room's walls were

covered with photographs of groups, individuals, and places and events from past river trips. Large maps showed both traditional Paiute territories and current reservation boundaries. The SPC 10-Year Monitoring poster used at the Science Symposium and a large cloth backdrop for a Powerpoint slideshow took up large portions of two walls. Projected on the cloth was a running collage of photographs from past river trips, including founders of the program and others who had departed.

Soon the Reunion formally began with an elder's opening prayer with the giving of thanks as its theme. It accounted for our presence safely in the room, for troops fighting overseas, the beautiful day, for our families, for the plants, and for our loved ones. Two of the SPC organizers spoke of the day's agenda for sharing stories, food, and interaction, and the last to speak emphasized the difficulties the Southern Paiutes have had over the years. One concluded that the Southern Paiutes remained in place as a people in spite of these challenges, as does the SPC monitoring program. After the two organizers and a technical consultant described the day's activities and the partnerships that formed through the SPC, the first speaker was one of the founding organizers of the SPC. She emphasized the importance of a person knowing who he or she is, and respecting others and what they share. A description of early involvement in the program followed, beginning with the early GCDEIS work in Las Vegas, in an "imperial plaza conference room" atmosphere that she admitted was somewhat intimidating.

The speaker noted that some tribes were singled out for inclusion in this process because their reservations touched the river, while others whose lands used to include the river were not included. The atmosphere emphasized to her that Southern Paiutes were a small group possibly without much power in these arenas, a feeling that grew stronger when an "entourage" from a much larger tribe came to the meeting "demanding inclusion" in the process. The speaker recalled that another founder of the program said at that time, "We should not doubt ourselves; that's our ancestral land too." She added that the Southern Paiutes were not a "power tribe" like some others, but decisions about these places still affect them because of both ancestral ties and ongoing concerns—even though in Las Vegas they were just "two little Paiute women speaking up for our people." She concluded by describing how the Kaibab Band was determined at the time to provide the resources to take the lead on involvement in the GCDEIS. However, the inter-band group decided a consortium of bands would be strongest, and so the SPC was formed to participate in GCDAMP activities. A small cheer went up from the audience when she noted that the laws governing the resources of the Colorado River Corridor protect the rights of all, with no exceptions for any Federal agency or anyone else. She then described a connection that all people in the room have to the region, and to each other through places.

The room continued to fill with people mingling and greeting as a succession of speakers referenced past trips during which people learned and shared information in significant places. Strong emotions were common in each of the five-minute talks offered by program participants. A few speakers referenced a theme developed on a trip from the early 1990s that was to become a reminder for what the Colorado River and its canyons mean to Southern Paiute people: "Don't be afraid to shake my hand when you see me." The Powerpoint photo collage continued to run on the screen in the background throughout the day. There was a mix of Paiute and English spoken, and many people announced their geographical origins and familial ties before they began to speak. One speaker noted that the monitoring and interactions of people, the Colorado

River, and the Grand Canyon enables them to think about tracing genealogies in different ways, and that just as the Southern Paiutes used to live in the Canyon but no longer do, one doesn't have to live on the reservation to be Paiute. A few others shared river trip observations of animals and plants and human interactions within the Canyon, and another prayer was said before lunch.

The first speaker after lunch was another founding member of the SPC. She emphasized continuance of the Southern Paiute people and of the SPC program in the GCDAMP, which no one thought would last as long as it has. Cheers and laughter followed. She described the human impacts on all kinds of places, the story of a plant collector with whom she shared a river trip, and the results of disrespectful behavior in these places. She concluded by noting that archaeologists and others continue to discover the layered nature of what the Southern Paiutes have always known about themselves, concluding, "That's the fight we always fight, the fight we'll always fight." One SPC monitor described a chance to go on the river and have other meetings with the "big shots" who always asked her and others to give Paiute histories. She noted that these people seemed to have good intentions of collaborating and listening, and said they wanted stories to incorporate into the AMP, but when they all got back to Phoenix, "they forgot all that." She interpreted this to mean that how the officials felt in the Colorado River Corridor was different from how they felt in meetings. On the other hand, as one Southern Paiute said bluntly, "Our story don't change." She finished by reminding the audience that there are many changes that occur in the AMP in short time periods, but the Southern Paiute story and beliefs have always been the same. "A lot of decisions get made from offices," one presenter noted, but the SPC program exists only because of all of the people such as those in the audience that day. Many noted the lack of a distinction between cultural and geographically-defined identities, and the responsibilities this entails: "You're all monitors. You've always been monitors, no matter how old you are." As another put it, "This is who we are. This is what we're supposed to protect."

Without question, all stakeholders in the GCDAMP care about the resources of the Colorado River Corridor, but their methods and goals differ significantly. Presenters at the Science Symposium emphasized uncertainty about roles and responsibilities, the complexity of the ecosystem, and the need to constantly interrogate their own and others' methods and information gathering practices. At the same time, they shared detailed information in a lighthearted atmosphere wherein they ridiculed themselves for their lack of certainty, and argued about what that uncertainty meant and what to do about it. The Southern Paiute meeting shared many of the same features. People made fun of their misunderstandings and confusions about the SPC program and how the river trips worked. They remarked on how much they learned about the defined resources, but also about themselves, and how they may best situate themselves in relation to a place. However, they did not confuse their roles and responsibilities in the Colorado River Corridor. The SPC Reunion presenters emphasized more explicitly that history must be incorporated into considerations about future activities. As was the case at the Science Symposium, people laughed and spoke familiarly and with respect, mixing serious information with lighter observations. While scientists in the Symposium seemed certain about some specifics of the ecosystem, and guarded about what they could conclude, Southern Paiute monitors attempted to combine this perspective with a more overt emphasis on their historical place in the system. This makes certainty already a part of the interaction between Southern

Paiutes and their traditional place. As one presenter at the Reunion put it, “We know who we are and where we are, and where we belong.”

Summary and Discussion

Management structures like the GCDAMP are effective in part because they operate by means of predictable exchanges between individuals with socially-sanctioned qualifications and high familiarity with how to make the structures work. Such means enable certain things to be accomplished, yet at the same time constrain the accomplishments of others. The SPC is attempting to work within the AMP and its established forms and their attendant expectations, rather than the opposite. While some conflict and confusion are understandable and to be expected within such a program, there is little recognition of the constraints that the AMP places on all participants, and how particular constraints affect different stakeholders in different ways. Those which AMP participants emphasized became the subjects of analysis above, and the following discussion will summarize and expand on that analysis.

A GCDAMP stakeholder’s success in aligning with AMP processes requires familiarity with Western science and policymaking. This is a skill developed by some individuals through their experiences in academic institutions and agencies, over the course of many years of study and practice presenting data to groups in established forms. This includes a readiness to argue for one’s point and to vehemently defend a position in what is ideally a democratic forum. To members of a culture raised in such environments, these ways of interacting make the kind of interaction that occur in AMP meetings appear natural. But not all cultures interact according to the same unwritten rules, as indicated by the Southern Paiute River Trip Reunion. When people are called to meetings in Phoenix, or to a university or science center conference room in Flagstaff, they know what to expect, but participants in such meetings also know what *not* to expect. One of these things is that there will not be a great deal of change in the ways the AMP operates.

As outlined in Chapter One, adaptive management depends for success on information-sharing and the willingness of individuals and groups to receive new inputs and to learn from them. Problems now being experienced by the GCDAMP are not new to the program, or to this style of management. Adaptive principles have been applied to numerous ecosystems from arid lands to forests to wetlands worldwide (Meffe et al. 2002). They range from attempts at achieving adaptive dynamics within business organizations (Fulmer 2000), to adaptive models for democratic national governments (Bennis and Slater 1998), a parallel that was referenced at the Science Symposium. Common to each of these approaches is the recognition of the human influences on the systems within which people work, and the difficulties and frustrations that can be expected in any attempt by people to conduct research on systems within which they are implicated, and about which they care a great deal (Graham and Kruger 2002). Yet not all stakeholders in the AMP share the same perception of its history, expectations, processes, or goals, let alone how these could be modified in practice (Gunderson and Holling 2002). The GCDAMP has been operating according to a set of models that have yet to be clearly defined and agreed upon by its diverse representatives, including how individual personalities and general cultural practices influence those models and ideals.

This set of conditions has effects on an ecosystem that exists far from the meeting site, but it also has effects on the stakeholders designated to work with that system. Data for this chapter have explored some of the mechanisms by which alignment with established GCDAMP practices becomes the responsibility of the SPC, and how fulfilling that responsibility among many others has been hampered by AMP processes. For example, the SPC reluctance to speak in AMP-accepted ways puts it at a disadvantage in differently-socialized groups of people who read silence as an indicator of acquiescence or apathy. SPC respondents regularly express their perception that they are held responsible for failed communication and for strained or confusing relationships, an example of which appears in Chapter Five. Confusion over exactly how non-tribal entities are supposed to "work with tribes" remains a problem among stakeholders and represents a source of confusion that has not abated since the original PA was signed and the GCD ROD was issued over ten years ago.

All participants in the GCDAMP, including the SPC, consider the Colorado River Corridor as a "complex system" that they can never know adequately. Frustration and ambiguity concerning identities, roles and responsibilities, and expectations, continue as major effects. What does not get addressed is the way the AMP and the people who comprise it have limited their own ability to respond to such unknowns and contingencies by working within a system that is supposed to adapt, but cannot. The AMP of course functions at some level, and produces results and future work, but at the same time it continuously undermines its potential by allowing confusion and misunderstandings to persist. If a program such as the AMP—ultimately comprised of individual people—cannot accommodate differences that it is not even accustomed to recognizing, there is little hope for change. SPC tribal members are finely tuned to this condition and its effects, but so are participating scientists and managers. References by tribal and non-tribal stakeholders to the "status quo" as an inevitable set of conditions for AMP operations actually undermine stakeholder confidence in adaptive management as a viable means of managing ecosystems and human relationships at once. Ironically the AMP, though predicated on its ability to adapt to changes, is comprised mostly of people who bring a specific and shared set of means and experiences and expectations to their interactions. What is missing for many of these participants, though not necessarily through any failing of their own, is an established means of accommodating alternative inputs, regardless of where they might originate. The best that meeting participants have been able to do with process-questioning comments thus far, for example, is to thank the participant with a note to "follow up" on the comment, after which attention is turned efficiently and authoritatively to a more manageable and predictable concern.

As these processes that comprise the GCDAMP take shape through the actions of individual people, they simultaneously demarcate the boundaries of what is possible in managing an enormously complex set of resources that *includes* those people. Fieldwork for this report points to a common stakeholder perception that AMP processes fail in significant ways, and without anyone understanding the reasons behind the failures. The result is that the AMP may not be functioning with, as the BOR/AMP website hopefully states, "All of the elements…in place for an effective, credible adaptive management effort" (http://www.usbr.gov/uc/rm/amp). This is especially important for the effective participation of a group such as a tribe, which receives all the markers of legitimacy through federal law, and therefore within the AMP, and then finds itself marginalized in practice, its activities always measured according to a single, established grid of expectations based not only on the practices and expectations of western science, but on

the individual people who reproduced them in meetings and within the Colorado River Corridor itself.

The GCDAMP and its Work Groups were created from a model developed in the halcyon days of adaptive management in the late 1970s. The AMP continues to operate on the currency of that promising vision of a new way to manage natural resources. What has never been missing from theory, but nearly always from actual practice, is the useful self-reflexivity that might provide the sought-after data for feedback into the program's own ways of doing business. This is especially evident when different cultures attempt to coordinate over the same space, and according to an established program of activities. The SPC member at the back of the room who asked about being at the table is "heard" by the AMP in one sense, but no one knows how to respond outside established norms. By attending meetings, conducting science on river monitoring trips, and repeating their claims to traditional rights and equal inclusion in the AMP, SPC tribal members exhibit cultural competence and accrue a measure of respect within a specific social environment. These actions and alignments are necessary to some degree if a group hopes to accomplish goals within the program. However, SPC participation in the AMP shows how that competence and respect are always subject to a particular kind of scrutiny and erosion that occurs through those same AMP processes, in which stakeholders either "play the game," or suffer the consequences.

Chapter Four
Southern Paiute Monitor Training, Education, and Public Outreach

Diane Austin and David Seibert

"Then the good thing is coming back from a river trip and hearing people talk about it. They see the work you've done, but I don't take credit for none of it. I throw it back at them, say it's because of everyone." –Southern Paiute leader

The Colorado River Corridor connects Southern Paiutes to both the past and future. To understand and interpret the impacts of the Glen Canyon Dam (GCD) on this region, Southern Paiutes require knowledge of Southern Paiute culture, the places and features within the Colorado River Corridor, and the operations of the Dam. Communicating those impacts to others with the power to minimize or mitigate them requires knowledge of U.S. law and policy; the people and institutions charged with managing the Dam, the Colorado River, and the lands within the Corridor; and the actions of visitors to the Corridor. The SPC education program has been developed to address the needs of Southern Paiutes and those with whom they interact in the Glen Canyon Dam Adaptive Management Program (GCDAMP).

The SPC monitoring program was developed as one aspect of Southern Paiute participation in the GCDAMP to evaluate the direct and indirect effects of GCD on cultural resources, as identified by Southern Paiute consultants within the Colorado River Corridor (see Stoffle, Austin et al. 1995 and Chapter Two of this report). Direct impacts of the Dam include fluctuations in flow, water temperature, sediment flow, and beach deposition and erosion. Indirect impacts include changes in plant and animal populations, visitor behavior, and interactions such as increases in trailing around sites that lead to the formation of gullies and increased erosion.

Purpose and Goals of the Program

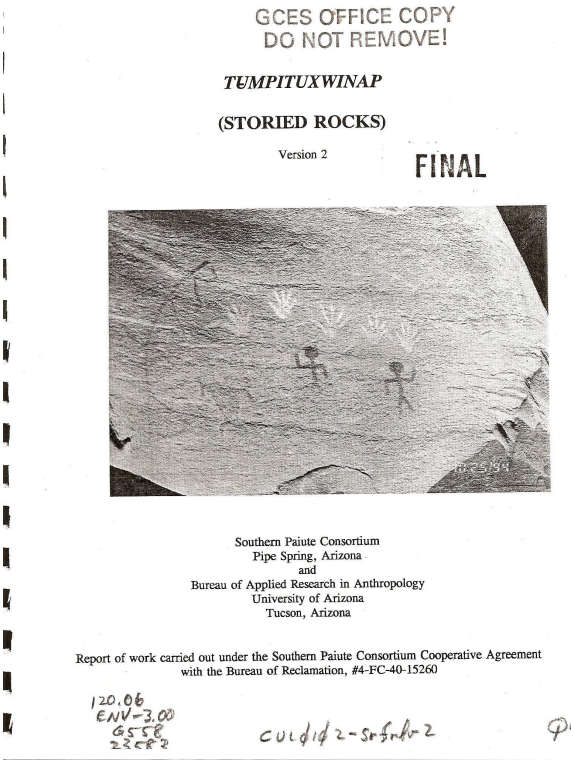
The education component of the Southern Paiute Consortium Colorado River Monitoring and Environmental Education was initially designed to provide education about GCDAMP and the SPC monitoring program to tribal members and youth from the SPC member tribes: the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah (PITU). This component is necessary to inform and educate future tribal leaders and train tribal monitors. The program's primary purpose has been to ensure that Southern Paiutes are informed about the SPC program and that the program will have sufficient support to be continued into the future. To achieve its initial objective, the SPC developed a monitor training program that is implemented annually.

Cultural resources are significant because of their ongoing value to living people; indeed, the entire Grand Canyon is a cultural resource for not only U.S. residents but others around the world as well. In his report on cultural resource compliance related to the effects of GCD operations, King (1999:3) states, "the term 'cultural resource' is taken to mean 'historic property' plus those landscape features and natural resources ascribed cultural value by any or all of the tribes, plus the cultural values that any or all of the tribes perceive in the Grand Canyon and its rivers." An important part of protecting cultural resources is preserving the stories and meanings that explain their place in human society; for groups like the Southern Paiutes with strong oral traditions, preservation of meaning occurs through interaction in the places of

significance. The SPC monitoring program integrates the process of learning about and interacting with cultural resources with an evaluation of their condition.

As the SPC program has evolved and grown, and in response to what Southern Paiutes have observed and experienced both within the Colorado River Corridor and at meetings and conferences, the SPC's educational goal has expanded to include education and outreach about the Colorado River Corridor and Southern Paiute historic and current ties to the region. Significantly, this goal is achieved through the annual presence of Southern Paiutes on the Colorado River during the SPC monitoring and education river trips where Paiute participants regularly interact with recreational visitors on boat trips. This goal is also achieved through outreach programs to schools and universities, civic organizations, and other entities, usually in the form of presentations and responses to outside requests for information or visitation by tribal members. As part of this effort, the SPC has developed and implemented education and outreach programs and products for the member tribes of the SPC and other Southern Paiute tribes, for members of the general public, and for specialized groups such as the Grand Canyon River Guides. These programs and projects provide information about Southern Paiutes, their history, and their perspectives on the Colorado River Corridor, including the importance of the broader cultural landscape that stretches from one rim of the Grand Canyon to the other and far beyond.

As the monitoring and education program has expanded, SPC leaders have had to confront the challenges of determining when, how, and with whom to share information about Southern Paiute culture. A central tension exists between the desire to have places and resources protected and the need to guard access to sensitive information. This tension is reflected in the sentiment of the Southern Paiute participant who commented, "Dealing with the scientists - year after year they want more information." The SPC has developed several documents, databases, and presentations to achieve its objectives. It has also established relationships with organizations and institutions through which it can reach its target audiences. Despite many successful encounters, negative experiences are long remembered. For example, during the early research period, SPC leaders were told that in order to participate in the GCDEIS they had to share information about specific places and their significance with the federal agencies. They were assured that any information they requested be kept confidential would be safeguarded. A couple of years later, a tribal member found in a used bookstore in Phoenix a copy of an SPC report, clearly labeled, "GCES OFFICE COPY DO NOT REMOVE!" (see Figure 4.1). Although that version of the report had been delivered to the GCES with large blank sections where sensitive information had been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Version 2

FINAL

Southern Paiute Consortium
Pipe Spring, Arizona
and
Bureau of Applied Research in Anthropology
University of Arizona
Tucson, Arizona

Report of work carried out under the Southern Paiute Consortium Cooperative Agreement with the Bureau of Reclamation, #4-FC-40-15260

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Figure 4.1. Cover of SPC report found in a used bookstore in Phoenix

removed, the fact that the office copy was on sale in a public bookstore raised concerns about the level of control over information submitted through the program. Likewise, after sharing information with river guides about one place of particular spiritual importance, tribal members recorded the presence of "shrines" that had been constructed there by the next monitoring visit.

The SPC education program is supported with resources from the Bureau of Reclamation (BOR) and the member tribes of the SPC. The Shivwits Band of the Paiute Indian Tribe of Utah also supports and participates in the program through the use of band funds. During 1999 and 2000, the program received support from the Grand Canyon Monitoring and Research Center (GCMRC; see Chapter One). Expert consultants are invited to participate in meetings, workshops, and on river trips to inform tribal members about issues of greatest concern to the Southern Paiutes, including relevant legal, historical, and scientific issues and ongoing research in the Colorado River Corridor. Nevertheless, Southern Paiutes themselves are the principal educators within the program.

Monitor Education and Training in the Southern Paiute Consortium Cultural Resource Monitoring Program

In 1995 the SPC, on behalf of the Kaibab Band of Paiute Indians and the Paiute Indian Tribe of Utah, began the development and implementation of an education and training component of its cultural resource monitoring program within the Colorado River Corridor. The goal of this component is to increase tribal members' capacity to monitor culturally important resources in ways that respect Southern Paiute interests and cultural practices and can provide information to non-Paiutes. Achieving its goal of preparing tribal members to monitor culturally important resources and communicating the results of that monitoring to Southern Paiute leaders and non-Paiutes requires knowledge and skills in several domains. To be effective, Southern Paiute monitors must understand the significance of the Colorado River Corridor in Southern Paiute culture and know how to behave in culturally appropriate ways while there. They also must become familiar with the specific monitoring techniques used by the SPC, with U.S. environmental policy and its requirements, and with the tenets of western science as it relates to research and monitoring being conducted in the Colorado River Corridor.

Monitor training and education occurs through direct participation, accompanied by opportunities for reflection and discussion. Prior to entering the Colorado River Corridor, monitors and monitors-in-training participate in meetings with SPC leaders and with tribal elders and cultural resource specialists. They receive introductory training in methods; information about the goals and expectations of the SPC with regard to monitoring; and copies of materials produced by the SPC. They also visit individually with other tribal members who have participated in the SPC program to learn more about the Colorado River Corridor and its significance in Southern Paiute culture.

When young people will be participating in the annual river trip, to further prepare them for the experience, the workshop participants participate in an overnight camping trip and receive specific information about the upcoming trip such as the sites that are to be monitored, the type of monitoring that will be conducted, and the expectations the SPC has for trip participants. The SPC also presents a "tour" of the SPC multimedia database and archive (see below). Finally, trip

participants are given basic information about what personal belongings they need to pack to be prepared for their trip, and when and how they can access the multimedia database and specific site information. Each youth participant receives a copy of the Public Multimedia Module to review prior to the river trip. The youth also are urged to visit with tribal elders before the trip to help prepare themselves for the experience.

Within the Colorado River Corridor, on an annual SPC river trip, monitors and monitors-in-training are given the opportunity to share information with one another in small and large groups. Each river trip begins with a prayer and presentation by tribal leaders and elders about the importance of the place, the trip, and Southern Paiute participation in the efforts to manage the area and its resources. As described in Chapter Two, the first stop along the river is at a heavily visited beach where monitors can practice the data gathering and recording techniques they will use during the river trip. At this beach, monitors and trainees participate in exercises to practice matching photos within the canyon environment, using a compass, and laying and reading transects. Then, throughout the trip, monitors and monitors-in-training help match and take photographs, install and read transects, and record information on data sheets (see Chapter Two). A monitoring program manager's handbook was designed early in the program to maintain consistency in the training, methodology, goals, and data analysis, helping to ensure that new monitors will be able to assume responsibility for the program as it develops over time.

On the river trip, individuals who are particularly interested in one or another aspect of the monitoring and education program step forward and assume a particular role for a period of time, and then pass that responsibility on to others. The diversity of participants and perspectives on each trip (see Table 4.1) contributes to various forms of information sharing, and learning situations remain dynamic and cumulative as the river trips progress, and as stories about prior years become part of participants' shared experiences.

Table 4.1. River Trip Participants

Year	SPC monitors	SPC Coordinator/Director, Outreach Specialist, Youth Director, etc	UA/BARA Education and Research Specialist	Elders	Monitors-in-training
1996	2	1	2	2	7 youth
1997	2	1	2	2	10 adults
1998	2	1	3	2	11 adults
1999	1	2	3	2	5 youth
2000	3	5	2	1	8 youth
2001	2	3	2	2	11 adults
2002	3	4	2	1	9 youth
2003	3	4	2	1	9 youth
2004	3	3	3	2	8 youth
2005	2	4	2	2	9 adults

Monitor training and education are integrated and ongoing throughout each river trip. In general, at each site some participants help complete formal monitoring tasks and record the condition of the site. Other individuals remain with the elders to listen to stories and information the elders want to share, spend time in quiet reflection, or discuss policy issues. At large and complex sites, the monitors and participants divide into two or more teams to gather all the necessary

information in a timely manner. All participants gather together again at the end of a site visit. Trip participants demonstrate their mastery of the skills needed for monitoring by taking greater responsibility for the monitoring tasks as the trip progresses.

Specific training and education related to monitoring is augmented by the cultural and environmental education necessary to understand the role of monitoring in the GCDAMP, and particularly the use of science in the program. Each year prior to the river trip, working from a five-year plan and addressing particular information needs or issues that have arisen during the previous year, the SPC leaders establish goals and objectives for the trip. These goals and objectives result directly from internal reviews of trips conducted by Southern Paiutes and from participation in the AMWG, TWG, and other events that have occurred during the year. For example, when the AMWG was considering proposals for mechanical trout removal at the Little Colorado River (LCR), leaders of the SPC arranged to meet with fisheries biologists at the LCR so that monitors and other trip participants could hear about and observe firsthand the reasons for the removal effort and the methods to be used. When decisions were being made to adjust water flows due to drought, SPC leaders arranged for special educational lessons and activities associated with the drought and its impacts. Through the SPC program, participants learn about and engage with topics such as traditional Paiute cultural practices, basic scientific methods, archaeology, hydrology, ecology, politics, and environmental education.

When youth are involved in a river trip, special efforts are made to address their specific educational needs. In addition to specialized training in monitoring skills and techniques, the education component of a typical youth-oriented trip includes (1) information about Paiute culture provided by elders and Southern Paiute cultural specialists, (2) learning through participation in Southern Paiute traditional practices, (3) education about how cultural resources along the Colorado River are being protected, including pertinent policies and protective designations, (4) information about policy and management related to Glen Canyon Dam, and (5) activity- and field experiment-based science and environmental education.

The monitoring training and program implementation culminates in a visit to the University of Arizona where monitors and monitors-in-training work alongside researchers from the Bureau of Applied Research in Anthropology (BARA) and the SPC's consulting ethnobotanist to compile data, enter it into electronic databases, scan photos, produce graphs and analyze the monitoring data, and write the SPC's annual report. BARA researchers also provide training and technical assistance with the SPC multimedia database and archive that was developed to preserve information collected by Southern Paiute program participants. The multimedia database was developed to: (1) enhance the archiving of monitoring data, (2) provide a concise and accessible medium for viewing and analyzing the monitoring data, and (3) integrate that information into an expandable, educational format. To keep it up-to-date, in addition to the monitoring data that are entered, participants scan photos and upload stories written by trip participants to the SPC multimedia archive. When appropriate, participants also update and modify the plant reference guide (see below), receive training in Geographic Information Systems (GIS) applications, and review and update the SPC's GIS database.

Cultural Education

The SPC monitoring and education program offers a unique opportunity for Southern Paiutes of all ages to learn about and participate in cultural activities associated with a place that holds tremendous significance in Southern Paiute culture. Due to the steady loss of access to the Colorado River Corridor and its resources (see Stoffle et al. 1994 for full discussion), Southern Paiutes are unable to regularly enter and interact with the region in the manner once common to their ancestors.

The annual river trip is a key component of the cultural education that is central to the SPC program. Going into the Colorado River Corridor, Southern Paiutes enter a place rich with spiritual and cultural meaning. Although there is no way to fully prepare for the transformational experiences that occur, through stories and discussions trip participants gain the information they need to make themselves ready for the trip and get the most out of the experience.

Taking young people into the Colorado River Corridor requires special preparation. Prior to each trip that will involve young participants, the youth are asked to submit a statement explaining why they want to participate in the trip and a letter of support from an elder or relative. This process begins to familiarize young tribal members with the seriousness of a river trip experience, informs them of the expectations others have of them, and gives elders and trip leaders the opportunity to begin familiarizing themselves with the background of potential participants and their individual needs and desires for the experience.

Throughout the river trips, Southern Paiutes are immersed in cultural experiences such as the orientation of nightly camps, the prayers and ceremonies that accompany activities that take place within the corridor, and the visits to particular places. Throughout the trip, the participants learn about the significance of the Colorado River to Southern Paiutes and appropriate behavior within its canyons. Prior to entering any site, the trip leaders gather the participants together and help prepare for any ceremonies or ritual practices that will take place there. Using the model developed in 1996 and based on Southern Paiute patterns of communication, participants gather each evening in a circle to share stories, thoughts, and feelings about the day's experiences and prepare for the following day's work. Details of these discussions are not shared beyond the group; much of the information that is shared among river trip participants centers on their personal lives, how they have been lived, and how they might be lived differently in the future, all influenced by reconnecting with places of spiritual and historic significance within the Colorado River Corridor. Participants also share stories about specific places and the culturally appropriate behavior expected there, including what they know about the places and any past experiences there. The SPC director and educational consultants regularly provide additional information about other groups and historical/political events related to the places, as requested. The evenings typically end with a time for prayer and reflection.

Integrated with cultural education are discussions about how cultural resources along the Colorado River are being protected, and what policies exist and are needed for increasing their protection (see also Science and Environmental Education section below). Central to these are discussions about what types of information can and should be shared with non-Paiutes and how best to share such information. Several resources have been developed to help Southern Paiutes increase their knowledge of cultural resources and cultural resource policy, two of which are described in greater detail below.

Plant Reference Guide

Southern Paiutes have a special relationship to the Colorado River Corridor, and the plants that inhabit the region are vital to Southern Paiute cultural practices and responsibilities. The monitoring program reflects this stewardship role. To assist tribal monitors and other trip participants in carrying out the monitoring activities, and to facilitate learning about the plants that are culturally significant to Southern Paiutes, a plant reference guide was developed in 1997. The guide includes over 125 pages of plants with photos; Paiute, scientific, and common plant names; and information about the significance of the plants in Southern Paiute culture. The guide was created using software that enables users to access each page individually for editing and updating information. Based on participant observation and interview information gathered by Paiute and BARA researchers, the plant guide has been a valuable resource for youth and elder monitors and other participants, providing users with a tool for educating themselves and one another on river trips and outside the Canyons.

Southern Paiute River Guide

Based on recommendations from 1997, the SPC began development of the *Southern Paiute River Guide* for use by monitors and trip participants. The guide includes overview maps of Southern Paiute territory and has a location finder on each page that shows the reader where she or he is located along the river and within the larger territory. This feature was included because of the difficulty of relating one's location along the river to traditional territory boundaries and to important locations on the north rim. The guide also has space for note-taking so participants can record information they wish to remember about places and events that occur on a river excursion. Interest in the guide by boatmen and by scientists and researchers on their own research and monitoring trips in the Colorado River Corridor has generated discussion about producing a public version of the *Southern Paiute River Guide.* At this time there are no resources for such a project, but the guide has meanwhile proven invaluable to river trip participants. They regularly express their satisfaction with a newfound ability to connect their locations and experiences in the Canyons with the day to day experiences—working, playing, hunting, or exploring—that they have beyond their rims.

Science and Environmental Education, with Special Attention to Youth

A key element of the SPC Monitoring and Education Program is the recognition of the need for tribal members and leaders to understand the role and function of science in the GCDAMP. Therefore, the SPC has devoted considerable attention to incorporating science education into its river trips. Because the importance placed on scientific understanding is a result of particular U.S. policies and their interpretation by GCDAMP participants, the SPC education program follows the holistic model of environmental education – bringing together science, policy, and culture.

Preparation for River Trips

Even before entering the Colorado River Corridor, tribal participants are introduced to the SPC monitoring program and the history of Southern Paiute participation in the Glen Canyon Dam Environmental Impact Statement and GCDAMP. Then, during the training workshops and evening discussions that take place on the river trip, one or more of the Southern Paiutes who

were instrumental in the creation of the SPC, or another individual knowledgeable about the program's inception, share additional information about the program and its beginnings, including the development of the Programmatic Agreement for Cultural Resources in the Colorado River Corridor. Throughout the trip, leaders and participants also discuss the ongoing relationship between the Southern Paiute tribes and federal agencies such as the Bureau of Reclamation (BOR) and National Park Service (NPS) regarding the Colorado River Corridor.

The SPC has developed and tried several approaches for preparing youth to participate in science education. For example, SPC leaders have worked with high school principals to develop activities before, during, and after the river trips that, when completed, will qualify the students to receive science credit at their schools. Students have selected topics of study such as ethnobotany or water quality, researched the topics prior to the trip, prepared presentations that they shared with other trip participants on the river trip, and then written summaries of their experiences which they presented to their tribal communities and schoolmates. The particular approach taken each year is determined by the SPC leaders to best match the needs and interests of the participants on that year's river trip.

On River Trips

The Colorado River Corridor is an excellent site for learning about the natural world and for discussing scientific approaches to understanding it. The SPC has developed learning modules related to geology, hydrology, biology, and chemistry. To enrich the educational component of the program and better integrate traditional and scientific knowledge and practices, new activities are regularly added to the science education component (see Stoffle, Austin et al. 1995 for a discussion of its basic principles). For example, in one activity that is conducted at several places along the trip, participants test temperature and water quality in both side streams and the Colorado River to observe the relationships between temperature and dissolved oxygen, mineral content and source of the water, and more. On the last day of the trip, the participants plot the data to create line graphs that illustrate the relationships. Such educational activities, like the monitoring training exercises, are designed to reinforce the development of basic skills in math and science and familiarity with scientific principles and methodology, all in the context of GCD and its impacts on the Colorado River ecosystem. Additional environmental education activities that have been developed for the program include an exercise designed to demonstrate the importance of biodiversity and the potential threats of invasive species, a mock-excavation intended to introduce the concepts of stratigraphy and chronology, wildlife and plant observation and illustration, and a water rights activity to stimulate discussion of the policies and problems regarding water distribution in the Southwest and the role of Native Americans in that process.

Throughout river trips, participants record stops and activities in their river guides and notebooks; these can then become part of the SPC's permanent database, if the participants so desire. Youth and adults are encouraged to participate in group collaborations in which they experiment with creating sketchbooks of their observations, and with writing stories of their experiences. As noted above, in some years students are given the opportunity to receive credit for their science work on trips through ongoing collaborations with local schools, effectively linking their schooling to tribal concerns.

Reflecting on their Experiences

During interviews and meetings conducted as part of this review, Southern Paiutes who had participated in the SPC Monitoring and Education Program shared their thoughts and reflections on the experience, often without prompting. Commenting on their experiences, tribal members noted that "this opportunity is worth a lot" and that the program offers "a way to get us to realize what great things we still have to learn." The significance of the program to the lives of former participants is also apparent in regular reference to "being on the river" at events such as funerals and the tribes' annual Heritage Day and Restoration celebrations and powwows. Given the reflexivity and adaptability that are built into the monitoring, education, and outreach components of the program, it is not surprising that participants have taken advantage of opportunities for personal growth and collective achievement. Over the course of more than ten years of Southern Paiute involvement in the Adaptive Management Program, several Paiute youth have made the transition from youth river trip participant to tribal monitor, while other participants have gone on to positions of responsibility that include Southern Paiute Consortium Coordinator, Tribal Secretary, Tribal Council Member, and Tribal Cultural Resources Director.

The most common themes that emerged during this program review centered on the reconnection of Southern Paiutes with the Colorado River and surrounding lands, with one another, and with their culture. In times of rapid change, youth, adults, and elders are frequently separated due to schooling and employment, and tribal members are routinely exposed to western values and practices. The SPC Monitoring and Education Program provides tribal members with opportunities to spend time together in a place of high cultural significance conducting ceremonies and visiting and evaluating the condition of sites that play a major role in Southern Paiutes' understanding of themselves and their relationship to others. These places have been significantly altered by the existence and operations of Glen Canyon Dam, and the SPC program provides a forum for tribal members to discuss strategies for protecting cultural resources and preserving their significance for Southern Paiute individuals and communities. Southern Paiute river trip participants expressed deep gratitude for being able to participate in the program and noted especially the importance of bringing youth and elders together in the same experience over an extended time. As several individuals noted, the river trip provides participants with an opportunity to meet people from other bands and to "see a different side" of the youth. They spoke both of the seriousness of the journey into the Grand Canyon, using words such as "responsibility" and "duty" to describe their participation, and also of the joy they experienced, referring to the trip as an "inspiration" and as both "very educational and fun."

Southern Paiutes who participated in meetings, interviews, and discussions noted the value of specific experiences such as learning the Paiute names for places throughout the Colorado River Corridor, the songs associated with particular places, and information about the richness of the flora and fauna living there. They commented that their physical presence on the river enabled them to connect stories and places. Several shared that they recognized a newfound importance of prayer, of gathering together at important sites, and of participating in the talking circle. In addition, participants spoke of the value of learning firsthand about the history and dynamics of Glen Canyon Dam, site sensitivity, and the impacts of visitation at those sites. They also talked about the need to learn about and maintain positive relationships with river guides and tourists on river trips, even though their values and perspectives differ.

Education of Other Southern Paiute Tribal Members

As evidenced by the SPC's decision to establish the Monitoring and Education Program and the development and use of the Plant and River Guides, education is an important component of the SPC program. Southern Paiutes who have participated in the program have learned much about their heritage, the Colorado River Corridor and Grand Canyon, cultural resource policy and management, and themselves; that is, they have consistently shown that the program enables them to consider and incorporate into their lives what it means to maintain connections between the Colorado River Corridor and their identities and lives when they are not actually in the Canyon environment.

A valuable body of information now exists on the cultural significance of the Colorado River Corridor to the Southern Paiute people, including cultural uses of specific places and of native plants and minerals. The Colorado River monitoring and education program has served as an invaluable opportunity for Paiute heritage to be discussed, recorded, and preserved for future generations of Southern Paiute people.

Despite the importance to Southern Paiutes of being part of a SPC river trip, due to limited seats on the boats and the challenges of preparing for and participating in a trip, most Southern Paiutes will experience at most one such trip in their lifetime. Consequently, one of the most important features of the intra-cultural exchange that occurs among Southern Paiute people has been the transmission of knowledge from river trip participants to those individuals who will never be able to experience a river trip – because of health, time commitments, or other reasons – or will never make more than one river trip. River trip participants make special presentations on reservations and in community meetings and emphasize the importance to all tribal members of receiving information about the conditions of cultural resources in the Corridor, and of maintaining regular visitation to the region and specific sites within it. This ongoing knowledge transfer also occurs among and within Paiute bands, increasing communication among and inclusion of tribal members separated by great distances and occupied with local responsibilities such as jobs and family demands.

Each year the SPC prepares information pertaining to its program and the annual river trip for presentation to its member tribes, resulting in as many as seven presentations (PITU has a general council and each of the five bands which constitute the tribe has its own council). The tribes are provided with information pertaining to the trip, work that will be accomplished that year, and the availability of space for tribal members to represent each of the bands. When requested, the SPC staff provides additional information to the tribes to allow them to suggest topics for inclusion in the program.

As noted above, a trip into the Colorado River Corridor is a significant experience for Southern Paiutes and one that requires considerable preparation; youth do not become eligible until they have reached a level of physical, social, and spiritual maturity. Both the Kaibab Band of Paiute Indians and the Shivwits Band of Paiutes have developed on-reservation programs for younger children that are intended to prepare the youth for eventual participation in the SPC monitoring and education program. At Kaibab, environmental and cultural program leaders have effectively integrated their programs with the SPC program, including visits to places within Marble and

Grand Canyon and their watersheds and tributaries for education and experimentation. The activities orient youth to their environment and bring together Southern Paiute and western scientific viewpoints and practices, while serving as preparatory programs for youth too young to undergo a river trip experience.

Outreach to Non-Tribal Visitors to the Colorado River Corridor

Southern Paiutes are keenly aware that they are few in number when compared to the many visitors – scientists, managers, and tourists – who enter the Colorado River Corridor each year. Though some tribal members argue that they cannot hope to influence the decisions and actions of so many others and therefore should stay to themselves, the majority of those who have participated in the SPC programs support continued efforts to interact with and educate others about their tribes, culture, and ties to the region. Still, those who have attempted to reach out to others express dissatisfaction and even misgivings when describing their efforts. According to one SPC representative, "I went down three times to give the presentations at the boatmen's trainings. [The importance of one site] was published in the *Boatman's Quarterly* – […] did that a while back. Even though we go on these boat trips and we tell them certain things, they exploit it more." The remainder of this section describes the outreach efforts of the SPC related to the Colorado River Corridor and ends with recommendations of tribal members who have participated in the SPC program.

AMWG and TWG Members

In addition to attending meetings and conferences of the AMWG and TWG (see Chapter Three), SPC leaders and representatives have participated in river trips; given presentations at TWG meetings and special events, and participated in special sessions such as the April 2005 Tribal Workshop with the aim of improving communication between the SPC and its member tribes and other members of the TWG and AMWG. Though SPC representatives noted that they felt these interactions were necessary, they also observed that these activities have generally failed to make much difference in their relationships with others. Reflecting on participation in a river trip for AMWG members during which tribal representatives provided information to the other workgroup members and scientists about their relationships to the Colorado River and concerns about the operations of GCD, one SPC representative commented, "Each tribe gave the history on a certain part of the Canyon related to their tribe. So we were hoping – they even said this themselves – when we were on the river everyone was getting along, more in agreement, listening to the tribes on their concerns. But when we got back to the table it was like they forgot all that and it was only money again… We brought up to them that we said prayers every morning before getting on the river. We took turns saying prayers. They went along with that. We told them they could come stand with us or not, whatever their belief is. Most of them did, a few did not."

Efforts to get separate tribes to combine their monitoring programs and river trips or to integrate their efforts with those of scientists and other groups have been unsuccessful. An SPC leader noted, "They want you to piggyback with other scientists. The tribes told them each tribe is different, have their own sites. We felt their sensitive areas, they wouldn't respect our beliefs.

They would do things we wouldn't do, like ripping plants from the ground. And they don't stop where we stop."

Others

The presence of Southern Paiutes on the Colorado River during river trips puts them into contact with recreational and other visitors on a regular basis. At times, tribal participants are approached by boatmen from commercial river trips and asked to speak to their clients about the SPC program, presumably to add value to the experiences they are providing. The SPC Coordinator often gives a brief presentation about the Southern Paiute ties to the Colorado River Corridor and the SPC monitoring program, sometimes specifically addressing issues such as taking care to protect archaeological sites and minimize trailing. In addition to this type of formal presentation, while they are monitoring, participants share general information about their activities with commercial river guides and people on private trips. In general, though those interactions are sometimes difficult because of the lack of knowledge and awareness of Native Americans in general and particularly of the differences between Southern Paiutes and other Native Americans, most participants support the efforts to interact with and educate visitors about their tribes, their culture, their connections to the Colorado River Corridor, and the impacts of GCD on all of these. When talking about their interactions with others, one tribal participant noted that they asked "good questions" of the Southern Paiutes. Others specifically commented that the river guides had asked them what they should tell their clients about places of cultural significance. These opportunities help the SPC achieve its goals of educating others about Southern Paiute perspectives, and have generally been very well received by the river guides and their clients.

Because visitors impact sites often due to ignorance, the SPC has incorporated visitor observations in its monitoring program, allowing its leaders and monitors to gain a better understanding of the types of impacts that are occurring and potential efforts to mitigate them. Such observations also make it possible to evaluate the effectiveness of the education program. Recreational visitors generally lack an understanding of cultural resources and what they mean to Southern Paiute culture, so in addition to the efforts that take place during SPC river trips, the SPC has consistently recommended that a visitor and river guide education program be developed and implemented by the SPC, in conjunction with the NPS and the GCMRC if possible. Though coordination among these entities has been limited to date, the SPC has taken steps to work directly with river guides, as described below.

River Guide Training

Because of the importance of commercial river guides in the education of visitors to the Colorado River, SPC Coordinators, tribal monitors, and Kaibab Tribal administrators have participated in the Grand Canyon River Guides training seminar to provide information to the river guides about Southern Paiute traditional lands, their perspectives on the Grand Canyon and Colorado River Corridor, tribal expectations of visitors to the Canyon, and tribal concerns about the impacts of GCD and of visitors to places along the river. They also inform the guides of the development of the Programmatic Agreement for Cultural Resources and tribal participation in the GCDAMP. In 1994, in an effort to reach a wider audience, Angelita Bulletts contributed an

article to the *Glen Canyon Environmental Studies Update* on the importance of the Colorado River and its canyons to the Southern Paiutes (Bulletts 1994). In seeking ways to enhance their program continues in the face of declining resources, SPC representatives and BARA researchers have contacted boat companies to learn about potential collaboration; those with whom they have communicated indicate that operators are excited about the possibility of having Southern Paiute involvement in their trips, for the education of both their boatmen and their river trip clients.

Public Education Multimedia Module

In another effort to reach a wider audience about Southern Paiutes and their relationship to the Colorado River Corridor and Grand Canyon, the SPC worked with BARA researchers to develop a multimedia module for the general public. Because of the sensitive nature of the information in the SPC's multimedia database, that database is not available to the public. Consequently, provisions were made for the creation of the Southern Paiute Consortium Public Module (hereafter the Public Multimedia Module).

A multimedia module is simply a way of presenting a wide array of information through computer technology. The first step in the creation of a multimedia module is to envision a "target user." Through this process, decisions are made as to what information is to be presented, and how that information should be displayed. For the Public Multimedia Module, the target user group is diverse. It includes the Paiute people, off-reservation relatives and acquaintances, students at all levels, visitors to the cultural center, and the public at large.

The construction of the Public Multimedia Module relied on the same background material as the Multimedia Database. However, the creation of the Public Multimedia Module required the removal of sensitive information such as the specific instructions for the use of traditional plants, references to the precise location of sacred sites, and the identities of the many Paiute people involved in the project.

The Public Multimedia Module also required an increased educational focus. The Multimedia Database was created by the Southern Paiute Consortium for Paiute use, and because of this, the typical user was already familiar with both the monitoring program and with Paiute culture. The same cannot be said for the target user of the Public Multimedia Module—little previous knowledge of either the monitoring program or Paiute culture can be expected. For this reason, significant multimedia resources were devoted to the introduction, definition, and explanation of the monitoring program in the context of Paiute culture. The shift in the typical user for the Public Multimedia Module, then, is reflected in the structure of the module: while much of the information (i.e. text, photos, sound) is drawn from the Multimedia Database, it is used differently. Moreover, these cultural resource sections are intermingled with new sections created to introduce the user to Paiute culture and Paiute ways.

Copies of the Module are on sale by the Zion National History Association in the Pipe Springs National Monument gift shop and at the Red Cliffs Convenience Store at Pipe Spring, Arizona. The Module has also been used in college courses such as the Native Peoples of the Southwest

course at the University of Arizona, and an introductory course at Pima Community College in Tucson.

Recommendations for Additional Outreach Efforts

During interviews and meetings conducted for this assessment, Southern Paiutes who have participated in the SPC Monitoring and Education Program offered specific recommendations for improving the program, and particularly outreach to non-Indians who visit the Colorado River Corridor or have management responsibilities there. They recommended producing books and pamphlets to let others know about the Paiutes, their history, and their ongoing ties to the region. One participant observed, "The guests should know that Paiutes were a very significant part of this canyon. How brilliant the Paiutes were and still are. How they lived in a harsh environment, developed housing and agriculture…mentally and physically designed to feed off the river or from side canyons and of course the list goes on." Several emphasized specifically the need to distinguish Southern Paiutes and their culture from that of other tribes that are generally associated with the Colorado River and its canyons. One individual noted that the region is "Paiute and not your common Navajo area type thing," while another commented, "These people just assume since they see one [Navajo] they think we're all Navajo, but it's not just a situation of 'seen one seen them all.'"

Of general concern was the need for a balance between sharing information in the interest of protecting sites without attracting more visitors and potential damage. The participants linked monitoring and outreach efforts, as did the participant who stated, "Some areas need to be monitored so that the guests are also aware of sacred places that the Paiute people use for ceremonial and traditional purposes."

Summary and Conclusions

The SPC education and outreach efforts have succeeded in reaching Southern Paiutes and others with information about Southern Paiute culture, ties to the Colorado River Corridor, and impacts of GCD on both. Critical elements of the SPC program are: (1) active participation of tribal elders who accompany Southern Paiute participants to culturally significant sites and share traditional knowledge with them; (2) active participation of tribal monitors who work directly with tribal participants to complete activities and share information about the cultural significance of the sites; (3) a training program specifically tailored to the needs of Southern Paiute monitors-in-training; (4) active participation of educational and environmental specialists with experience in environmental/outdoor education and knowledge of western science and environmental policy and the cultural, social, and political history of the area; and (5) relevant and useful discussion of contemporary issues of relevance to the Paiute people and their efforts to protect the Colorado River Corridor and Grand Canyon. Each of these elements enhances the entire program so program participants receive a comprehensive education about the region impacted by Glen Canyon Dam.

Ongoing advances in technology and mechanisms for archiving data and making it accessible pose challenges for the SPC. As one representative noted, "I guess what I would like to see – as technology is changing – we need more people in there to keep our database kept up with the

technology part of it. More on preserving what we have, data collecting, how things have changed over the years. When people come to [the SPC] office, make it easier for them to see the change. And to actually see how many are really into this." Software programs now exist that would make it easier to use and maintain the SPC multimedia modules, and to make public information accessible via the internet. Any significant change in the SPC databases and educational and outreach materials will require an investment of time and resources, something not available under the existing annual allocation the SPC receives from the BOR.

In addition to its efforts to provide information to Southern Paiutes, the SPC has expanded its program to include education and outreach to non-Paiutes who visit the Colorado River Corridor and are responsible for the operations of GCD. In this, it has been less successful, as evidenced by continued misunderstanding of the Southern Paiutes, their ties to the region, and their reasons for being concerned about the impacts of GCD. The turnover of SPC personnel and personnel within the GCMRC and BOR, pressures to narrow the focus of the GCDAMP, and large volumes of material associated with other aspects of the GCDAMP have all affected the time and resources available for education and outreach efforts. Nevertheless, Southern Paiute participants continue to see these as very important to their ability to participate effectively in the GCDAMP and to mitigate the negative impacts of GCD on the Colorado River Corridor.

Chapter Five
The Terrestrial Ecosystem Program: A Case Study of Tribal Involvement in the GCDAMP

Diane Austin

As described in Chapters One through Four, since the inception of Glen Canyon Dam Adaptive Management Program (GCDAMP), the Southern Paiute Consortium (SPC) has participated in meetings, conferences, river trips, and other activities with scientists, agency personnel, tribal representatives, and other participants. Despite the good intentions of many, these interactions have often led to frustration on the part of all parties involved. In order to better understand the intent, nature, and challenges of such interactions, and in the hopes that the lessons learned from an in-depth look at one such program would generate findings that are relevant to other programs and interactions as well, SPC program leaders and researchers from the University of Arizona's Bureau of Applied Research in Anthropology (BARA) conducted a case-study analysis of one program. After reviewing documents related to the GCDAMP and talking with current and former SPC and other tribal leaders, the research team selected the Terrestrial Ecosystem Program (TEP) for review. The analysis utilizes information on SPC involvement in the TEP from the very beginning of the program through the issuance of the final program report (Kearsley, Cobb et al. 2006). Data were gathered from written documents and materials (including websites) of the SPC, the Kaibab Band of Paiute Indians, other participating tribes, and the Grand Canyon Monitoring and Research Center (GCMRC), as well as from phone and meeting notes taken during the program's operation. In addition, notes from interviews with former SPC directors, tribal leaders and key administrative staff, and scientists and staff of the GCMRC who were directly involved in the program were incorporated into the analysis. Unless otherwise noted, quotations used in this chapter were drawn directly from notes taken during meetings and interviews.

Background on the Terrestrial Ecosystem Program

Since the earliest days of the Glen Canyon Environmental Studies (GCES) program[7] and continuing through the GCD Environmental Impact Statement (GCDEIS), many individuals and groups have expressed concerns about the impact of Glen Canyon Dam (GCD) on the terrestrial riparian corridor below the dam. Plant communities of the pre-dam old high water zone (OHWZ) are readily distinguished from those of the post-dam new high water zone (NHWZ). The OHWZ is generally in decline due to the *existence* of the dam because it no longer receives water or nutrient-rich sediments from pre-dam Colorado River floods (Anderson and Ruffner 1987 and Bureau of Reclamation 1995, cited in Kearsley, Lightfoot et al. 2006). The NHWZ includes introduced species such as tamarisk and camelthorn and is affected due to the *operations* of the dam (Stevens et al. 1995 and Kearsley and Ayers 1996, 1999a, 1999b, 1999c, cited in Kearsley, Lightfoot et al. 2006). The impacts of changes in river flow and riparian vegetation on animals are not well understood.

[7] This program was the precursor to the GCMRC. It was established in 1983 to conduct scientific studies of the impacts of the Glen Canyon Dam on the Colorado River ecosystem.

The TEP was developed to address information gaps and to gather data that could be included in computer models that have been developed to predict the physical effects of dam operations on the Colorado River Corridor. The GCMRC established cooperative agreements with Northern Arizona University and Helen Yard Consulting to carry out the TEP, and it retained a significant role throughout.[8] According to the final report issued at the end of its first three years, the program had six primary research objectives (Kearsley, Lightfoot et al. 2006: 5-6):

> 1) To create a powerful sampling design with probability-based site selection, which will allow system-wide inferences to be made from monitoring data.
> 2) To integrate sampling of terrestrial biotic resources in ways that are based on our understanding of how hydrographs of regulated rivers impact terrestrial resources.
> 3) To monitor terrestrial resources in ways which allow their inclusion in current conceptual and analytic computer models relating dam operations to physical processes.
> 4) To expand on integrated investigations currently underway regarding interaction among vegetation structure, arthropod abundance, and breeding bird populations in the Colorado River Corridor.
> 5) To survey terrestrial faunal components about which little is known beyond scattered collection records, including terrestrial arthropods, herpetofauna, and small mammals.
> 6) To incorporate Tribal perspectives and information in all phases of monitoring through consultations, shared sampling, training and reciprocal exchanges of information.

Clearly, the program was vast in scope. It was based on the assumption that it is possible to generalize from specific sites to the entire system, a belief that models can adequately represent conditions in the riparian corridor and are appropriate even in a system as complex as the Colorado River ecosystem, and the notion that tribal perspectives can be integrated into a framework defined and directed by tenets of western science. These goals evolved along with the program; for example, in the solicitation for proposals for the TEP, the Principal Investigators were asked to include tribal participants in the field work activities and the interpretation of project data, though the exact roles of the tribal participants were not explicitly defined at the time.

A less well-articulated but nonetheless extant goal of the TEP was the integration of monitoring programs in order to eliminate inconsistencies and duplication of effort and to reduce both the costs of operating such programs and the number of river trips being conducted. Data integration, to bring together data from many disparate research and monitoring efforts in the Colorado River Corridor, has been an expressed goal of at least some GCDAMP participants since before the AMP was in place. Numerous meetings have been held in Flagstaff, at the Grand Canyon's north rim, and even within the Colorado River Corridor since at least 1995 with this aim. As one example, the SPC's monitoring program initially included GCES surveyors because GCES program leaders at the time had determined that data integration would occur through use of a Geographic Information System (GIS; see Chapter One, Figure 1.3). In the following years, because the effort was not very successful and the surveyors were no longer available, the SPC restructured its monitoring program so that it did not rely on surveyors.

[8]According to a GCMRC report entitled, "Terrestrial Ecosystem Activities," the budget included funds to cover the costs of a total of 30 percent of the salaries of two GCMRC program managers.

Seeking Tribal Involvement: Who and Why

Almost since the inception of the tribal monitoring programs, at least some individuals within the BOR sought to limit the scope of tribal monitoring to include only archaeological sites, define who could participate in tribal programs to include only tribal members, and eliminate what was perceived as duplication of data being gathered by those programs. The TEP was recognized by some as an opportunity to integrate the tribal monitoring programs into those being developed by scientists. Those individuals interpreted the recommendations of several GCMRC and GCDAMP reviews that tribal participation be incorporated into other AMP programs as support for their perspectives. For example, in 2000 a Protocol Evaluation Panel (PEP) convened by the GCMRC and supported by the BOR produced a Cultural Resource Program Assessment that concluded there was inadequate integration of the various GCMRC programs. "Tribal representatives and the members of the Subpanel noted that it appeared that the research carried out by one aspect of the program—terrestrial biology, for example—was done without integrating adequately another, related subdiscipline such as ethnobotany" (PEP 2000: 37) The assessment recommended that "GCMRC should develop and implement a Five-Year Plan that integrates all GCMRC programs into a truly interdisciplinary research program, rather than continuing to operate as four single programs as is currently the situation" (PEP 2000: 37).

Though GCMRC staff initially vascillated on where the cultural, especially ethnobotanical, components of the tribal programs should be, after the PEP report was issued they tended to take the position of the BOR. The effort to eliminate separate tribal monitoring programs was strongly resisted by the SPC and Hualapai Tribe, so at first the idea of having a Native American perspective incorporated within the TEP was viewed as a possible solution to the impasse. During an interview conducted for this review, one GCMRC scientist interpreted the PEP findings as follows: "Terrestrial recommendations were to expand the sampling environment and to at the same time integrate tribal concerns and a more holistic approach that included insects and animals along with the plants." The 'charge' for GCMRC was to include tribal perspectives in this work." However, given the GCMRC's ability to deal with only "credible, objective scientific information" (see Chapters One and Three) and the specific need for numeric data for the computer models, without a clear idea of what was meant by tribal perspectives, the goal proved to be unachievable.

To further confound matters, despite the more general wording of Goal 6, because data integration was a principal goal of the TEP, only tribes with monitoring programs in the Colorado River Corridor were included in the program. The Hopi and Hualapai Tribes and the SPC were the only tribal groups with monitoring programs at the time the TEP was developed, and they were informed that they would receive funding if they would develop a proposal to work with the GCMRC to integrate their monitoring efforts into the larger TEP. Eventually, all three groups submitted proposals and entered into agreements with the GCMRC to participate in the program. Tribes that had not developed monitoring programs were not included in the TEP but were later invited to evaluate the program's final product. At that time, the Pueblo of Zuni prepared a written report expressing dissatisfaction with the approach used to gain tribal input and the failure to incorporate the tribal perspectives of even the tribes that had been involved (Murrell and Seowtewa 2006).

The SPC attempted to respond to the GCMRC's request that it participate in the TEP. During the proposal development phase, significant problems arose that made it clear that the GCMRC staff had very limited understanding of the SPC, its program, or its goals. After several interactions with the program organizers, the SPC Coordinator was unable to determine how the SPC could effectively participate in the TEP and sought assistance from the University of Arizona. On behalf of the SPC, I contacted the GCMRC to request additional information about the goals of the TEP and the GCMRC's expectations for tribal participation. The GCMRC program manager requested that tribal representatives participate on the TEP river trips and provide a "holistic" assessment of the condition of each site (phone notes). Our discussion of approaches to site and resource assessment yielded no additional information other than that the tribal members were expected to be able to evaluate a site holistically and determine if the conditions were "positive" or "negative."

Another issue of concern to the SPC was whether the sites to be visited were those that the SPC was already monitoring. One of the TEP scientists agreed to send the list of sites to the SPC Coordinator, and the Coordinator and I noted that none of the sites, which were selected somewhat at random, [9] were being monitored by the SPC. The SPC informed the GCMRC of this but was told nevertheless that the goal of the program was to integrate all the monitoring programs; the SPC interpreted the message to mean that failure to participate would put its entire monitoring program – even the elements that were focused on non-biological features – at risk.

In 2001, the SPC Coordinator attended meetings at Northern Arizona University in Flagstaff to discuss the TEP and how it would operate. Following those meetings and several phone conversations, the SPC coordinator concluded that SPC participation in the TEP would help ensure Tribal participation in the program, provide an opportunity for learning about the program and the scientific methodologies employed, and provide an opportunity to offer input on the Southern Paiute perspective on the TEP. The SPC submitted a proposal to the GCMRC in 2001 with three goals:

1. Participate in at least one river trip to gain a better understanding of how data are collected in the terrestrial ecosystem monitoring program. Visit some of those sites during the Southern Paiute annual monitoring trip to discuss the methods and provide a tribal perspective on the site conditions.

[9] As noted by the TEP scientists, "A preferred approach [to site selection] is to develop a probabilistic randomized sampling scheme as recommended by Urquhart et al. (2000) based on a GIS vegetation base map. Unfortunately, the acquisition of imagery and development of a vegetation base map for the river corridor did not begin until May 2002, and it was not available for this pilot effort… In the absence of a GIS base map for sample site selection, criteria used to select Terrestrial Ecosystem Monitoring (TEM) sample sites were 1.) To establish integrated sites within most geomorphic reaches, as was logistic ally feasible. The location of the individual TEM sites had to be such that oar boats could travel downstream from one site to the next between late morning, when all the previous night's sampling gear and samples were stowed, and 5:00 p.m. when that night's sampling gear could be laid out. The outcome of this was that sites needed to be generally 30 miles apart. 2.) To establish TEM sites within geomorphic reaches having at least 100 m of shoreline for sampling in old and new high water zones and also accommodate a large field crew (24 people). 3.) To establish some of these TEM sites as "fixed sites" at bird survey sites that had been sampled consistently since the 1980's" (Kearsley 1996: 32-33).

2. Participate in the meetings hosted by the GCMRC to review data and initial findings and discuss monitoring methods, objectives and data analysis.
3. Host several meetings with tribal and other experts in Traditional Ecological Knowledge to develop a plan for integrating Paiute knowledge into the Terrestrial Ecosystem Monitoring program

SPC Participation in the TEP

The SPC's proposal was accepted. The Statement of Work issued by the USGS/BRD/GCMRC for Southern Paiute Consortium Participation for the Terrestrial Monitoring Project (Requisition 1-3022-3146) included 1) the SPC proposal as it was submitted, 2) participation in two project meetings, and 3) preparation of a brief written report. The scope stated, "The Southern Paiute Consortium shall participate in a GCMRC Project Meeting to be held between the dates of August 01, 2001 and August 31, 2001, to discuss data and other information obtained during the Spring, 2001 GCMRC river trips. Southern Paiute Consortium input shall include discussion concerning Southern Paiute Consortium perspectives on Southern Paiute Consortium and western science data collection methods. This will include possible complimentary approaches and Southern Paiute Consortium interpretation of the data to date. The Southern Paiute Consortium interpretation shall include an assessment of the condition of the resources with a general explanation of the Southern Paiute Consortium perspective." The SPC was to participate in a second project meeting, to be held in November 2001, "to present Southern Paiute Consortium data, collection methods, and Southern Paiute Consortium interpretation of the information. The Southern Paiute Consortium PIs shall also present their views on future Southern Paiute Consortium monitoring activities and the integration of those activities with GCMRC biology monitoring." The final report was to "include the Southern Paiute Consortium perspectives on data methodologies, Southern Paiute Consortium methodologies, data results, and recommendations for future Southern Paiute Consortium monitoring activities. The report will also include the integration of those activities with GCMRC biology monitoring."

The SPC hired a Kaibab Paiute tribal member who had participated in both Southern Paiute and non-Indian river trips as its representative to the TEP. During 2001, the SPC representative participated in three river trips and gave a presentation to TEP scientists and GCMRC program managers about what she was learning. According to the representative, "They actually taught me a lot, how this bug affects this bug, different water levels, zones, which specific plants are there… One geologist knew a lot. A lot of them were graduate students – river people, but still in school. I think they knew some, but they didn't know the canyon. They knew what they were talking about, but they didn't know the canyon. A few of them had been on river trips before, but… I [concluded] the boatmen knew more about the canyon than the professors and students."

The SPC representative was hired specifically to participate on TEP river trips to learn more about the TEP, what the scientists were doing and why they were doing it, and to try to determine how native perspectives fit into what they were doing. She was to share information about the SPC and Southern Paiute culture with the TEP participants and then return home to share what she had learned with the tribal councils and members of the SPC member tribes.

Neither the representative nor the SPC Coordinator was aware that a significant goal of the TEP was to generate data that could be incorporated into scientific models.[10]

The SPC representative had been selected because she had experience on both Southern Paiute and non-Indian trips. Still, participation in the TEP river trips proved to be both rewarding and a significant challenge for her. The stops were filled with activities such as laying transects, netting insects, and collecting specimens. She helped the other participants with these field activities, but decisions about techniques had been made prior to the trips so she could do little but observe and provide manual labor. She did not attempt to carry out SPC monitoring activities on the TEP trip because none of the SPC monitoring sites were visited; the SPC conducted its monitoring trip separately, as specified in its proposal.

On the TEP trips, because the scientists were busy when the boats were stopped, the SPC representative was instructed by the trip leader to move from boat to boat as the group traveled down the river and use the travel time to teach the others about Southern Paiute culture. It proved difficult for her to share information while traveling, given other responsibilities such as rowing and bailing, lack of interest by some of the scientists, and the awkwardness of getting into a boat and talking about "culture" to a group of strangers. During an interview conducted for this assessment, she noted, "It's really hard because you can't say too much because it's not for them to know. You can't incorporate scientific theory and oral history native beliefs because scientists think there's a reason for everything and some things have just been passed down."

An equally noteworthy challenge for the SPC representative arose from the fundamental difference in the way the scientists and Southern Paiutes relate to the Colorado River Corridor (see also Chapter One) and behave while they are there. The representative noted that finding time to pray and make offerings, distancing herself from the alcohol consumption while not being perceived as aloof, and determining what information should and should not be shared with others were all specific challenges. She observed, "I don't think it worked. I'm sure it was accepted when I said something. They'd say, 'Oh yeah, yeah,' but they- I'm sure they tried to understand, but I did not get it across to them how I felt… I think it's two different worlds totally, but I know we could teach them something – our culture, our history – because they had no clue. I would tell them all the north rim was Paiute, Paiute names for the places. I was trying to give them an idea of what this means to us."

Also during 2001, the SPC held meetings on the Kaibab Paiute Reservation with tribal members, scientists, and anthropologists to discuss the SPC monitoring program, the TEP, and the integration of traditional knowledge into the TEP. During its 2001 annual river trip, the SPC visited some of the sites included in the TEP, and trip participants met with TEP scientists in Marble Canyon to share information about the two programs, their purposes, and the information they did and could collect. The SPC Coordinator, representative to the TEP, and I attended project meetings in Flagstaff at which we listened to the description of the TEP, discussed the methods to be used in the program, and shared information from the SPC monitoring trip. Because the first year TEP activities consisted of establishing the baseline for future monitoring, the TEP scientists did not yet have data to share.

[10]This information only became known to SPC leaders when the SPC received a copy of the TEP final report (Kearsley et al. 2006) to review.

After a year of participation in the program, both the SPC representatives and the TEP scientists agreed that there was little opportunity for integrating the data from the two programs in a meaningful way. A major source of divergence stemmed from site selection. The SPC monitoring sites were selected through a lengthy process of research with tribal elders about the meaning and significance of specific places within the Colorado River Corridor, an analysis of which sites might be impacted directly or indirectly by the operations of the Glen Canyon Dam, and an ongoing assessment of potential and actual impacts to the sites resulting from the process of monitoring them (see Chapter Two and also Stoffle, Austin et al. 1995). The TEP sites were selected through attempted randomization within predetermined river reaches, and there was no mechanism for including sites of particular interest. In discussions with the GCMRC and TEP scientists, the SPC argued that cultural resource sites could not be selected at random (the Colorado River Corridor itself is only under such intense scrutiny because it is a cultural resource for many people), so a program of monitoring random sites within the Corridor *instead of continuing its monitoring program* would not meet the needs of the SPC or its member tribes nor fulfill its responsibilities to its member tribes under the PA. Because the sampling frame and the methods being used by the TEP scientists had been determined by the GCMRC before the program began and were not open for scrutiny, it was unclear what decisions could be impacted by Southern Paiute perspectives. Still, the SPC did not completely withdraw from the program. In its 2001 annual report, the SPC concluded,

> From exploratory informal discussions between SPC and TEP managers, it became apparent that the goals, methods, and locations of sites for the SPC ethnobotanical monitoring protocol are very different from those of the TEP, and all parties concerned agreed that it was not feasible or desirable to merge the two monitoring programs. However, participation of SPC representatives in TEP river trips was seen as a positive action that would benefit both programs.

The SPC 2001 report submitted to the Terrestrial Ecosystem Monitoring Project (TEMP), concluded, “The SPC intends to use the data collected in the TEMP to understand conditions along the entire river and to provide a context within which to interpret data collected by SPC monitors. The SPC will participate in the TEMP again in 2002 to determine if this integration will be possible” (p. 2). Based on these findings, during 2002, the GCMRC contacted the SPC to submit another proposal, and the SPC did so, changing nothing but the date in its proposal. The proposal was again accepted; except for the date, the Statement of Work issued by the USGS/BRD/GCMRC for Southern Paiute Consortium Participation for the Terrestrial Monitoring Project (Requisition 02-3408-3154) was exactly the same as that issued in 2001. However, funds for SPC participation were not received until September 2002, after the August meeting and most of the TEP river trips had ended. In its 2002 annual report, the SPC concluded,

> The SPC was invited to participate in the TEP and took the opportunity to investigate whether and how the TEP and SPC’s other activities would complement one another. The SPC produced a report in 2001; work for 2002 was delayed because funds were not made available until September 2002. The SPC intends to continue to participate in this effort.

During the ensuing months, the SPC hired a new Coordinator; the new Coordinator was uncertain about the purpose of the TEP or how to best participate in it. Consequently, during 2003, the SPC did not submit a proposal to continue participation in the TEP. Subsequently, the new Coordinator was contacted by the GCMRC/USGS requesting that the SPC again participate in the program, this time in the form of a cooperative agreement with the USGS. In response, the SPC again changed the date on its original proposal and submitted it once more to the USGS. The GCMRC responded with a cooperative agreement (No. 03RAG0016) between the USGS/Grand Canyon Research and Monitoring Center [sic] and The Kaibab Band of Paiute Indians. The agreement was established with the Kaibab Band as the federally recognized tribe and fiscal agent for the SPC. The agreement included a USGS program description that outlined the USGS and Kaibab Paiute Tribe's/SPC's roles (see Table 5.1), the SPC proposal as submitted, special terms and conditions, general provisions, and report preparation.

Table 5.1. USGS and Southern Paiute Roles in the TEP in 2003

THE USGS ROLE	THE KAIBAB PAIUTE TRIBE ROLE
GCMRC personnel shall collaborate with The Kaibab Paiute Tribal Council, the designated Tribal Principal Investigator and other contributors in ensuring Kaibab Paiute presence for Fall and Winter 2003 AMP and other Interested Party meetings, exact dates to be stated after award of the agreement.	Members of The Kaibab Paiute Southern Paiute Consortium will do the following: Assist in the design and implementation of the long-term integrated monitoring program for the Colorado River ecosystem as described in their technical proposal entitled, "Southern Paiute Participation in Grand Canyon Monitoring and Research Center Terrestrial Ecosystem Monitoring – 2003."[11] This Technical Proposal is included at the end of this Program Description.
GCMRC personnel shall collaborate with The Kaibab Paiute Council, and Principal Investigator in authorship of the Biological Terrestrial Monitoring Annual Report	
GCMRC shall work with The Kaibab Paiute Tribe in addressing culturally based concerns found in analysis of GCMRC data, and the development of a plan for integrating Paiute knowledge into the Terrestrial Ecosystem Monitoring Program.	
GCMRC shall collaborate with The Kaibab Paiute Tribe in assessment of Resource Health; and in the development of various survey instruments, and shall offer guidance if necessary on aspects of the formal data integration.	

[11] This is the proposal originally submitted in 2001 and included on p. 103 of this report. The proposal did not describe how the Kaibab Band of Paiute Indians or SPC would assist in the design and implementation of the long-term integrated monitoring program for the Colorado River ecosystem, so it was unclear from the start what was really intended in the program.

In spite of this apparently new role for GCMRC, the SPC, and the Kaibab Paiute Tribal Council in the TEP, no one involved in the program at the time recalled efforts to collaborate in the preparation of the program report. By definition, collaboration involves a process of working together in a joint effort. However, there exists no evidence that anyone from the GCMRC attempted to get on the Kaibab Tribal Council agenda during 2003; records of those meetings do not show the TEP as the topic of any of them.

One TEP team meeting was held in Flagstaff, but SPC participation occurred by chance rather than by design. On Tuesday, February 10, the SPC Coordinator was forwarded an email message that was sent that same day to representatives from the Hualapai and Hopi Tribes:

> As we discussed on the phone a few days ago, most of the key TEM team members will be in Flagstaff this Friday, Feb. 13, and they would like to meet with you to solicit your input and recommendations for how best to address tribal perspectives in the comprehensive report they will be submitting to GCMRC later this spring… A stipulation of the original TEM agreement was that this project would consider and incorporate 'tribal perspectives' in the development and implementation of he long-term monitoring plan. Representatives from the Hopi and Hualapai Tribes and the Southern Paiute Consortium have participated in the pilot TEM project for the past two years, and suggestions for incorporating tribal perspectives into the program have been offered at previous meetings and also in tribal reports. The meeting on Friday will provide an opportunity to revisit and refine those suggestions before the TEM team submits their draft final report… We anticipate that each tribal representative may want to take approximately half an hour to review past recommendations and to offer additional insights for consideration in developing the final report."

The SPC Coordinator's message began, "I tried to call you earlier this week about this meeting, but could not reach anyone. I don't know if you are in a position to participate in this meeting on such short notice, but if you are willing to make the long drive, we would certainly welcome and appreciate your participation. I will be out of the office tomorrow and Thursday morning, but perhaps you could call me on Thursday afternoon to let me know if you will be able to attend." The SPC Coordinator attended the meeting and participated by listening and talking about the SPC program; her attendance at the meeting was the last SPC involvement in the TEP.

During June 2003, the GCMRC hired a new Sociocultural Resources Program Manager, one whose perspective about her role and responsibilities differed considerably from that of her predecessor. Sometime during the year, the SPC received a two-page document entitled, "Tribal Information Needs for the Terrestrial Ecosystem Monitoring Program." According to the (unknown) author of the document, "To insure that tribally-pertinent data are collected and integrated into the TEM program, tribes need to address the following topics in their final reports on the TEM program." A list of five questions followed (see Appendix F), all of which assumed that the TEM program could and would generate useful findings. A suggested outline for tribal reports included a summary of tribal involvement in the TEM project, tribal data requirements

for Resource Monitoring, an assessment of the TEM program, and recommendations. Tribes were asked to assess the ways in which the TEM approach was useful to the tribes, field techniques that were inappropriate from a tribal perspective, how things could be done differently to meet tribal concerns for tracking change and health status of the terrestrial ecosystem, and species/resources that are most important to monitor. As evidenced by the outline, the GCMRC had redefined the terms of tribal participation, even though it had accepted and funded the SPC's proposal to do something other than what it was requesting. The SPC submitted its annual report to the BOR and GCMRC but did not address all the topics in the outline.

In July 2004, the new Sociocultural Resources Program Manager of the GCMRC wrote to the Chairperson of the Kaibab Band of Paiute Indians requesting a meeting to discuss concerns about the SPC's participation in the TEP and GCDAMP. She noted, "Delivering information back to the Adaptive Management Program is an essential outcome of all GCMRC-sponsored activities. Lately, there seems to be a breakdown in the process, and information resulting from the Southern Paiute's participation in the TEM program has not been getting back to the GCMRC and the Adaptive Management Program. I am also concerned that the monitoring data currently begin gathered by the Southern Paiute do not seem to meet the needs of the adaptive management program" (Fairley 2004: 2).

In an August 2004 briefing paper, the Sociocultural Resources Program Manager offered her perspective on the purpose of the TEP, "After years of consultation, staff at Reclamation and GCMRC concluded that the Southern Paiute's main interests in the river corridor mostly revolves around the native plants and animals. These living plants and animals, and Paiute's interest in monitoring them, are more directly tied to the legal requirements of the Grand Canyon Protection Act than to the National Historic Preservation Act, which is principally concerned with maintaining and preserving historic properties. Because GCMRC has the lead role for providing monitoring information to the AMP, as required by GCPA, while Reclamation is the lead agency for Section 106 NHPA compliance, the agencies concluded that there should be a transition from Reclamation managing river trips for NHPA compliance and consultation purposes to GCMRC managing them in conjunction with tribal ecosystem monitoring activities, reflecting tribal interests under GCPA. This shift was to take place over a two-to three-year period. The first step in this transition occurred in 2001 when each tribe with an expressed interest in monitoring terrestrial resources was asked to submit a written proposal to the Terrestrial Ecosystem Monitoring Program of GCMRC" (p. 2). According to this interpretation, instead of incorporating "Tribal perspectives and information in all phases of monitoring through consultations, shared sampling, training and reciprocal exchanges of information," as noted by Kearsley, Lightfoot et al. (2006: 5-6), the TEP was intended to fundamentally alter the relationship among the SPC, BOR, and GCMRC and to shift the legal basis for SPC participation and monitoring activities.

After receiving the briefing paper, the SPC Coordinator, chairperson of the Kaibab Band of Paiute Indians, consultants, and tribal attorney held a conference call to determine an appropriate response. Among their concerns were the claim that the BOR and GCMRC had determined the Southern Paiutes' interests revolved around plants and animals and that that information was being used to justify separating the Southern Paiutes from NHPA

compliance issues. From its inception, the SPC monitoring program has been based on the SPC perspective that the entire region including the Colorado River Corridor and Grand Canyon is a traditional cultural property (TCP) and has included an integrated evaluation of culturally significant sites, paying attention to beach access, vegetation, archaeological elements, rock and mineral features, and water sources (see Chapter Two). The tribal chairperson submitted a letter to the BOR outlining the SPC and tribal concerns with the letter and program.

Between 2003 and 2007, two meetings occurred on the Kaibab Paiute reservation. In the first one, two BOR representatives visited the Kaibab reservation to establish the terms of a new cooperative agreement. Then, a GCMRC representative, the SPC coordinator, and the Kaibab Tribal Chairperson met once, but the issues raised in the 2004 letter were never resolved.

In 2005, the TEP was expected to move into a new phase and tribal participation was included in the Statement of Work developed by the GCMRC for the program. The need for tribal participation was defined as follows (GCMRC nd):

> While western scientists describe the terrestrial ecosystem using certain parameters, tribal members traditionally use a different framework to evaluate terrestrial resources. This project attempts to obtain and merge information from both sources to assess the resources more comprehensively. The primary goal of the tribal component of this project is to incorporate Native American perspectives in the interpretation of significant changes in the abundance and distribution of native plants and terrestrial animals including avifauna. The FY05 budget includes $30,000 dollars to develop booklets, CDs and other tools that will translate scientific terminology and data into culturally relevant categories and terms. These media will allow the tribes to readily interpret the results of the terrestrial ecosystem monitoring results and will also be useful for public outreach and educational purposes. The budget also provides $10,000 annually for each tribe to hire a consultant or internal staff person to review the results of GCMRC's annual terrestrial monitoring effort and prepare a report assessing those results from a tribal perspective. This report will provide recommendations to the Glen Canyon Dam Adaptive Management Program for consideration in future management of the resources… Each participating tribe will develop booklets, CDs, or other media that will allow translation of the scientific monitoring data into terms that are more consistent with tribal perspectives. In addition, each participating tribe will review the terrestrial ecosystem monitoring comprehensive report that is being prepared by GCMRC -co-operators in FY05 and will prepare a written assessment of the TEM results.

To date, the SPC has not participated in this program.

The TEP draft report was first issued in July 2005; the final revision and resubmission occurred in August 2006. The report is organized in four parts and includes seven appendices, as shown in Table 5.2.

Table 5.2. Table of Contents for the report from final report, *Inventory and Monitoring of Terrestrial Riparian Resources in the Colorado River Corridor of Grand Canyon: An Integrative Approach*

Report Section	Authors	Pages
Part I		
Introduction	M.J.C. Kearsley, D.C. Lightfoot, S.L. Brantley, J.K. Frey, H.K. Yard	4-31
Part II: Integrated Terrestrial Ecosystem Monitoring		
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The report includes two mentions of tribal participation in the program:
"An additional goal of this project was to include perspectives from the Tribes who participate in the adaptive management process. Rather than imposing a formal method for this goal, we have accomplished it by maintaining direct contacts with the Paiute, Hopi and Hualapai tribes. We have met while on the river when our separate trips have coincided, have included tribal

representatives in our trips, and have participated in resource monitoring trips sponsored by the Tribes. We have also presented results of our first three years of work to the Tribes in a set of twice-yearly formal presentations at GCMRC during which we received feedback on how our work relates to Tribal concerns. We have also been advised on how to perform and report the work so that it bears directly on Tribal information needs and avoids conflicts with cultural values. We have endeavored to incorporate these points into the work described in this report" (Kearsley, Lightfoot et al. 2006: 6).

"[W]e wanted to include the perspectives of members of the Hopi, Paiute and Hualapai tribes who have strong historical and cultural ties to Grand Canyon. These groups are stakeholders in the adaptive management of Glen Canyon Dam, and many of these tribes' cultural properties are biological in nature and are heavily represented in the post-dam riparian zone. We therefore determined which elements of our project could supplement the information needs of the cultural programs of the tribes beyond those provided by their own ethnobotanical and cultural monitoring" (Kearsley, Lightfoot et al 2006: 7-8).

Based on these statements, the goal of integrating tribal perspectives was fulfilled if the report met tribal information needs and did not conflict with tribal cultural values. The authors admit that their findings are tentative, based on only three years worth of data that could be used to show possible links among plants, animals, and their physical environment but not causality. "Overall, our integrative findings demonstrate that Grand Canyon riparian environments that support dense stands of vegetation also support larger numbers of animals" (Kearsley and Lightfoot 1006: 158).

As indicated in the description of the FY05 Statement of Work, the focus of the TEP shifted from integrating monitoring programs to translating scientific findings into formats and language "accessible" to the tribes – though at every stage of the process the GCMRC and TEP scientists controlled the interactions and forms of communication and set the bounds on what could be considered. What some believed began as an effort of mutual exchange ended as a project to provide scientific data to tribes and have the tribes interpret and assess those data "from a tribal perspective."

Despite the focus on collaboration in the SPC's 2003 Scope of Work, in interviews, GCMRC staff admitted they had not yet been out on the reservations. According to one GCMRC program manager, "We have made repeated efforts to meet here or there [on the reservations], but they haven't worked out yet." GCMRC is "ready to go anytime," but lack of resources and time were cited as barriers to traveling to the tribal headquarters for a meeting.

Summary of Participants' Assessment of Program

Given the multiple – and conflicting – goals of the TEP, it is not surprising that most participants concluded that these goals were not achieved. Those who were unaware of the political aims of the program reported being unsure what the tribes were actually supposed to do. Although some participants believed the program was supposed to integrate Southern Paiute traditional ecological knowledge into the TEP, no one was able to articulate what was actually intended by such integration or a mechanism by which it was supposed to occur. The most direct form of

Southern Paiute participation in the TEP was through the TEP river trips, but because the selection of sites, dates, and methods had been determined before the tribes became involved, Southern Paiutes perceived that their participation was not intended to be central to the program. Once on the TEP river trips, the lack of any clear role for the tribal member and of time for talking except during boat travel further impeded efforts at collaboration. In reflecting on her role, the SPC representative said, "Why was even a tribal monitor included in the Terrestrial [Program]? They were doing their research, but how were the Indian tribes to be included? If I was the only Indian that showed up…" The GCMRC's principal goal was to get the SPC to accept the TEP as a replacement for its monitoring program, yet neither the program managers nor the TEP scientists had a clear vision of what was integration of tribal perspectives in that program might mean or how to accomplish it.

The scientists involved in the TEP did not articulate a common view of why the tribes were involved. One scientist interpreted the overall goal of the program to be one of educating the tribes about science, "The intent of the TEM was to include tribes that studied plants. We tried to provide data collection methods, translations [of scientific concepts] and general education to the tribes who wanted it." According to another, "The idea was to see how we could incorporate- The tribes didn't feed back into the TEM program… Maybe they thought that [just] being on a river trip covered it." Another scientist commented that the GCMRC "put a tribal representative on trips to observe, and I guess compare to what they do." However, a significant difference between tribal and scientific approaches to monitoring lies not only in the specifics of the monitoring process – tribal members as well as scientists collect data using their senses and utilize specific processes such as line transects and photo matching for comparing data on repeat visits – but in what can be inferred from the data being collected. For example, during an interview conducted for this assessment, a GCMRC scientist commented, "The tribal approach clearly does not try to say that a site or two represents the whole Canyon, in the way that hard science approaches try to make that claim." Of course, there is not consensus among scientists that the TEP approach is adequate for drawing conclusions about the entire Colorado River ecosystem, a 291-mile stretch that encompasses three distinct desert ecosystems, is home to rocks that vary in age on the order of millions of years, is intersected by side canyons that flood and scour at irregular intervals, and more. In the end, the TEP included 34 integrated monitoring sites where bird surveys, vegetation structure measurements, and arthropod, herpetofaunal, and small mammal surveys were conducted; at an additional 78 sites only breeding bird surveys and vegetation structure measurements were completed.

One TEP scientist noted that there was supposed to be a gathering twice annually to interpret the data. The tribes were expected to present their data at these meetings as well. Given that they were supposed to participate in the TEP trips and on those trips were asked to provide information about Southern Paiute culture, and that those efforts were largely unsuccessful, it was unclear what data they should have presented. The SPC representative shared information about what she had learned on the TEP trips and summarized the findings of the SPC's annual monitoring trip, neither of which met the GCMRC staff expectations. GCMRC staff admitted that it was possible the tribes did not understand what the GCMRC wanted.

One of the tribal employees responsible for handling financial matters at the time noted that she had not interacted with anyone from the GCMRC concerning the use of the funds. During an

interview, she remembered thinking, "'Okay, they're going to give us this money.' There never were a lot of requirements… In my mind, this was like 'free money'." At another point she commented, "We never really talked to those people down there."

One TEP scientist concluded, "The integration we sought that might modify the program or create feedback didn't happen." Another one held out that the program might still work: "The TEM could provide good information for all players, systemwide, if we get better at establishing the goals and procedures." The SPC's efforts to distinguish its program from the TEP, based in part on site selection, was interpreted to mean that the Southern Paiutes were only interested in specific sites, and, in the words of one GCMRC scientist, "undermined their own efforts in relation to GCMRC."

As soon as the TEP got underway, the GCMRC attempted to get the SPC to discontinue its monitoring program and receive information on ecosystem conditions from the TEP. As noted above, that effort was unsuccessful; the SPC agreed to participate in the TEP to ensure that its program could continue, not as a means of ending it. When the GCMRC realized that the tribes were not going to simply offer their "perspectives" on terrestrial resources and then leave the research and monitoring to the scientists, the TEP strategy changed. According to one GCMRC scientist, "The tribes were saying they wanted to continue their own monitoring aside from the TEM [Terrestrial Ecosystem Monitoring]. The only way I could think of was to include tribes on river trips." Because the SPC program was not restricted to biological monitoring, simply including tribal representatives on river trips being conducted as part of the TEP could not meet the tribes' information needs. In reflecting on the program, another GCMRC staff member wondered aloud if the tribes may have considered it a threat of some kind, a feeling that she said might have been valid to some degree. "The pressure is always on to be efficient," meaning fewer river trips and less money to monitoring efforts.

A GCMRC scientist also commented on the change of focus, noting that the TEM came into being in the context of "trying to get the tribes to be more explicit about defining their boundaries and what needs they have in the Canyon." A program manager added, "The original idea was for tribes to participate and monitor at once during TEM program;" when that proved unsuccessful, a scientist noted that the GCMRC "changed the purpose of the river trips from monitoring to consultation in order to get tribes away from focus on strictly monitoring and in order to elicit 'more about feelings' than data gathering." This new direction was not articulated to the SPC, and given that the only other people on the river trips were the TEP scientists, it is unclear with whom consultation was to occur and who was to be the recipient of the information about Paiutes' feelings.

As in other aspects of the Southern Paiute program, the SPC's ability to successfully anticipate and address the desires of the GCMRC in relation to the TEP was for some linked to the question of who could represent Southern Paiute interests in the GCDAMP. The SPC initially included a tribal member on the TEP river trips because of the apparent desire for Southern Paiute perspectives on the terrestrial ecosystem, though clearly that effort did not meet anyone's expectations. In its own monitoring program, the SPC worked with a non-Paiute botanist to ensure that biological data collected in that program could be translated into language acceptable to the western scientists. Because a primary goal of the TEP integration was to eliminate the SPC

monitoring program, discussion of the TEP also led to discussion of the SPC's monitoring program. Consequently, one GCMRC scientist questioned why the SPC employed a non-Indian botanist when "it seems like it should be a Paiute person."

An Analysis of What Happened

The TEP failed to achieve any of its stated goals – neither incorporating tribal perspectives in all phases of monitoring nor shifting the tribal monitoring programs to the GCMRC. The reasons for this failure are many, and these will be examined in the following sections.

Lack of Communication

Throughout the period of her participation in the TEP, apart from the river trips and the meetings where she was asked to make a formal presentation of her findings, communication between the SPC representative and the GCMRC and TEP scientists was limited to phone calls with the GCMRC staff person responsible for coordinating river trips. More generally, at no time during the program did anyone from the GCMRC or any of the TEP scientists visit either Southern Paiute reservation to do TEP-related work such as reviewing data or writing reports. Even in the final year, when the Scope of Work issued by the USGS/GCMRC stated that the GCMRC personnel would collaborate with The Kaibab Paiute Tribal Council, the designated Tribal Principal Investigator, and other contributors in ensuring participation in meetings, co-authorship of a report, completion of a resource assessment, and development of a plan for integrating Paiute knowledge into the Terrestrial Ecosystem Monitoring Program, efforts to inform and meaningfully involve the SPC were minimal. Likewise, no one from the SPC or Kaibab Paiute Tribal Council contacted the GCMRC to arrange separate meetings about the program.

Lack of Shared Goals and Objectives

It is clear that the various participants in the TEP – the GCMRC scientists and program managers, the TEP scientists, and the SPC representatives – had different ideas about what was to be accomplished through the program. As described above, written documents originating from all three groups illustrate just how far apart these groups' goals and objectives were. The lack of communication among TEP participants meant that little progress was made bringing the groups together.

The program was initiated by the GCMRC to meet its needs, and when it failed to achieve its original goal, the GCMRC established a new goal for it. Initially, the TEP scientists were given the task of incorporating tribal perspectives without a clear idea about why they were doing so or what they were to do with the information once they had it. Then, the GCMRC's goal for the program shifted to consultation, but the TEP scientists were not the ones to play that role on behalf of the Federal government. At the same time, GCMRC managers failed to communicate the new goal to either the tribes or the TEP scientists or to make the structural changes in the program that would have been necessary for it to be able to meet the new goal of improved consultation. Even in the final year, when the GCMRC redefined the SPC's participation as collaboration with the GCMRC, it was unclear who was to be responsible for ensuring that such collaboration occurred. No one directly involved with the TEP traveled to any of the Southern

Paiute reservations to meet with tribal leaders or representatives; in general those involved in the program said they had too many competing demands. If tribal participation was a priority, it could be expected that the GCMRC or TEP scientists would have made at least one visit to the SPC. However, even at this point it is unclear who should have been responsible for arranging that visit.

Given the problems with the SPC involvement in the program, why did the GCMRC and SPC continue? The GCMRC had embarked on a three-year program, and integrating tribal perspectives was one of its stated goals. Thus, even when it was not getting what it wanted, it continued to enter into agreements that – at least on paper – made it appear that its goal was being achieved. However, even by the third year, other than changing wording in the agreement, the USGS/GCMRC did nothing to change the process or implement practices that would lead to a different outcome. In the end, lacking any specific information on tribal viewpoints, the final TEP report nevertheless included two paragraphs that refer to the process of integrating perspectives.

From the perspective of both SPC coordinators and tribal administrative staff, the program's purpose became increasingly obscure as the program evolved. By the third year, the SPC did not even submit a proposal to participate in the program. Yet, a USGS staff member contacted the SPC and encouraged the Coordinator to submit a proposal; although the motivation for this move was unclear to tribal leaders, they resubmitted their initial proposal. They accepted the changes offered by the USGS, but when nothing much happened in the final year, they interpreted the silence as confirmation that by that point the GCMRC had to spend money on tribal participation and the TEP was the easiest way to do so (see next section).

The Importance of the Larger Context of Tribal Involvement in the GCDAMP

The TEP was initiated during a time when the funds being allocated to the tribes for their participation in the GCDAMP had been held constant and supplemental funding from other sources had ended (see Figure 1.4). At the same time, efforts were being made to streamline GRMRC activities, particularly resource identification and monitoring, and to reduce the costs of such activities. During this period, some GCMRC staff were telling tribal representatives that they could supplement the funds coming from the BOR with money for specific projects allocated through the GCMRC. Thus, it is not surprising that some tribal participants interpreted the effort to involve tribes in the TEP as a way to get more money to the tribes. As is discussed in greater detail in the following section, the lack of significant interaction between the SPC and GCMRC reinforced this notion.

The TEP was developed after several external reviews of the program had recommended an expansion of tribal participation and after a period of intense discussion and debate within the GCMRC, TWG, and tribes about what was appropriate involvement for the tribes in the GCDAMP. One perspective was that tribal participation in the GCDAMP was limited to issues involving "cultural resources." However, "cultural resources" was not explicitly defined, and most of the people active in the cultural resource program were archaeologists, so the prevailing view was that cultural resources were objects of material culture (e.g., pottery sherds, tools, rock structures, rock art). Relegation of cultural resource issues to the NHPA and biological concerns

to the GCPA made it difficult for tribes to articulate their concerns in ways that would be heard. A TWG cultural sub-group was formed to set up the cultural program to cooperate effectively with other science programs, including how they might integrate tribal issues and knowledge, but interviewees involved in that early attempt indicate that the group was not very active or effective.

A second perspective on tribal participation emphasized that the tribes had interest in more than just isolated places and artifacts identified as "cultural resources." Those interests extended to the animals, plants, water, and earthen features of the Colorado River Corridor. However, even after external reviewers supported efforts to recognize landscape features and natural resources as Traditional Cultural Properties (TCPs) eligible for the National Register of Historic Places (see Chapter One), the notion that plant communities were cultural resources was not widely accepted.

Within this context, the efforts of the GCMRC scientists and program managers to define for the tribes what they should be interested in, how they should participate, and who they should involve in their programs was not well received. The GCMRC personnel attempted to redirect the tribes according to their predetermined notions of what would be acceptable participation according to the GCMRC's needs. Ironically, when they were unable to convince the tribes to drop their programs and utilize data collected by a group of scientists under the TEP, the GCMRC program managers determined that the tribes should share their "feelings," a position that precluded inclusion of anyone other than tribal members in the program. What was to be done with those "feelings" was never specified.

The struggles within the TEP also highlight the significant gap that exists between a particular scientific approach that focuses on replicable methods for collecting isolated bits of information about plants, insects, and animals, and then attempts to bring them together to create a picture of relevant interactions, - largely disassociated from place – and an approach that focuses on context and seeks to understand places and what is happening at them. This gap is articulated by Southern Paiutes who remark that the scientists don't "know the canyon." Yet, despite talk of the need for including holistic perspectives, this gap is hardly recognized or acknowledged. Attempts to argue for something other than the familiar reductionist approach designed around sampling, taking specimens, and making species lists are dismissed as non-scientific.

Summary and Conclusions

The causes of failure to integrate tribal perspectives into the TEP are at once both obvious and obscure. Clearly, without shared goals and objectives and a mechanism for building relationships and breaking down barriers among participants, little can be accomplished. This failure, though, is rooted in problems much larger than whether or not one group's understanding of the condition of a particular resource differs from another's. As White (2006: 1) has observed, more intractable than the incorporation of traditional ecological knowledge into scientific frameworks is the incompatibility between traditional knowledge and the values and procedures of Western-style governance that reinforce certain forms of understanding and existing relationships of power. "Governance … is very much a function of the rules--formal and informal--and the

organizational culture of the institutions of governance. In turn, rules, institutions, and cultures are deeply rooted in worldviews and values" (White 2006:1).

Throughout the TEP, the GCMRC was dedicated to controlling activities, interactions, and the boundaries of what could be discussed; even the TEP scientists noted that the program design was "dictated by GCMRC" (Kearsley, Lightfoot, and Brantley 2006: 200). Yet, it is unclear what the GCMRC hoped to gain from the program, especially after it became clear that the SPC had no intention of discontinuing its monitoring program in lieu of receiving information that might be collected at some point in the future (continued support for the TEP is not guaranteed). In its final attempt to control the SPC's participation, it established what it would accept as a final product, even though the SPC's Statement of Work would not generate the information being requested.

Despite the TEP's limited success and uncertain future, some scientists believed that information from the TEP would eventually be valuable: "I think what we need for one thing is a better understanding of how TEM information could be more useful for the tribes." As of this writing, the program has collected only three years' worth of data at a limited number of locations, so any patterns at this point may be spurious; it is difficult to say whether and how the information collected in that program will be useful for the tribes or any GCDAMP stakeholders.

Western science offers frameworks for knowing about certain features of the physical, biological, and social world. Through systematic observation, experimentation, and modeling, scientists seek to describe, explain, and predict environmental and social phenomena such as the impacts of the operations of GCD on the nearly 300-mile stretch of the Colorado River Corridor between GCD and Lake Mead. Because of the size and complexity of the Colorado River ecosystem, anyone attempting to understand what is happening in the system must focus on some features and ignore others. Thus, some scientists pay attention to sediment flows, others to birds, and still others to fish, with the intent of combining what they have learned with information gathered from other scientists to say something about the system, GCD, and its impacts.

Likewise, though the Southern Paiutes recognize the entire Colorado River Corridor and Grand Canyon as a TCP, they have focused their attention on understanding the impacts of GCD on specific places of cultural significance with the expectation that by learning what is happening at some places they can understand the types of effects caused by the operations of GCD. Because Southern Paiutes no longer have unrestricted access to the Colorado River ecosystem to live, hunt, gather, farm, conduct ceremonies, and otherwise meet their livelihood and spiritual needs, their understanding of that ecosystem is informed by oral tradition, stories, specific approaches to gathering information while they are within the impacted region, and more general comparisons with similar places found elsewhere and to which they have greater access.

The TEP was an effort to consolidate several efforts to gather information about the terrestrial riparian corridor by bringing together various groups that were attempting to understand the functioning of the corridor and the impacts of GCD there. Yet, despite the effort to integrate data from multiple sources, the effort was led by the GCMRC, the science provider to the GCDAMP, and only information that could be incorporated into the design developed by the GCMRC and

adopted by the TEP scientists could be utilized. In the end, therefore, rather than a program to incorporate tribal perspectives, the program evolved into an effort to educate tribes about science and what the scientists had learned in their three-year effort. Because it was the first attempt by the biological scientists to integrate their own findings, their conclusions were necessarily preliminary and incomplete. Despite the co-authored introduction and one tentative chapter devoted to the integration of findings, most of the 262 page report is devoted to separate descriptions and analyses of vegetation structure, arthropods, herpetofauna, and mammals, and the recommendations for improved inventory and monitoring methods is extensive. As in other initiatives of the GCDAMP (see Chapter Three), the effort to incorporate tribes was negatively affected by political agendas to limit the scope of the GCDAMP, the uncertainties surrounding how to do science in the complex Colorado River ecosystem, and the lack of a clear understanding of either traditional ecological knowledge or its relationship to the scientific enterprise. The SPC, like other TEP participants, muddled through, generally conceding, as the TEP scientists did, to the dictates of the GCMRC, but speaking out at various points to reclaim its program and authority to participate in the GCDAMP and PA as it deemed appropriate.

In spite of attempts to incorporate SPC monitoring programs into the TEP, or attempts to separate components from the SPC monitoring program and incorporate them within the TEP, no common ground for accomplishing this was ever elucidated, and, beyond budgetary considerations, no rationale or justification was ever determined.

Chapter Six
Summary and Conclusions

The Southern Paiute Consortium (SPC), with the assistance of researchers from the Bureau of Applied Research in Anthropology (BARA) at the University of Arizona and Dr. Arthur Phillips III, consulting ethnobotanist, conducted this ten-year review and evaluation of its participation in the Glen Canyon Dam Adaptive Management Program (GCDAMP). The purposes of this summary are to (1) provide a comprehensive review of SPC participation in the GCDAMP; (2) evaluate whether the SPC program has met the needs of its member tribes and addressed concerns of other GCDAMP participants; and (3) review and modify, as appropriate, the SPC's monitoring and education program and protocols. The Goals and Management Objectives (MO) outlined by the GCDAMP that are of primary concern to the SPC are as follows:

Goal 11: **Protect, Manage and Treat Cultural Resources**.
MO 11.2. Preserve resource integrity and cultural values of traditionally important resources within the Colorado River Ecosystem.
MO 11.3. Protect and maintain physical access to traditional cultural resources.

Goal 12: **Maintain a High Quality Monitoring, Research and Adaptive Management Program**.
MO 12.7. Attain and maintain effective tribal consultation to ensure inclusion of tribal values and perspectives into the AMP.
MO 12.8. Attain and maintain tribal participation in the AMP research and long-term monitoring activities

The SPC participates in the GCDAMP in four principal ways: (1) appointing a representative on the Adaptive Management Workgroup (AMWG), a federal advisory committee; (2) participating in the Technical Workgroup (TWG), Cultural Resources Ad Hoc Group (CRAHG), and other committees established to advise the AMWG; (3) developing and implementing its Colorado River Corridor monitoring and education program to enhance Southern Paiute understanding of the impacts of GCD on places and cultural resources of special concern to Southern Paiutes and to gather the data necessary for informing its member governments of those impacts and for increasing its effectiveness in the GCDAMP; and (4) participating in projects and studies developed by scientists and other stakeholders of the GCDAMP.

Participation in the AMWG and Related Committees

This review has found that, despite numerous challenges, the SPC has successfully established and maintained participation in the GCDAMP since its inception. And, based on feedback from more than 100 Southern Paiute tribal members, the Southern Paiute people want to continue participation in the GCDAMP and to protect all that is Paiute within the Colorado River Corridor.

In general, the SPC's program has operated as it was designed. The SPC representative to the AMWG – usually the SPC Director/Coordinator – gains information about GCD operations and their effects through participation in committees, its own monitoring and education program, and

other projects and studies in which Southern Paiutes become involved. That individual shares information with leaders, elders, and other interested persons from its member tribes. Still, this review has identified several areas that require attention to improve the SPC's program and increase the effectiveness of the SPC participation in the GCDAMP.

The traditional lands of the Southern Paiute people are bounded by more than 600 miles of the Colorado River from the Kaiparowits Plateau in the north to Blythe, California in the south. Southern Paiute people were given a special responsibility by their creator to protect and manage this land and water and all that is upon and within it. The challenge for the SPC is to translate this general responsibility into specific ways of engaging with the scientists, land managers, and others responsible for the operations of Glen Canyon Dam (GCD) and the GCDAMP. Unfortunately, attempts to resolve differences between Western scientific and Southern Paiute traditional knowledge and ways of understanding the Colorado River ecosystem have been unsuccessful, in spite of several efforts to integrate them. Significant improvements in the integration of Southern Paiute and other Native American perspectives are unlikely to occur without major changes in the organization and function of the GCDAMP. Nevertheless, attempts to find philosophical and practical common ground should continue, perhaps through a dedicated committee that includes Native American, GCMRC, and other GCDAMP participants, along with other knowledgeable persons who understand and have experience bringing together Native American and Western scientific worldviews. In the meantime, the scientific and tribal programs should continue in parallel, as equal partners with the responsibility for monitoring the impacts of the operations on GCD on the Colorado River ecosystem and providing that information to the GCDAMP.

The SPC Monitoring and Education Program

The SPC monitoring and education program has been in continuous operation since 1995. One of the main strengths of the SPC program, increasing in importance with each passing year, is its consistency. While methods have been changed in instances where it was necessary to gather meaningful data, the protocols at most sites have remained consistent and comparable from year to year throughout the duration of the program. This has allowed a long-term perspective on the changes that have occurred in the Colorado River corridor and their relationship to dam operation.

To assess the impacts of the operations of GCD, in 1995 the SPC identified 20 sites that were both of particular cultural significance to Southern Paiutes and potentially impacted by the operations of the dam. Of those sites, the three between the dam and Lees Ferry have not been monitored since 1998. Because of the lack of attention to this region, its proximity to the dam, and heavy use by visitors, the SPC should develop and implement monitoring protocols for sites between Glen Canyon Dam and Lees Ferry that are culturally significant to the Southern Paiutes and potentially impacted by the operations of Glen Canyon Dam.

The other SPC sites are impacted by dam operations through (1) continued loss of sediment over time, (2) inundation, (3) input of sediments at high flows, and (4) variation in the amplitude of diurnal water releases. Consequently, these sites also show changes in vegetation and animal habitat, and impacts caused by changes in the movement of human visitors. A significant

challenge for the program has been separating impacts from the operations of GCD from other impacts to the sites. Though monitoring activities at some sites have required modification due to the challenges of monitoring in a dynamic environment, the SPC program has generated data through a range of climatic and flow regimes. To ensure that useful data are collected over the long term, the SPC should continue to investigate alternative approaches to monitoring the impacts of dam operations at highly dynamic sites such as Whitmore Wash.

The conclusion of this review is that the program should continue to operate, guided by the protocols developed in 1995 and modified as needed since that time, so that the long-term impacts caused by dam operations can continue to be monitored and can be better understood. In general, GCD has become a significant feature in the Colorado River ecosystem and, along with other features such as drought, has influenced the functioning of that system. The plant and animal communities within the ecosystem show continued adjustment to the changes wrought by the dam, though the maintenance of modified low fluctuating flows has created a more stable environment within which native plant species, such as *Salix exigua* (coyote willow) and *Tessaria sericea* (arrowweed), have been able to gain advantage over those species such as *Tamarix chinensis* (tamarisk), which thrive in disturbed environments. Visitor movement, too, has become systematic based on the predictability of the flow regime, which has enabled the National Park Service (NPS) to manage heavily visited sites through trail improvements and the SPC to tailor its education and outreach efforts to those sites as well. Consequently, based on the data collected to date, the SPC supports continued operation of GCD under the existing flow regime.

Communicating with Others

Lack of effective communication – with tribal leaders and members, other GCDAMP participants, and members of the public – has been a major problem for the SPC and has been exacerbated by changes in leadership within the SPC and the agencies responsible for managing the operations of GCD. Specific efforts should be made to address this problem. Within the GCDAMP, the development of an orientation packet for both existing and new AMWG members and key agency personnel would provide a first step in acknowledging the complexity of the program and the need for developing a shared, working knowledge of all the program components, the basis for their existence, and the information generated since the program began.

The SPC can take several steps as well. The SPC should develop an orientation packet for newly elected tribal council members to ensure that tribal leaders are up-to-date with information about the GCDAMP and Southern Paiute involvement in it. The *Southern Paiute River Guide*, which was created in 1996, should be updated with information gained through participation in the GCDAMP. The SPC should develop a website and outreach materials about Southern Paiute concerns in the Colorado River Corridor, the SPC program, and the findings of its first ten years of operation. These should be made available to GCDAMP members and also members of the general public. The SPC Director/Coordinator should continue to participate in training sessions for river guides, NPS personnel, and others with direct responsibility for managing the activities of visitors in the Corridor. In addition, the Director/Coordinator should seek additional means of

communicating with those audiences, such as submitting articles to the *Boatmen's Quarterly Review* and other relevant publications.

Since the Colorado River and its canyons were first recognized by Euroamericans for their potential – as sites for mining, dams, a railroad, and recreation – the Southern Paiutes have been forced to adapt to the policies and practices of people whose interests have often been diametrically opposed to their own. Still, they have persisted in trying to be recognized and given the opportunity to fulfill their cultural and legal mandate to protect this region which is central to their lives and understanding of who they are. Southern Paiutes have always belonged to this region and within it, not the reverse, and so must continue to manage it through regular interactions that can only occur in place, regardless of how the region changes over time. The incidental fact that the region now contains a dam and many other relatively new features does not alter this sacred responsibility. These words, written in 1996, continue to reflect the Southern Paiute position:

> Today, there are many interested parties with concerns for the Colorado River Corridor, and this makes traditional land use difficult. Although the federal land managers consider the land to be in their control, the Southern Paiute continue to perceive it as a land without ownership and a land that cannot be controlled but merely utilized in a good way. For the Southern Paiute, dominion over the natural part of life is inconceivable; it is as a person having ownership over another and controlling his or her capabilities. The People can only serve as stewards and act in the land's best interest. Southern Paiutes must employ yesterday's teachings with today's technology to best care for the land. (Austin and Bulletts 1996a:2)

Through the GCDAMP, the SPC will continue to represent the Southern Paiutes and ensure that their viewpoint on the operation of the dam and its effects on the Colorado River ecosystem is presented to other stakeholders and scientists who represent a variety of sometimes conflicting interests. Although effective integration of scientific and Southern Paiute worldviews has not been achieved, efforts to find common ground should continue. The opportunity for others to hear and appreciate Southern Paiute viewpoints, and for Southern Paiutes to learn about and understand other interests, is invaluable.

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APPENDICES

APPENDIX A: Glen Canyon Dam Adaptive Management Program Goals and Objectives

APPENDIX B: March 2007 AMWG Ranking Exercise to Select Hypotheses to Test

APPENDIX C: Southern Paiute Consortium Monitoring Program Protocol and Sample Site Checklist

APPENDIX D: Composite and Line Transect Monitoring Forms

APPENDIX E: Sample Photo Log - Southern Paiute Monitoring

APPENDIX F: Tribal Information Needs for the Terrestrial Ecosystem Monitoring Program

APPENDIX A
Glen Canyon Dam Adaptive Management Program Goals

Goal 1: Protect or improve the aquatic food base so that it will support viable populations of desired species at higher trophic levels.
Goal 2: Maintain or attain viable populations of existing native fish, remove jeopardy from humpback chub and razorback sucker, and prevent adverse modification to their critical habitat.
Goal 3:
Goal 4: Maintain a naturally reproducing population of rainbow trout above the Paria River, to the extent practicable and consistent with the maintenance of viable populations of native fish.
Goal 5: Maintain or attain viable populations of Kanab amber snail.
Goal 6: Protect or improve the biotic riparian and spring communities including threatened and endangered species and their critical habitat.
Goal 7: Establish water temperature, quality, and flow dynamics to achieve the adaptive management program ecosystem goals.
Goal 8: Maintain or attain levels of sediment storage within the main channel and along shorelines to achieve the adaptive management program ecosystem goals.
Goal 9: Maintain or improve the quality of recreation experiences for users of the Colorado River ecosystem, within the framework of the adaptive management program ecosystem goals.
Goal 10: Maintain power production capacity and energy generation, and increase where feasible and advisable, within the framework of the adaptive management program ecosystem goals.
Goal 11: Preserve, protect, manage, and treat cultural resources for the inspiration and benefit of past, present, and future generations.
Goal 12: Maintain a high quality monitoring, research and adaptive management program.

APPENDIX B
March 2007 AMWG Ranking Exercise to Select Hypotheses to Test

LTEP Draft Hypotheses for Ranking March 28, 2007			
Issue:	Rank		Core Questions and Hypotheses
Endangered Fish:			
			Core Question:
		1	Have humpback chub population estimates stabilized or increased recently, and if so, why (warm water, non-native control, other factors)?
			Hypotheses:
Rank 1-5		1.1	Ho–Increased water temperatures in HBC habitat have no effect on HBC reproduction and recruitment.
		1.2	Ho–Flow fluctuations or stability have no effect on HBC reproduction or recruitment.
		1.3	Ho–Increased water temperatures have no effect on the proliferation of non-native fish species or on fish parasites and diseases.
		1.4	Ho–Non-native control has no effect on HBC reproduction or recruitment.
		1.5	Ho–Mainstem Colorado River flows have no effect on survival of young-of-year HBC emerging from the Little Colorado River.
			Core Question:
		2	What are the factors limiting humpback chub reproduction and rearing in the main channel of the Colorado River below Glen Canyon Dam?
			Hypotheses:
Rank 1-32		2.1	H_o–Increased water temperatures in HBC habitat will have no effect on HBC reproduction and recruitment.
		2.2	H_o–Flow stability has no effect on HBC reproduction or recruitment.
		2.3	H_o–Increased water temperatures have no effect on the proliferation of non-native fish species or on fish parasites and diseases.
		2.4	H_o–Non-native fish have no effect on HBC survival, reproduction or recruitment.
		2.5	Ho–Hydraulic impoundment of the LCR by mainstem Colorado River flows has no effect on survival of YOY HBC emerging from the LCR
		2.6	Ho–Flow fluctuations or stability has no effect on HBC survival, reproduction or recruitment.

		2.7	Ho–Mimicking a natural hydrograph, in both annual and daily fluctuations, has no affect on the aquatic ecosystem including native and nonnative fishes
		2.8	Ho–Daily fluctuations of 5 Kcfs have no affect on survival and recruitment of juvenile humpback chub
		2.9	Ho–Providing seasonally available steady flows in the summer and autumn to create more stable near-shore habitats for young-of-year humpback chub has no affect on humpback chub recruitment
		2.10	Ho–Differences in mainstem turbidity have no affect on humpback chub survival and recruitment
		2.11	Ho–Loss of all humpback chub young-of-year flushed into the mainstem has no affect on overall humpback chub recruitment
		2.12	Ho–Control of nonnative fishes in the mainstem has no affect on survivorship and recruitment of humpback chub
		2.13	Ho–Control of nonnative fishes in tributaries in Grand Canyon and throughout the tributary basins has no affect on survivorship and recruitment of humpback chub
		2.14	Ho–Control of nonnative Asian fish tapeworm in the mainstem and tributaries has no affect on survivorship and recruitment of humpback chub
		2.15	Ho–Mainstem Colorado River flows have no effect on survival of young-of-year HBC emerging from the Little Colorado River.
		2.16	Ho–Changes in temperature and flow have no effect on aquatic food base that are significant to fish populations
		2.17	Ho–Modeling can determine if thermal conditions can be modified over a 10-year continuous period of operational management (assuming a TCD) that will result in positive effects to humpback chub and other native fishes and the Lees Ferry trout fishery, despite ancillary effects from nonnative fishes and parasites.
		2.18	Ho–Modeling can determine what combinations of flow and temperature over a 10-year period would be most beneficial to hbc based on cost/benefit.
		2.19	Ho–Flow fluctuations have no affect on conditions in nearshore margin and backwater habitats (e.g., backwater size and geometry, temperature regimes, and food availability) used by juvenile humpback chub
		2.20	Ho–Flow fluctuations have no affect on conditions in nearshore margin and backwater habitats used by non-native fishes that serve as predators and competitors of juvenile humpback chub.
		2.21	Ho–Changes in temperature and flow have no effect on spawning of humpback chub in the mainstem.

		2.22	Ho–Changes in temperature and flow have no effect on over-winter survival of humpback chub in the mainstem.
		2.23	Ho–Dam operations do not interact with other factors affecting humpback chub population status (such as the presence and abundance of nonnative species).
		2.24	Ho-Maintenance of the Lees Ferry trout fishery (target population levels) has no effect on downstream trout populations or on HBC recruitment in Grand Canyon
		2.25	Ho-Re-colonization of RBT from tributaries and from below and above the LCR removal reach will not require that mechanical removal be an ongoing management action
		2.26	Ho-Increased water temperatures will not increase the incidence or magnitude of infestation of Asian Tapeworm in HBC or impact survival and growth rates
		2.27	Ho-Entrainment of non-native fish in GCD releases will have no effect on HBC survival, reproduction or recruitment
		2.28	Ho-Water quality parameters in the LCR do not negatively affect HBC survival, reproduction or recruitment
		2.29	Ho-Recreational and scientific activities have no effect on HBC survival, reproduction or recruitment
		2.30	Ho-Habitat improvements in the LCR will have no effect on HBC survival, reproduction or recruitment
		2.31	Ho-The aquatic food base in the Lees Ferry reach is not critical to HBC survival, reproduction or recruitment
		2.32	Ho-Flow stability will have no effect on the aquatic food base upon which HBC depend
			Core Question:
		3	Will dam operations, including temperature changes, diel fluctuations, and BHBFs affect the movement of razorback sucker from Lake Mead into Grand Canyon?
			Hypothesis:
		3.1	Ho–Changes in dam operations will have no effect on razorback sucker.
Expanding HBC Range:			
			Core Question:
		4	Can the decline of HBC be reversed by expanding the current range of HBC into suitable unused historic habitat within GRCA/GLCA (tributaries/mainstem)?
			Hypothesis:

Rank 1-2		4.1	Ho–Control of nonnative fishes in tributaries in Grand Canyon and throughout the tributary basins has no affect on survivorship and recruitment of humpback chub
		4.2	H_o–Non-native fish have no effect on HBC survival, reproduction or recruitment.
Fine Sediment:			
			Core Question:
		5	Can the decline in sediment resources since 1990 be reversed using "flow" options with remaining downstream sand supplies from tributaries (Paria and Little Colorado Rivers and lesser tributaries)?
			Hypotheses:
Rank 1-9		5.1	H_o–Releasing BHBFs with each significant Paria River sediment input will not reverse the negative trend of sediment storage in Grand Canyon.
		5.2	H_o–The duration of BHBF events has no effect on the conservation of sediment.
		5.3	H_o–Dam releases subsequent to BHBF events have no effect on sandbars formed by the BHBF.
		5.4	Ho–Releasing BHBFs with each significant Paria River sediment input will not reverse the negative trend of sediment storage in Grand Canyon.
		5.5	Ho–The duration of BHBF events has no effect on the conservation of sediment.
		5.6	H_o– BHBF magnitude has no effect on conservation of sediment
		5.7	H_o–BHBF flows will have no effect on the number, size (area), and location of beaches (> 8K cfs) in Glen and Grand canyons
		5.8	Ho–BHBFs will not result in persistent changes to sandbars used as campsites.
		5.9	Ho–Flow regimes occurring between BHBF events will not diminish campable area.
Archeological Sites:			
			Core Question:
		6	If the answer to Core Question #5 is yes, then will such enhanced sediment conservation promote in-situ preservation of archeological sites?
			Hypotheses:
Rank 1-2		6.1	H_o–Aeolian transport of sand will not change as beach area and volume change.
		6.2	H_o–Aeolian transport of sand will not alter gully formation or erosion rates of gullies tributary to the Colorado River in Grand Canyon.

Recreation and Camping:			
			Core Question:
		7	If the answer to Core Question #5 is yes, then will such enhanced sediment conservation promote conservation of recreation beaches and campable area?
			Hypotheses:
Rank 1-3		7.1	Ho–BHBFs will not result in changes to area and volume of sandbars used for camping
		7.2	H_o–BHBFs will not result in persistent (>1 year) changes in area and volume of sandbars used for camping
		7.3	H_o – Flow regimes occurring between BHBF events will not diminish campable area
Effects of BHBFs:			
			Core Question:
		8	Will high flow experiments promote conservation of high priority AMP biological resources (e.g., native fishes, native riparian vegetation, aquatic food base, rainbow trout)?
			Hypotheses:
Rank 1-9		8.1	Ho-Backwaters created by BHBFs will not result in increased survival and recruitment of humpback chub and other native fishes in Marble and Grand Canyon.
		8.2	H_o–BHBFs will not measurably impact distribution and abundance of non-native fishes in Grand Canyon.
		8.3	H_o – BHBFs will not measurably impact distribution and abundance of native fishes in Grand Canyon
		8.4	H_o–BHBFs will not result in a measurable change in the aquatic food base below Glen Canyon Dam
		8.5	H_o–BHBFs will not result in measurable changes in the composition and areal extent of native and nonnative riparian vegetation.
		8.6	H_o–BHBFs will not have a measurable impact on the Lees Ferry rainbow trout population size or downstream displacement
		8.7	Ho–BHBFs will not materially impact distribution and abundance of native fish habitat, including backwaters, vegetated shoreline, and rock overhangs (bedrock undercut banks)
		8.8	Ho–Changes in fish habitat caused by BHBFs will have no affect on humpback chub survivorship and recruitment
		8.9	Ho–BHBFs will do not result in displacement and loss (mortality) of young-or-year/juvenile humpback chub

Water Quality:			
			Core Question:
		9	Will high flow experiments affect the water quality released from Glen Canyon Dam?
			Hypotheses:
Rank 1-2		9.1	H_o–Operation of the river outlet works and the penstocks will not alter Lake Powell hydrodynamics or stratification or alter release water quality.
		9.2	Ho–Operation of the river outlet works and the penstocks will not alter Lake Powell hydrodynamics or stratification or alter release water quality.
Dam Operations:			
			Core Question:
		10	Will warming dam releases positively affect listed or special status species in the Colorado River ecosystem (including effects of non-native species)?
			Hypotheses:
			(Many of the hypotheses listed above address warming Colorado River water)
Visitor Experience:			
			Core Question:
		11	Can visitor experience (boating, camping, sightseeing, safety) be enhanced through alteration of the MLFF flow regime?
			Hypotheses:
Power Plant Hourly Releases:			
			Core Question:
		12	What effect do power plant releases (ramp rates, fluctuating and steady) have on listed or special status species in the Colorado River ecosystem?
			Hypotheses:
			(Many of the hypotheses listed above address power plant operations)
Rank 1-6		12.1	Ho–Changes in dam operations will have no affect on downstream vegetation.
		12.2	Ho–Changes in dam operations will have no affect on southwestern willow flycatcher.
		12.3	Ho–Changes in dam operations will have no affect on bald eagle.
		12.4	Ho–Changes in dam operations will have no affect on Kanab ambersnail
		12.5	Ho–Changes in dam operations will have no affect on flannelmouth sucker and bluehead sucker.
		12.6	Ho–Changes in dam operations will have no affect on northern leopard frog.
Trout Fishery:			
			Core Question:

		13	How can the Lees Ferry trout fishery be improved?
			Hypotheses:
Rank 1-9		13.1	Ho-The adult population of rainbow trout is not controlled by survival rates during incubation and YoY/juvenile rearing stages, or by changes in growth and maturation in the adult population influencing egg deposition
		13.2	Ho-The size of rainbow trout in Glen Canyon is not controlled by density and food availability
		13.3	Ho-Increased water temperature will not result in the occurrence of whirling disease in rainbow trout
		13.4	Ho-Rainbow trout do not migrate from Glen to Marble and eastern Grand Canyons, nor do Glen Canyon migrants support the population in Marble and eastern Grand Canyons
		13.5	Ho-A limited number of years of mechanical removal of rainbow trout in Marble and eastern Grand Canyons will not result in a long-term decrease in abundance
		13.6	Ho-There is no angler preference between trout density and size
		13.7	Ho-There is no correlation between GCD flow constraints (ramping rates, daily flow range, etc.) and maximize fishing opportunities and catchability
		13.8	Ho-Flow stability will have no effect on the Lees Ferry aquatic food base
		13.9	Ho-Increased turbidity will have no effect on the aquatic food base
Invasive Species:			
			Core Question:
		14	How can invasive species be eliminated, reduced or controlled in the Colorado River ecosystem?
			Hypotheses:
Rank 1-3		14.1	Ho-There is no effective means for reducing or eliminating Asian tapeworm in the CRE
		14.2	Ho-Tamarisk poses no significant threat to the CRE
		14.3	Ho-There is no effective means for reducing or eliminating tamarisk in the CRE
Strategic Science Questions from the Knowledge Assessment workshop:			
		1	To what extent are adult populations of native fish controlled by production of young fish from tributaries, spawning and incubation in the mainstem, survival of YoY and juvenile stages in the mainstem, or by changes in growth and maturation in the adult population as influenced by mainstem conditions?
		2	To what extent does temperature and fluctuations in flow limit spawning and incubation success for native fish?

		3	What is the relative importance of increased water temperature, shoreline stability, and food availability on the survival and growth of YoY and juvenile native fish?
		4	How important are backwaters and vegetated shoreline habitats to the overall growth and survival of YoY and juvenile native fish? Does the long-term benefit of increasing these habitats outweigh short-term potential costs (displacement and possibly mortality) associated with high flows?
		5	Do the potential benefits of improved rearing habitat (warmer, more stable, more backwater and vegetated shorelines, more food) outweigh negative impacts due to increases in non-native fish abundance? To what extent could predation impacts by non-native fish be mitigated by higher turbidities?

APPENDIX C
Southern Paiute Consortium Monitoring Program Protocol and Sample Site Checklist

1. Evening prior to site visit:
   Discuss significance of site, goals of monitoring, problems noted in the past, possible remediation

2. Upon arrival at site:
   Gather, pray, prepare for site visit, as appropriate

3. Scoping of site:
   Each individual walks around site, finds place to watch, listen, reflect; where relevant, observe visitor behavior

4. Whole group meeting:
   Review monitoring goals and existing photo points, and establish new ones as needed. Verify that *sampling units* within each site are sufficient to measure overall site condition.

5. Team activities:

    1. Photo documentation - replicate “monitoring” photos; modify site maps as needed
    2. Install transects and read them
    3. Do visitor monitoring
    4. Meet after monitoring to turn in forms and compile all information on a single site monitoring form.

5. REMINDER:

Transects run toward the river (the 0 point is Point A and is located distant from the river; the other endpoint is Point B and is located on the shore of the river).

Plant transects run parallel to the ground. If an obstacle, such as a rock or a bush causes the transect to be above the surface, maintain that elevation to the extent possible the entire length of the transect and project transect “shadow” on the surface.

Place the photoboard in each monitoring photo for archival purposes.

River Mile 197R Above Parashant Southern Paiute Monitoring Site 14

Monitor (s) _____ Date _____

__ 1. General site evaluation (refer to site overview photos and check one response for each):

Overall site condition

___ No change from previous year
___ Degradation of site since previous year
___ Improvement of site since previous year

Arroyo/gullying/bank cutting/slumpage

___ No change from previous year
___ Increase since previous year
___ Sand replaced since previous year

Other obvious impacts (specify):

__ 2. Photograph any conditions, such as gullying, that cause a change from previous year - identify each shot with Mile, Site #, Condition, Date. Complete Photo Log and record Photo Points on Site Map.

__ 3. Meet with monitoring team and assess whether existing sampling units adequately assess the condition of the monitoring site. Review priority tasks. Adjust tasks as warranted by overall site condition and ability of the existing units to measure it.

Priority Tasks for Transition Monitoring Trip May 2005 (check when completed):

[Note: Vegetation at this site serves to protect rock art. Use the site overview and photos to evaluate the level of protection afforded the rock art panels.]

Team 1:

__ 1. Locate maximum extent of high water - mark this on site diagram and in relation to transects.

__ 2. Rephotograph high water level - identify each photo with: Mile, Site #, Purpose, Date. Complete Photo Log and check Photo Points on Site Map.

__ 3. Record the condition of the fire pits and grinding stone and complete Archaeology Monitoring Form. Pay particular attention to bank slumpage impacting fire pits.

__ 4. Photograph the fire pits and grinding stone - identify each with Mile, Site #, Feature #, Date. Complete Photo Log and record Photo Points on Site Map.

__ 5. Record the condition of the rock art panels and complete the Rock Art Monitoring Form. Pay particular attention to trampling of the vegetation in front of the panels.

__ 6. Rephotograph rock art panels - identify each with Mile, Site #, Transect #, Date. Complete Photo Log and record Photo Points on Site Map.

__ 7. Take special note of and photograph, if necessary - identify each photo with: Mile, Site #, Purpose, Date. Complete Photo Log and record Photo Points on Site Map:

trailing in and around the site

Impact of high water on sand deposited in 1996 spike flood

Team 2:

__ 8. Reinstall 47.4 m line intercept transect from rock art panel to beach.

__ 9. Install two additional 50 m long line intercept transects, tying all to rock art panel, archaeology site, and/or boat dock area.

__ 10. Identify and record intercepts of plants along transects 1,2 and 3 on Vegetation Monitoring Forms.

__ 11. For existing transect, rephotograph monitoring photos - identify each photo with Mile, Site #, Transect #, Date. Complete Photo Log and check Photo Points on Site Map..

__ 12. For new transects, photograph transect endpoints and reference photos necessary for relocating transects in the future - identify each photo with Mile, Site #, Transect #, Date. Complete Photo Log and check Photo Points on Site Map..

__ 13 Photograph the trails where they cross the transect - identify each with Mile, Site #, Transect #, Date. Complete Photo Log and record Photo Points on Site Map..

NOTES:

APPENDIX D
Composite and Line Transect Monitoring Forms

1. Site #: _____ 2. Ecozone (OHWZ/NHWZ/Desert)
3. Monitors: _____ 4. Date: _____

Use the back of this page to record additional comments!

Natural Impacts

Plants	Rock Art	Archaeology	Water Source
0:none; 1:<5%; 2:5-50%; 3:50-95%; 4:>95%	0:absent; 1:present; 2:increase; 3:decrease; 4:NA	0:absent; 1:present; 2:increase; 3:decrease; 4:NA	0:none; 1:<5%; 2:5-50%; 3:50-95%; 4:>95%
__ erosion __ flooding __ plant competition __ animal activity	__ surface erosion __ direct water __ mineral accretion __ frost damage __ salt deterioration __ soil/dirt/mud __ vegetation __ microflora __ animals	Complete Table on Reverse	__ erosion __ flooding __ plants __ animals

If arroyos or gullies are present at this site, do they drain into the river? (No/Yes/NA)
Describe the impacts marked above (specify type of cultural resource):

Other Natural Impacts (Explain the impacts and to which cultural resource type):

Natural Impacts since last monitoring:

Human Impacts

Plants	Rock Art	Archaeology	Water Source
0:none; 1:<5%; 2:5-50%; 3:50-95%; 4:>95%	0:absent; 1:present; 2:increase; 3:decrease; 4:NA	0:absent; 1:present; 2:increase; 3:decrease; 4:NA - CIRCLE:	0:none; 1:<5%; 2:5-50%; 3:50-95%; 4:>95%
__ on site camping __ trailing __ picking __ clearing vegetation __ water inundation due to dam	__ on site camping __ vandalism/graffiti __ dust from foot traffic __ erosion by trailing __ water inundation due to dam	(structures; artifacts; roasters /hearths; perishables/middens) __ on site camping __ vandalism/graffiti __ collection piles __ water inundation due to dam	__ water inundation due to dam

Ease of access (specify resource type): a) very easy b) moderately easy c) difficult d) very difficult

Describe the impacts marked above (specify type of cultural resource & plant species, if applicable):

Other Human Impacts (Explain the impacts and to which cultural resource type):

Human impacts since last monitoring:

Any human impacts related to river and/or dam (ie new trails to avoid high water, new beaches near a sampling unit)?

Mark location of each impact on site map.

Impacts are either: 0:absent; 1:present; 2:increase; 3:decrease; 4:NA

#	Type of Impact	Archaeological Data				
		Structures	Artifacts	Roasters/ Hearths	Perishables/ Middens	Other
1.	Surface Erosion (0-10cm)					
2.	Gullying (10-100cm)					
3.	Arroyo Cutting (>1m)					
4.	Bank Slumpage					
5.	Eolian/Alluvial Erosion					
6.	Side Canyon Erosion					
7.	Animal-Caused Erosion (trailing, burrowing)					
8.	Other Natural Impacts (spalling, roots)					

COMMENTS:

Southern Paiute Consortium
Colorado River Corridor Vegetation Monitoring Form
Line Intercept Transects

1. River Mile: _____ 2. Monitoring Site Number/Name: _____
3. Plot #: _____ 4. Date: _____
5. Ecozone: (OHWZ/NHWZ/Desert): _____
6. Length of Transect: _____
7. Monitor (s): _____
8. Plot Location (see attached map): _____
9. Notes:_____
_____

Species name	**Total Intercept**	**Measurements** [Please Describe Method of Taking Measurement] _____ _____ _____ _____

APPENDIX E
Sample Photo Log - Southern Paiute Monitoring

Please indicate the location of permanent photo station shots on the enclosed graph paper and/or on the enclosed archaeological site map. For shots taken at a permanent photo station, please mark down a compass reading in the appropriate space below.

Roll #: _____ Film Type: _____ **Site # 14 - Above Parashant**
Notes:_____
_____

log #	M / R	description	date / time	roll #	compass reading	special camera settings/ notes
14-1	R	site overview				
14-2	R	site overview. From p/p 14.2				rock at top of transect 1
14-3	R	site overview				
14-4	R	site overview				
14-81	M	From 45m on Transect #1				showing overview of Transects 1 & 2
14-82	M	From 12m on Transect #2 towards river				20 cm upriver from line
14-83	M	From 28m on Transect #3 toward pt. A				standing on rock

		TRANSECT #1				
14-20	R	new transect end pt			250^{o}	line held under rock from downstream end of mesquite, top of trail.
14-25	R	closeup of 0pt. Retake photo				
14-26	R	closeup of 0pt. Remove				w/black dot
14-19	R	Cyndi at pp. 14.18			240^{o}	taken from 14.18, showing trail. Erosion #10 horizontal.
14-21	M	trail to rock art and boulders			170^{o}	from transect end pt.
14-22	R	down transect from new 0 to end.			140^{o}	overview of transect from 14 25.
14-18	R	Diane at pp. 14. 19			60^{o}	up stream end of most heavily used part of trail- taken from 14.19, showing trail
14-23	M	dead mesquites in front of rock art. From p/p 14.2			70^{o}	horizontal view
14-24	R	dead mesquites in front of rock art. From p/p 14.2			70^{o}	vertical view
14-16	R	red boulder inside shelter. Close-up at 80mm.				photo shows black marks on left side- appear to be drawn recently w/ charcoal
14.17	M	trail in front of boulders. Same photo as 14.18			69^{o}	Diane at upstream end of trail. Photos with both cameras because apparent problem BD camera.
14-27	M	down transect from new 1m pt.			140^{o}	
14-28	R	location of tape through acacia				older end pt. from above -10m
14-29	R	location of tape through acacia				old end pt. from below -11.5m
14-79	R	From 4m toward river				
14-80	R	From 16m downriver 4m from line				looking at line, showing how line crosses trail
14-84	R	16m from 2 m upriver from line				

14-8	R	17.4m pt.				looking up to pt. A
14-9	R	17.4m pt.				looking down to end pt. at river
14-30	R	middle of line from 2m upstream of line at 23.5m				
14-10	M	26.4m pt.				looking to end pt at river
14-31	M	down transect from 33m				looking toward end pt at river
14-11	M	36.4m				looking up to pt A
14-33	M	at 42m-2m away at looking at end of transect			180^{o}	
14-12	M	43.4m pt				looking up to pt. A
14-13	M	43.4m pt.				looking to end pt. at river
14-32	M	looking up transect from 46m			324^{o}	looking toward 0 pt.
14-34	R	site overview from 46m			340^{o}	transect in left hand side; horizontal
14-35	R	high water line				board at high water mark
14-36	R	high water line and return channel - 3m from line			42^{o}	board at high water mark - from downstream of transect
14-37	M	trail where it crosses line at lower end from below				from below at base of slope
14-38	M	trail where it crosses line at lower end from below				from above-on rock above trail
14-39	M	trail were it crosses line at upper end.				from below- looking up at wall and 0pt.
14-14	R	transect: point B				looking at pt. B
14-15	R	transect: point B				looking away from pt. B

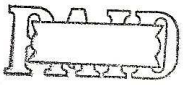
APPENDIX F
Tribal Information Needs for the Terrestrial Ecosystem Monitoring Program

Tribal Information Needs for the Terrestrial Ecosystem Monitoring Program

The intent of collecting biological data for monitoring is to provide information about change associated with resources that are inherently important as well as those that are thought to be critical links in biological processes. The current terrestrial monitoring program has focused on resources that are directly affected by water availability (e.g., plant species and plant growth) or that respond to these resources (insect abundance, bird abundance). Currently, data are collected in a manner that permits year-to-year comparisons of change. The interpretation of the data as to whether a change is reflective of the health of the resources is influenced by the adequacy of the data, how the data are provided, and the cultural values of the interpreter.

To insure that tribally-pertinent data are collected and integrated in the TEM program, tribes need to address the following topics in their final reports on the TEM program:

1. What types of data do each tribe require for resource monitoring purposes?
   a. Plant and animal species of importance?
   b. Qualities about those species that are important to monitor (for example: numbers, location, time of year).
   c. How can the data be presented so as to be most useful for tribes? (e.g., raw data tables? graphs? schematic images?)
2. How would each tribe use these data for interpreting environmental conditions and change?
3. What elements of the current TEM approach meet tribal needs and what is lacking in the current approach?
4. What elements of previous monitoring approaches (the approaches previously used by the tribes for monitoring resources of tribal concern) are not being met by the current TEM approach?
5. Given budgetary constraints, what resources are priorities for monitoring?



Below is a suggested outline for the tribal reports. The precise format of the report is not critical, however, so long as the necessary information is included.

Introduction: background and purpose of tribal involvement in the TEM program.

Summary of Tribal Involvement in the TEM project: What was done over the past three years specifically for this project? Include trips participated on, interviews conducted, information gathered, reports prepared, etc.

(Tribal) Data Requirements for Resource Monitoring: See questions 1 and 2 above. Depending on the level of tribal interest, certain classes of resources (plants, mammals, insects, etc.) may be discussed in greater depth than others.

Assessment of current TEM program: See questions 3 through 5 above. In what ways is the current TEM approach useful to tribes? Are some/most/all tribal needs being met by the current approach? Are any aspects of the current program (field techniques, etc.) inappropriate from a tribal perspective? Evaluate the overall program in terms of how well it does and does not monitor changes to the resources of tribal concern.

Recommendations: How could things be done differently (better) to meet tribal concerns for tracking change and health status of the terrestrial ecosystem? Given budgetary constraints, what species/resources are most important to monitor? Please try to prioritize your recommendations (most important, less important)