

NORTH CENTRAL ARIZONA REGIONAL WATER STUDY

Area: North Central Arizona

Location: An Area encompassing the Town of Page, Cameron, City of Flagstaff, City of Williams, Village of Tusayan and the Grand Canyon National Park Village in Coconino County.

Local Organization: The North Central Arizona Regional Water Planning Partnership.

Local Participants: City of Flagstaff, City of Williams, Village of Tusayan, Navajo Nation, Havasupai Tribe, Kaibab Forest, Grand Canyon National Park

Technical Support: Department of Water Resources, U.S. Geological Survey

Objective: The objective of the partnership is to define a cooperative program of water supply, water conservation, and resource protection that will best serve public needs and protect nationally and locally significant resources from actions that would threaten their future protection through the following actions.

- The participants will conduct an evaluation of present and future water supply needs.
- The participants will seek a better scientific understanding of the characteristics of the aquifer and the associated resources to be protected.
- The participants will evaluate the potential for the development of regional water sources needed to meet projected supply needs.
- The participants will define water conservation measures that could be applied to the region to lessen the amount of water currently being used for domestic purposes and reduce future demand for water.
- Based on the best scientific knowledge available, the participants will define and evaluate alternatives for water supply, conservation, and resource protection that are consistent with federal and state law and will best serve the public good.
- The Partnership may develop a resource management plan that will best achieve the objective of this effort.

Possible Cost Share Partners: U.S. Department of the Interior, Flagstaff, Williams, Navajo Nation

North Central Arizona Regional Water Supply Study Contact List

Phase 2 Participants:

Organization	Name	Phone	Mailing Address	Fax	E-mail
Navajo Nation Dept of Water Resources	John Leeper Mike Foley	520- 729-4004	PO Drawer 678 Fort Defiance, AZ 86504	520- 729-4126	
Havasupai Tribe	Margaret Vick	602- 829-6663	1215 E. Del Rio Dr. Tempe 85282-3918	602- 829-3990	margaret.vick@azbar.org
City of Flagstaff	Ron Doba Utilities Director	520- 774-5281	211 W. Aspen Ave. Flagstaff 86001-5399	520- 779-7696	
City of Williams	Dennis Dalbeck	520- 635-4451	113 S. First St. Williams 86046	520- 635-4495	
Tusayan Hydro Resources	John Rueter	520- 638-9243		520- 638-2363	
Tusayan Anasazi Water Company	Chris Thurston	520- 773-9500		520- 773-9600	
City of Page	Bill Plummer	602- 922-4645		602- 922-0739	
Coconino County	Bill Towler	520- 226-2700	2500 N. Fort Valley Rd., Bldg. 1 Flagstaff	520- 226-2701	
Department of Water Resources (ADWR)	Mike Pearce	602- 417-2420	500 N. 3rd St. Phoenix 85004-3903	602- 417-2415	mjpearce@adwr.state.az.us
Department of Water Resources (ADWR)	Gregg Houtz	602- 417-2408	500 N. 3rd St. Phoenix 85004-3903	602- 417-2415	gahoutz@adwr.state.az.us
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US Geological Survey (USGS)	Bob Hart	520- 556-7137	2255 N. Gemini Dr. Flagstaff 86001	520- 556-7112	
US Geological Survey (USGS)	Don Bills	520- 556-7142	2255 N. Gemini Dr. Flagstaff 86001	520- 556-7112	
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North Central Arizona Regional Water Supply Study Contact List

Organization	Name	Phone	Mailing Address	Fax	E-mail
US Forest Service (USFS) Kaibab Nat'l Forest	Dennis Lund	520- 635-8270		520- 635-8208	
Bureau of Indian Affairs (BIA)	Raymond Roessel Water Resources	602- 379-6789	PO Box 10 Phoenix 85001	602- 379-6835	
Governor's Office	Gary Scaramazzo	520- 773-1110		520- 773-1310	
Verde Watershed Association	Tom O'Halleran	520- 284-2023		520- 284-2032	
Morrison Institute	Rick Heffermon	602- 965-4525	PO Box 874405 Tempe 85287-4405	602- 965-9219	rheff@netzone.com

To be kept informed:

Organization	Name	Phone	Mailing Address	Fax	E-mail
National Park Service Water Resources Division	William Hansen Water Rights Branch	303- 225-3532	1201 Oak Ridge Drive, Suite 250 Fort Collins, CO 80525	303- 225-9965	
Grand Canyon Trust	Nikolai Ramsey	520- 774-7488	2601 N. Ft. Valley Rd. Flagstaff 86001	520- 774-7570	
Bureau of Indian Affairs (BIA)	Robert McNichols Superintendent	520- 769-2286	13067 E. Highway 66, PO Box 37 Valentine 86437-0037	520- 769-2444	
Department of Justice	Peter Fahmy			303- 231-5363	
City of Page	Richard Jentsch Assistant Manager	520- 645-8861	Box 1180, 697 Vista Ave. Page 86040	520- 645-4254	
Ashfork Water Service	Lewis Hume	520- 637-2774	P.O. Box 436 Ashfork 86320	520- 637-2442	
State Senate	John Wettaw	800- 352-8404	1824 Spencer Circle, Flagstaff, AZ 96004	602- 542-3429	
State of Utah Dept. Of Natural Resources Div. Of Water Resources	Robert King	801- 538-7259	1594 W. North Temple, Suite 310 Box 146201 Salt Lake City, UT 84114-6201	801- 538-7279	nrvres.rking@email.state.ut.us

North Central Arizona Regional Water Supply Study Contact List

Private Water Companies:

Organization	Name	Phone	Mailing Address	Fax	E-mail
Bellefont Water Company	Nona McClain	520-635-2467	301 S. 9th St. Williams 86046		
Doney Park Water	Bill Linville	520-526-1080	7161 N. Hwy 89 Flagstaff 86004		
Flagstaff Ranch Water Company		602-954-0321	2525 E. Arizona Biltmore Cir. Phoenix 85016		
Forest Highlands Utility Management	Bill Strauss	520-525-1139	221 Griffith Springs Forest Highlands 86001		
Heckethorn Water Company		520-779-3812	527 Lake Mary Rd Flagstaff 86001		
Mountain Dell Water Inc.		520-774-9550			
Ponderosa Utility Corporation	Walt Brown	520-525-6210	3A W. Osage Flagstaff 86001		
West Village Water Company					

**MEMORANDUM OF UNDERSTANDING
OF THE PARTICIPANTS OF
THE NORTH CENTRAL ARIZONA
REGIONAL WATER STUDY**

BETWEEN THE

**Arizona Department of Water Resources
Grand Canyon National Park
Kaibab National Forest
U.S. Geological Survey
Havasupai Tribe
Navajo Nation
City of Flagstaff
City of Williams
Village of Tusayan
Coconino County
City of Page**

I. INTRODUCTION

Recent discussions between state and federal agencies, Indian Tribes, local cities and villages, and public interest groups have identified issues regarding the need for a firm water supply to meet current and projected demands, and the protection of the regional aquifer, seeps and springs, and water-related resources along the south rim of the Grand Canyon in Grand Canyon National Park and within the Havasupai Reservation. There is a need to cooperatively evaluate and develop a regional water study that identifies future water sources and water development scenarios which will implement progressive water conservation practices and protect the regional aquifer and sensitive aquatic resources in north central Arizona.

This Memorandum of Understanding (MOU) between the Arizona Department of Water Resources (ADWR), Grand Canyon National Park, the Kaibab National Forest, the United States Geological Survey, the Havasupai Tribe, the Navajo Nation, the City of Flagstaff, the City of Williams, The City of Page, and the Village of Tusayan and establishes the framework for the cooperative pursuit of the objective stated below. This effort is titled "The North Central Arizona Regional Water Planning Study", hereafter referred to as "The Study".

The geographic area of concern is roughly defined as being bordered on the north by the Colorado River, on the west by the Cataract Canyon drainage, on the south by the Cities of Flagstaff and Williams and on the east by the Western Agency of the Navajo Nation.

II. OBJECTIVE

The objective of The Study and this MOU is to cooperatively develop regional water plans and/or cooperative programs that identify future water supplies and water development scenarios that best serve public needs and protect nationally and locally significant resources.

III. COOPERATION

Through this MOU, The Study seeks to achieve the objective through the following actions:

- A. Evaluate present and future water supply demands and needs.
- B. Evaluate the need for studies and data collection, which advance the scientific understanding of the characteristics of local and regional aquifers and water dependent resources, including flora and fauna associated with springs and seeps.
- C. Identify and develop water conservation measures that can be applied in the region to reduce existing and future demand for water in the north central region of Arizona.
- D. Evaluate the potential for the development of regional water sources needed to meet projected demand.
- E. Based on available scientific knowledge, develop and evaluate alternatives for water supply and development, water conservation, and resource and aquifer protection that are consistent with federal and state law and that best serve the public.
- F. Recommend management alternatives that take into account existing growth management plans and the absence of such growth management plans that could be employed to achieve the objective of the Study.

IV. IMPLEMENTATION AND ADMINISTRATION

ADWR will chair The Study and will provide administrative and technical support to this cooperative effort. Participants will be responsible for briefing their individual agency or organization. ADWR will provide summary reports of Study activities no less than twice per year.

V. LIMITATIONS

Nothing in this MOU shall be construed as limiting or affecting the legal authorities or management abilities of any of the participants. Any party to this MOU may withdraw from this agreement by providing written confirmation that they intend to terminate their participation.

Phase One Report

Many communities in the central plateau region of northern Arizona are currently experiencing, or anticipate, water supply problems. Others on the plateau are expressing concerns over the possible effects of increased groundwater pumping. The purpose of the North Central Arizona Regional Water Supply Study is to bring together these entities and, using a regional approach, address these water supply issues. This report is Phase 1 of the study, whose purpose was to:

- identify stakeholders and participants and their interests
- quantify the current and future water use demands of project participants
- examine potential water sources, surface and groundwater, local and imported
- develop conceptual design and cost estimates for an alternative that offers a regional solution
- examine and develop methods to protect and preserve the groundwater resources of the region
- outline further study and plans to meet needs of water users in the region.

Current Stakeholders and Interests

Navajo Nation

Currently, many users on the western half of the reservation must drive to water sources and haul the water back to their homes. The Navajo Nation is interested in increasing the water supply to the western half the reservation, in the areas of LeChee, Coppermine, Bodaway/Gap, and Cameron.

City of Flagstaff

Flagstaff meets summer peaking demands from a surface water source, Lake Mary. This source is very drought-sensitive. Flagstaff is interested in a more reliable supply to replace this source.

City of Williams

Williams' water supply comes from five shallow surface water reservoirs. This supply is extremely drought-sensitive, and a large amount of water stored in the reservoirs is lost to evaporation and seepage. Williams also supplies water to several outlying, unincorporated communities in Coconino County. Williams is interested in a firm water supply to replace this unreliable surface water source.

Tusayan

Tusayan currently meets its base water needs by groundwater pumping. Peak demands are supplied by trucking in water from Grand Canyon Village or from Williams. Tusayan is interested in a reliable supply to supplement or replace their wells, which may have impacts on the many springs in the area.

Grand Canyon National Park

The Tusayan Growth EIS, conducted by the U.S. Forest Service, has focused public and government attention on ways to plan for moderate amounts of growth in the vicinity of Grand Canyon National

Park while providing for the protection of sensitive springs and seeps along the South Rim that may be at risk from regional groundwater extraction. The National Park Service (NPS) is interested in securing a long-term water supply for the park and nearby communities that will most likely assure the continued protection of sensitive park water resources and those of the nearby Havasupai Reservation.

Kaibab National Forest

Kaibab Lake, near Williams in the Kaibab National Forest, is a recreational spot, but drought-sensitive. Kaibab Forest is interested in a water source to maintain the lake year-round and through drought periods.

Havasupai Tribe

The Havasupai Indian Reservation borders Grand Canyon National Park to the south and is located west of Grand Canyon Village. The Tribe is concerned about the effect of increased groundwater pumping on spring flow within the Havasupai Reservation and within Grand Canyon National Park. The Tribe is participating in the study to develop a mechanism to limit groundwater withdrawals and find an alternate supply of water for the region.

Cocoonino County

Population growth in the unincorporated area between Williams and Tusayan is expected to more than double in the next fifty years. This area will need a reliable water supply, which could be provided either by groundwater or another source. The County is also concerned with the effects increased groundwater pumping might have on the springs in the Grand Canyon.

Bureau of Indian Affairs

The Bureau of Indian Affairs' (BIA) primary concern is the potential impact to Indian trust assets and water resources due to groundwater pumping in the region.

City of Page

Page is interested in increasing its water supply to serve the City's growing needs and the demands of the area's recreations industry. Page is also interested in participating in a joint use water delivery system from Lake Powell.

Water Demand Analysis

Projected demands from a new supply source are summarized below. See Appendix A for complete Water Demand Analysis Report.

Demand From a New Supply Source
(acre-feet per year)

	2010	2020	2030	2040	2050
Flagstaff	1,100	1,100	1,100	1,100	1,100
W. Navajo Nation	800	1,300	1,900	2,900	3,700
Williams	1,000	1,500	2,000	2,000	2,000
Tusayan	350	350	350	350	350
Grand Canyon N.P.	500	580	660	740	800
County	500	700	800	900	1,000
Kaibab Lake	500	500	500	500	500
Total	4,750	6,030	7,310	7,490	9,450

Supply Sources

Surface Water

The Navajo Nation will receive 2,800 acre-feet of Central Arizona Project and Kingman Colorado River water based on the agreements-in-concept for the Little Colorado River Adjudication. This water will supply a portion of the demand of the western Navajo Nation. The Grand Canyon National Park has water rights to Roaring Springs, which ultimately flows into the Colorado River. The park's ability to transfer their diversion point to Lake Powell may not be permitted under current law.

Several other possible sources of water for the project have been identified, all from the Colorado River. Increased surface water potential on the Coconino Plateau is limited due to the unavailability of surface water and lack of good reservoir sites. Colorado River sources include purchasing or leasing rights from the Colorado River Indian Tribes, the Cibola Valley Irrigation District, or the Yuma-Mesa Reclamation Project. Rights from the Wellton-Mohawk Irrigation District, or from other Indian tribes, such as the Cocopah, are also being examined. The final Little Colorado River settlement may include a quantity of water for marketing. See Appendix B for complete discussion of possible supply sources.

Groundwater

Several entities, including Flagstaff, Navajo, Tusayan, and Valle, currently pump groundwater. Without an additional water source, most participants will probably increase groundwater pumping to meet their water needs. The Havasupai Tribe, Grand Canyon National Park, Kaibab National Forest, Coconino County, and the Bureau of Indian Affairs are all concerned about the effects of increased groundwater pumping. A multi-year USGS regional study of the groundwater system and

its interaction with surface water and springs on the plateau is proposed to start next year (See Appendix E).

Other Sources

Groundwater and surface water sources in the Little Colorado River basin were also considered, but there are institutional barriers to such transfers.

Delivery Alternatives

Page-Cameron Pipeline

One alternative for this study is a pipeline from Page to Cameron, continuing on to the Grand Canyon, Williams, and Flagstaff. The proposed pipeline would deliver water to the areas of LeChee, Coppermine, Bodaway/Gap, and Cameron on the western half of the Navajo reservation, Grand Canyon, Tusayan, Valle, Williams, and Flagstaff. A preliminary design and cost-estimate were developed for this option. Two possible routes were analyzed; both begin at Lake Powell near Page and proceed south to Cameron.

1. Route 1 continues about 1.5 miles past Cameron, to the ARCO Line 90 right-of-way, where it splits into two spurs. The first spur continues west along the alignment of the ARCO pipeline to Highway 64 between Tusayan and Williams. From this junction one spur heads south to Red Lake, Valle, and Williams, and a second spur heads north to Tusayan and Grand Canyon Village. The second spur heads south along Highway 89 from the ARCO pipeline south of Cameron to Flagstaff.
2. Route 2 splits at Cameron. The first spur heads west along Highway 64 to Grand Canyon Village, then south to Tusayan, Red Lake, Valle, and Williams. The second spur heads south along Highway 89 from Cameron to Flagstaff.

At this time Flagstaff has not committed to participation in the project, so each pipeline route was analyzed with and without their participation. The estimated cost of this option, including water treatment, ranges from \$170 to \$212 million. The cost of a small storage reservoir to provide additional storage for the Grand Canyon was estimated at \$2 million. Construction costs and operation and maintenance costs would be allocated among the participants using a mutually agreeable formula. The two routes, design, and cost estimates are in Appendix C.

Grand Canyon Pipeline

In the short term, the park needs to increase its storage capacity. Currently, the park has only a 2-week supply and would like to increase their storage to a 2-month supply.

Grand Canyon Village currently receives its water supply from Roaring Springs in Bright Angel Canyon on the north rim, via the Transcanyon Pipeline. The pipeline was constructed in 1965. One year later it was destroyed by a flash flood in Bright Angel Canyon, but was placed back in service in 1970, after replacement of much of the pipeline. Engineering studies predict another catastrophic failure before the year 2000.

The Transcanyon Pipeline is nearing the end of its useful life, and is continually suffering corrosion and stress failures. An engineering study published in 1993 (See Appendix D) defined "end of life" as:

1. operation and maintenance costs increase to a point where replacing the pipe is more cost-effective than repairing and maintaining the existing pipe
2. destruction of pipe due to natural or manmade disaster

The study predicted end-of-life within three years in the Phantom Ranch area, and six years for the remainder of the pipeline. The report recommended replacing the most vulnerable sections of the pipe and moving a 7200-volt power line paralleling the pipe, but the recommendations were not acted on. The estimated cost of these recommendations was more than \$15 million (1993 dollars). Maintaining or replacing the pipeline is problematical for the following reasons:

- The current route is about 12.5 miles long, and covers extremely rough terrain that can only be accessed by foot trail or helicopter.
- Bright Angel Creek is subject to frequent flash floods and rockfalls from seismic activity. The pipeline has been destroyed twice by these occurrences, in 1966 by a flash flood and in 1983 by a rockfall.
- Any pipeline in the Phantom Ranch area will be subject to the same electrolytic corrosion from the 7200-volt power line that parallels it. The 1993 report recommended the power line be moved, adding to the cost of the project.

Black Mesa Pipeline/ARCO Pipeline

The ARCO pipeline, designated Line 90, is an oil line designed to carry crude oil from the four corners region to California. The pipeline follows the same right-of-way as the Black Mesa pipeline, a coal slurry line running from the Black Mesa coal mine to Bullhead City. One option considered was to purchase Line 90 from ARCO, and recondition it. However, ARCO recently sold the line to Questar, Inc., a natural gas company. Using the right-of-way of the pipelines is being considered in the above Western Navajo Pipeline option.

Conclusions

The number of people residing in North Central Arizona is expected to double in the next 50 years. Most, if not all, water supply associated with this level of growth will be supplied from groundwater sources from deep wells on the Coconino Plateau. Meeting this demand by increased groundwater pumping will be difficult since the depth to water is more than 1500 feet in most areas. There is also widespread concern over the impact on springs and seeps in the Grand Canyon from groundwater pumping in areas that are hydrologically connected to the Canyon. The City of Flagstaff plans to use groundwater as its major supply source unless availability and cost or environmental impacts of groundwater pumping limits the city's use from this supply source in the future.

Pumping groundwater from other areas on the Plateau (Black Mesa, Little Colorado River drainage) must overcome both cultural and institutional barriers that seem insurmountable. Local surface water sources are limited and in most areas over-appropriated.

Replacing the Transcanyon Pipeline only benefits Grand Canyon Park, and to a lesser extent Tusayan. Also, this alternative poses problems from an environmental and aesthetic perspective. Abandoning this route would increase the flow in Bright Angel Creek and do away with the exposed pipe in the canyon.

Pumping water from the Colorado River in western Arizona to the demand centers on the Coconino Plateau would be cost-prohibitive.

The Western Navajo Pipeline may be a cost and environmentally effective alternative that would provide the region a firm, reliable water supply to meet future demands and deserves further study.

Recommendations for Phase Two

The following tasks are recommended for Phase Two of the project:

- Obtain a formal commitment from participants. A Memorandum of Understanding (MOU) has been drafted to continue the regional study
- Create a Legal Subcommittee to investigate the acquisition of water rights and the need and structure of a regional water authority
- Begin a regional groundwater study of the central Coconino Plateau. This will be headed by the USGS
- Clarify and evaluate current conservation policies and additional conservation measures that could be enacted
- Refine cost estimates for delivery options, select a preferred alternative, and identify financing options
- Outline necessary NEPA compliance
- Outline necessary clearances such as rights-of-way, easements, other administrative clearances, and local ordinances
- Begin public review process for project
- Identify and analyze options for aquifer protection

Phase Two should be completed by the end of 1999.

No Action Alternatives

Navajo Nation

Under both No Action Alternatives, Navajo Nation would develop their own water supply independently of other north central Arizona entities.

Other Interests

With no regional project, increased demand in the region will be met by increased groundwater pumping. The unincorporated areas between Williams and the Grand Canyon, as well as Tusayan, will most likely use groundwater to meet their needs. The increased pumping could potentially impact the seeps and springs in the Grand Canyon.

"A" Alternatives—No partnerships; entities act alone

City of Flagstaff

Flagstaff's future demands would be met by drilling new wells and increasing groundwater pumping. For example, to replace the unreliable Lake Mary supply, the capital cost of drilling new wells is estimated to be \$17.5 Million or about \$804 per acre-foot. This does not include O&M costs.

City of Williams

Williams would meet future water demands by drilling new wells and pumping groundwater. The estimated capital cost of drilling and pumping new wells is \$ _____ Million or about \$ _____ per acre-foot.

Tusayan

Tusayan would continue to receive its water supply from current sources: pumping from deep wells, hauling water from Williams and the Grand Canyon, and reclaimed water.

Grand Canyon National Park

Under this alternative, Grand Canyon National Park would either need to replace the Transcanyon Pipeline or continue its current practice of repairing and replacing failed sections. Currently the pipeline cannot handle any increased flow due to size and pressure constraints. The current capacity is about 350 AF/yr. The No Action Alternative also offers no protection of the Canyon's seeps and springs. The cost of maintaining the Transcanyon Pipeline is more than \$50,000 per year. These costs will continue to increase. Replacing the pipeline from Roaring Springs to Indian Gardens, as was recommended in a 1993 report, will cost about \$23 Million, with a cost per acre-foot of about \$3,849.

"B" Alternatives—Limited partnerships between entities

City of Flagstaff

The proposed pipeline through the western Navajo Nation would be built, and continued to Flagstaff and Williams. The estimated cost-share for Flagstaff under this alternative is \$42.5 Million, or \$1,048 per acre-foot.

City of Williams

Williams would receive water through the pipeline described above. Their estimated cost-share is \$64 Million, or \$867 per acre-foot.

Tusayan

Under this alternative, Tusayan would partner with Grand Canyon National Park to replace, upsize, and extend the Transcanyon Pipeline to Tusayan. Their estimated cost-share is \$13 Million, or \$3,302 per acre-foot.

Grand Canyon National Park

If the entire Transcanyon Pipeline were replaced, upsized, and extended to Tusayan, as discussed above, the Park's estimated cost-share is \$24 Million, or \$2,509 per acre-foot.

Cost Comparisons for Current Supplies, No Action Alternatives, and Regional Pipeline Alternatives
(amortized over 40 years at 4%)

	<i>Current</i>	<i>No Action-A</i>	<i>No Action-B</i>	<i>Route 1A</i>	<i>Route 1B</i>	<i>Route 2A</i>	<i>Route 2B</i>
<i>Navajo Nation</i>	U	U	\$247	\$230	\$232	\$227	\$232
<i>Flagstaff*</i>	\$390-\$550	\$804	\$1,048	\$1,004	-NA-	\$1,006	-NA-
<i>Williams</i>	\$725		\$867	\$784	\$796	\$945	\$972
<i>Tusayan</i>	\$3,260-\$16,290	U	\$3,302	\$949	\$962	\$662	\$677
<i>Grand Canyon</i>	\$3,980	\$3,849	\$2,509	\$1,109	\$1,121	\$727	\$742
<i>Valle</i>	\$5,700-\$7,010	U	\$897	\$728	\$741	\$770	\$797
<i>Red Lake</i>	U	U	\$829	\$723	\$736	\$885	\$912
<i>Kaibab Lake</i>	-NA-	-NA-	\$866	\$761	\$773	\$922	\$949

*Current and No Action-A Alternatives do not include O&M costs.

Phase Two Work Plan Outline

- I. North Central Arizona Regional Water Supply Study Partnership (Chair: ADWR)**
Obtain a formal commitment from participants via a Memorandum of Understanding (MOU)

- II. Geohydrology and Water Resources Study (Chair: Don Bills)**
Begin a regional groundwater study of the central Coconino Plateau

- III. Engineering Subcommittee (Chair: John Leeper)**
 - A. Outline necessary clearances such as:
 - 1. Rights-of-way and/or easements
 - 2. NEPA
 - 3. Local laws
 - B. Complete engineering options and cost out options

- IV. Aquifer Protection and Growth Management Subcommittee (Chair: Margaret Vick)**
 - A. Study and identify resources to be protected
 - B. Study the zone of protection for these resources
 - C. Determine methods of enforcement of protection measures
 - D. Evaluate current growth and water management plans and related issues
 - E. Examine population and demand projections under different scenarios, including conservative and expansive projections for population growth as well as water use
 - F. Create a range of possible scenarios for water demand

- V. Legal Subcommittee (Chair: Mike Pearce)**
 - A. Further identify potential water sources and begin discussions with appropriate federal and state and Tribal agencies, as well as water right owners
 - B. Outline financing options for:
 - 1. Construction
 - 2. Operations and maintenance
 - 3. Water supply
 - C. Determine an administrative option for regional water administration
 - D. Study and determine mechanisms, including legislation and enforcement options for resource protection
 - E. Define and implement a public review process for input on a preferred plan

- VI. Conservation Subcommittee (Chair: Ellen Endebrock)**
 - A. Study existing regulations and controls on water usage
 - B. Examine potential conservation measures, including cost and feasibility
 - C. Determine mechanisms for enacting and enforcing conservation measures

Coconino Work Plan

Federal Fiscal Year

	1999	2000	2001	2002	2003	2004
Data compilation/assessment/maintenance						
Design and implement data collection						
Develop water budget						
Build GIS covers						
Data documentation and release						
Develop regional geologic model						
Geologic mapping						
Develop regional geohydrologic map						
Synthesis of geologic structure, fabric, discontinuities						
Geophysical investigations						
Develop conceptual model of basin						
Evapotranspiration/Discharge estimates						
Develop recharge estimates						
Water use estimates						
Synthesis of aquifer hydraulic properties						
Evaluate hydrochemical flow paths						
Develop regional flow model						
State wide spatial database						

Budget

Table 1. Staffing/Salary

	Federal Fiscal Year						Total
	1999	2000	2001	2002	2003	2004	
Hydrologist Project chief	28.3	116.5	120.0	123.6	31.8	33.4	453.6
Hydrologist GIS/Data base	6.5	29.1	30.0	30.9	31.8	32.8	161.1
Hydrologist Modeler		5.4	5.5	28.5	36.4	37.5	113.3
Geologist		40.2	41.4	42.6			124.2
Hydrologic Tech		25.0	25.7	26.5	27.3	28.1	132.6
Student	6.0	6.2	6.3	6.5	6.7	6.9	38.6
Reports staff	1.8	3.7	7.6	19.5	20.1	20.7	73.4
Total	42.6	226.1	236.5	278.1	154.1	159.4	1096.8

Table 2. Project Budget

	Federal Fiscal Year						Total
	1999	2000	2001	2002	2003	2004	
Salary	42.6	226.1	236.5	278.1	154.1	159.4	1054.2
Equipment	42.0	30.0	5.0	5.0			57.0
Laboratory		15.0	15.5	15.9			46.4
Vehicles	1.0	3.0	3.1	3.2	3.3	3.4	17.0
Travel	1.0	3.0	3.1	3.2	3.3	3.4	17.0
Shipping		2.0	2.1	2.1	0.5	0.5	7.2
Continuous hydrologic records		125.0	85.0	87.6	90.2	92.9	390.7
W-L data site operation	5.3	35.0	35.0	35.0	35.0	35.0	180.3
Supplies	23.0	4.1	4.2	4.4	4.5	4.6	25.8
Total	114.9	443.2	389.5	434.5	290.9	299.2	1795.6
ADWR contribution	102.4	370.5	315.6	359.4	266.7	266.7	1496.4
USGS contribution *	12.5	72.7	73.9	75.1	32.5	32.5	299.2

* Contribution assumes USGS Geologic Division will completely fund geologic work.

North Central Arizona Regional Water Supply Study

Aquifer Protection Subcommittee

April 1, 1999

Attached documents:

1. Outline of issues.
2. E-mail from Don Bills, USGS regarding technical issues (4 pages).
3. Map of aquifer from Tusayan Growth EIS.
4. Statement from Havasupai Chairman regarding aquifer protection dated Sept. 1998 (2 pages).
5. Tusayan Growth EIS Bulletin No. 10, Dec. 1998 Summarizing Public Comment (4 pages).
6. Report, Havasupai Assessment of Canyon Forest Village Project, Sept. 11, 1997, by Owen Williams, P.H. (10 pages).**
7. Report, Colorado River Water Supply Alternative for Additional Development in the Grand Canyon/Tusayan Area of Northern Arizona, Sept. 15, 1997, by William Swan (8 pages).**

*Prepared by Margaret Vick, attorney for the Havasupai Tribe.

* *The reports by Owen Williams and William Swan were submitted by the Havasupai Tribe as part of their comments on the Tusayan Growth EIS in September, 1997, prior to the creation of Alternative H which will use imported water for a CFV development.

Aquifer Protection Sub-committee
North Central Arizona Regional Water Supply Study
March 5, 1999

Outline of potential issues to be addressed by the sub-committee:

1. Technical information.
 - a. Identify what information is available and compile a list.
 - b. Summarize existing information.
 - i. USGS report.
 - c. Identify technical information needed to make policy decisions about aquifer protection.
 - d. Identify gaps in needed and available information.

2. Examine existing methods to accomplish aquifer protection.
 - a. Determine benefits and short-comings of Arizona Groundwater law.
 - b. Examine the Arizona Groundwater Management Act and its potential effectiveness in this situation.
 - c. Examine other Arizona laws and legislative attempts to accomplish a similar purpose.
 - d. Examine resource protection or conservation statutes from other states.

3. Prepare goals and strategies to accomplish.

4. Examine methods of enforcing long term protection.

RE: N-C Az. water supply study aquifer protection sub-committee memo
Date: 3/10/99 11:48:15 AM US Mountain Standard
From: djbill@usgs.gov (Donald J Bills, Hydrologist, Flagstaff, AZ)
To: margaret.vick@azbar.org
CC: djbill@usgs.gov (Donald J Bills, Hydrologist, Flagstaff, AZ), bhart@usgs.gov (Robert J Hart, Supv. Hydrologist, Flagstaff, AZ)

While the USGS can not provide input into political or legal aspects of aquifer protection evaluation for this part of northern Arizona; we can provide input regarding technical information and issues. The draft USGS proposal for geohydrologic and water resource assessment of North-Central Arizona provided a list of 9 issues that must be addressed in order to be able to evaluate aquifer response to natural and man-caused stresses.

These are:

1. What are the extents of the regional ground-water flow systems within the deep seated sandstone and limestone aquifers?
2. How are these two ground-water flow systems hydrologically related?
3. What is the structural fabric of these regional ground-water flow systems and how does that influence ground-water flow, recharge, and discharge?
4. Are there perched aquifers or other water-bearing zones in the area that have not been previously identified or mapped?
5. How do ground-water and surface-water systems on this part of the Colorado Plateau interact?
6. What is the seasonal and long-term flow variability of surface-water and spring resources in discharge areas of the regional-flow system?
7. How will current and projected ground-water use affect surface-water and spring resources in discharge areas of the regional-flow system?
8. At what level can water use be sustained without impacts on critical or natural resources that depend on surface water and spring flows in the discharge areas?
9. Are there changes in regional water chemistry due to waste disposal and (or) effluent use/recharge?

The study objectives of:

1. The geologic and geohydrologic framework for surface-water and ground-water flow in North Central Arizona will be defined and characterized.
2. The affects of natural and man-made stresses on the sustainability of surface-water and ground-water resources will be quantified.

are designed to address all of these issues.

The USGS draft proposal at \$6,000,000 includes the drilling of 3-4 observation and monitoring wells at about \$750,000 each. While these wells may provide critical information on the geohydrology and ground-water flow in parts of the area where no information currently exists (like Markham Dam and the plateau east on state route 64) they should not be considered critical to the initial phase of the study. The Items needed for geologic and geohydrologic characterization and defination can be accomplished in a staged manner in light of the present funding ability of the study (i.e. the ADWR \$100,000).

The attached table, also included in the USGS draft proposal, summarizes currently available data that the USGS intends to evaluate as part of this process. The remaining sources of information that I am aware of include NFS, NPS, and ADWR databases, and the Montgomery study in support of CFV (if avalilable). These resources would also be evaluated for what information they can provide to characterizing the geohydrology and ground-water flow of north-central Arizona.

I hope that you find these comments useful. Please feel free to pass them on to other committee members. If you have questions or need additional information please let me know.

Sincerely,
Don Bills

Table 1: PRELIMINARY SUMMARY OF AVAILABLE DATA AND HYDROLOGIC STUDIES FROM USGS FOR THE NORTH CENTRAL ARIZONA REGION

North Central Arizona Regional Water Study Group

November 1998

A. Surface-water gages - Active

1. Colorado River Mainstem
 - a. 09383100 - above mouth of the Little Colorado River
 - b. 09402500 - at Grand Canyon (Phantom Ranch)
 - c. 09404200 - above Diamond Creeks
2. Tributary to the Colorado River
 - a. 09402450 - Cottonwood Spring above confluence of Cottonwood Cr.
 - b. 09403013 - Pump House Wash Spring near Grand Canyon
 - c. 09403043 - Hermit Creek above Tonto Trail
 - d. 09404110 - Havasu Creek at Supai
 - e. 09404112 - Havasu Creek above Havasu Falls
 - f. 09402000 - Little Colorado River near Cameron
 - g. 09404295 - Diamond Creek near Peach Springs
 - h. 09404222 - Spencer Creek near Peach Springs
3. South flowing drainage
 - a. 09503700 - Verde River near Paulden
 - b. 09504000 - Verde River near Clarkdale
 - c. 09504420 - Oak Creek near Sedona

B. Surface-water gages - Discontinued

1. Little Colorado River at Mouth
2. Havasu Creek at Mouth
3. Miscellaneous crest-stage gages for Cataract Basin
4. Miscellaneous spring sites
 - d. Monument Creek
 - e. Elves Chasm (Royal Arch Creek)
 - f. Matkatamiba Creek
 - g. Olo Creek
 - h. National Canyon Creek

C. GIS Coverages

D. Special Studies/Data Collection Programs - Recent

1. City of Flagstaff - Ground-water availability for the vicinity of Flagstaff.
2. City of Williams - Ground-water Investigations in the vicinity of Williams.
3. Havasupai Tribe - Water-quality and seepage investigations for Havasu Creek and Hilltop Deep Well siting.
4. City of Flagstaff - Walnut Canyon crest-stage gage network.

5. National Park Service - Little Colorado River Basin Study
6. Spring and tributary flow to the Colorado River, Lees Ferry to Lake Mead. in progress.

E. Special Studies/Data Collection Programs - Historic

1. City of Flagstaff - Flood hydrology near Flagstaff, AZ WRIR 87-4210
2. City of Flagstaff - Determination of Evaporation and seepage losses, upper Lake Mary near Flagstaff, AZ WRIR 87-4250
3. City of Williams - Surface-water supply for the City of Williams, Coconino County, AZ OFR (Thesis by Bert Thomsen, USGS)
4. Arizona Department of Water Resources - Southern Coconino County Water-Resource Assessment, Bulletin 4.
5. Ground Water resources of the San Francisco Peaks ground-water area, AZ OF-81-914.
6. Spring and tributary flow to the Colorado River, Lees Ferry to Lake Mead, USGS/ASLD WRR 34
7. Miscellaneous unpublished flow and water-level data.

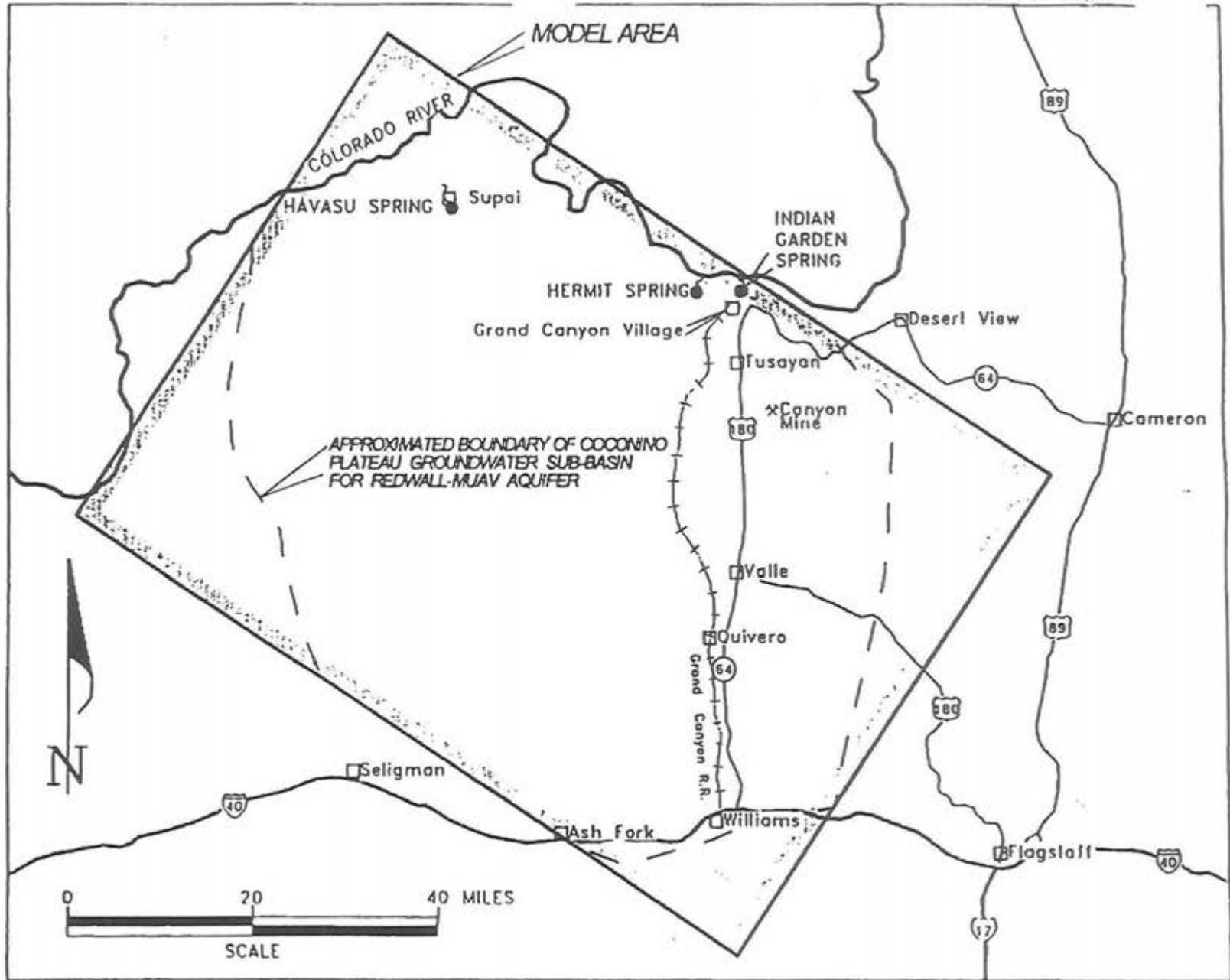


FIGURE 1. LOCATION MAP





HAVASUPAI TRIBAL COUNCIL

P.O. BOX 10 • SUPAI, ARIZONA 86435 • (520) 448-2731

September, 1996
Supai, Arizona

We are the Havasupai, known to neighboring tribes as the Cohonino, the Guardians of the Grand Canyon. The Coconino Plateau in north central Arizona has been our home for thousands of years. Our aboriginal homeland was stolen from us to make Grand Canyon National Park and the Kaibab National Forest.

Last year, five million people visited the Grand Canyon and there are projections of ten to twelve million within a few years. This is too many. The resources and beauty of the Grand Canyon cannot withstand this many people.

The Park Service and the Forest Service have tried to address some of the problems caused by too many people in the Tusayan Growth Environmental Impact Statement. But, limiting visitors is not an alternative we are given, nor is stopping commercial development to serve this increasing number of visitors.

In the public debate and numerous discussions in this paper, the key issue for expanded development at the Grand Canyon and in Tusayan has been ignored. Water is the key for development in this fragile and arid environment.

The water of the Coconino Plateau once was protected by flowing 3,000 feet below the surface to emerge from the canyon walls at the major springs of Supai, Indian Gardens and Hermit Springs, and at numerous smaller springs and seeps deep within the canyons. It was too expensive, too risky to drill wells on the Plateau to intercept its flow. Not anymore. With more the 5 million people a year coming to see the Grand Canyon, developers are taking the risk to supply their hotels, restaurants and stores. A handful of wells have been drilled and even the Park Service has considered drilling more.

We believe that the Grand Canyon, our home, and the springs and seeps are best protected by limiting the number of people who visit. But this is not a choice that we are given in the Tusayan Growth EIS. The Forest Service, the Park Service and Coconino County say that additional commercial development, including Canyon Forest Village, will be built. If not on public land acquired through a land exchange, then on private land. A transportation staging area and Park employee housing are going to be built by the Park Service on public land in Kaibab National Forest. Given these limited options, we choose to protect the water.

The hydrologists are telling us that the wells into the Redwall Muav aquifer supplying water to commercial development are taking water that would otherwise flow to the springs in Supai and Grand Canyon. The water will supply showers and laundromats instead of flowing over Havasu and Mooney Falls. We cannot let this continue. We as Havsu 'Baaja, the people of the blue-green water, will fight to stop the pumping of water from under the Coconino Plateau.

Long before there were hydrologists, we knew the flow of the water. It starts as snow and rain on Wii Hagnbaja, the San Francisco Peaks. It then flows underground through the veins of our Mother, to our place of origin, under our resting place after the great flood and then to our homes in Supai Canyon and what used to be our homes and gardens in the Grand Canyon. Our Mother's veins are the fractures and faults of the Coconino Plateau, these are the pathways for the water, the lifeblood, to flow for all creatures and plants to survive.

Canyon Forest Village proposes a development in Alternative H that will bring water to this area from the Colorado River. They will not use water from wells. It will be expensive, but it is possible and they are willing to spend the money. The United States Forest Service should require that they do this.

The Forest Service prefers Alternative G which will use water from wells. We have told them that they cannot give away our water with a land exchange. Alternative H provides the expanded commercial development and the visitor services of Alternative G, but does not take water from the springs. This should be the choice of the Forest Service from among all the alternatives presented.

No matter what shape or size of development is permitted on private or public land, it should not steal water from us or from the Grand Canyon. Water is the essence of the Havsuw 'Baaja and we must protect it. Join us in this effort with your comments on the Tusayan Growth EIS.

Lincoln Manakaja, Chairman
Havasupai Tribe

(Comments on the Tusayan Growth Supplemental Draft EIS may be submitted to Kaibab National Forest, 800 S. 6th Street, Williams, AZ 86046 until October 9, 1998.)



Tusayan Growth Environmental Impact Statement Bulletin

Number 10

December 1998

Public Comment Results

In July the Kaibab National Forest released the *Supplement to the Draft Environmental Impact Statement (SEIS) for Tusayan Growth*. The SEIS described three new alternatives (Alternatives F, G, and H) developed in response to public comments on the draft EIS. The original five alternatives (A, B, C, D, and E) were described and analyzed in the draft EIS released in June 1997. The SEIS also identified the Forest Service Preferred Alternative (Alternative G). As with the draft EIS, the public was invited to comment on the SEIS and new alternatives.

This issue of the Tusayan Growth EIS Bulletin provides you with some insights about the public comments the Kaibab National Forest received on the SEIS. Specifically, this bulletin presents information on how the comments are being processed and analyzed, how many individuals commented and where they are from, and what the public said.

Many of you receiving this issue of the bulletin attended public open houses about the SEIS and/or submitted written comments. We appreciate your participation, your input is very important.

IN THIS ISSUE

How Public Comments Are Processed	1
How Public Comments on the SEIS Are Considered	2
Who Commented and Where They Are From.....	2
What the Public Told Us.....	2
Where Do We Go from Here.....	5

How Public Comments Are Processed

Understanding public comments is an important part of the EIS process. To ensure that all comments are taken into consideration and attributed to the correct author (commentor), the following procedure was used:

- Each letter was given an identification number. This identification number allows the author of the letter to be tracked and located in the public comment management system database. Several people wrote more than one letter and may have more than one identification number.
- After being assigned an identification number, each letter was read and specific comments were identified. Many letters contained multiple concerns or comments (the average letter contained 1.7 comments, but some letters contained over 100 comments).
- The comments were grouped into categories that followed the format of the SEIS. By the end of this phase of comment analysis, 27 general categories with 35 subcategories (see page 4 of this bulletin) were identified.
- All comments were categorized and entered into an electronic database for easy access. The electronic database allows the EIS team to sort comments by subject matter and run various queries.
- Throughout the next several months, EIS team members will develop responses to comments. Comments and responses will be printed in a Response to Comments document, which will be released in Spring 1999.

How Public Comments on the SEIS Are Considered

Public comments on the SEIS serve three major functions. First, public comments may identify additional issues that need to be analyzed. Second, public comments help the EIS team review and refine the analysis of alternatives in the EIS. Third,

the EIS team considers public comments and preferences when it recommends a preferred alternative to the Regional Forester for the Southwestern Region of the Forest Service, who is responsible for selecting the alternative to be implemented.

Who Commented on the SEIS and Where They Are From

In total, 1,758 individuals offered 2,940 comments on the SEIS. Although letters came from all over the United States, letters from Arizona accounted for 59 percent of the total. Nearly a third of the letters (30 percent) came from northern Arizona. Other states in the Southwest (Utah, Nevada, New Mexico, and Colorado) accounted for 12 percent of total letters received. Colorado alone accounted for six percent of the

total, while Utah accounted for five percent. Responses from states outside the Southwest comprised 26 percent of letters. California residents sent nine percent of all letters. Only nine percent of commentors were affiliated with a business or organization.

Although the SEIS received 863 more letters than did the draft EIS, the number of comments made on both was almost

equal. This is attributed to the fact that the average letter on the draft EIS contained 3 comments, while the average letter on the SEIS contained 1.7 comments. The SEIS received 39 percent more letters from states outside Arizona than did the draft EIS. Letters from northern Arizona cities comprised a third of letters received on the SEIS as compared to over half of letters (57 percent) received on the draft EIS.

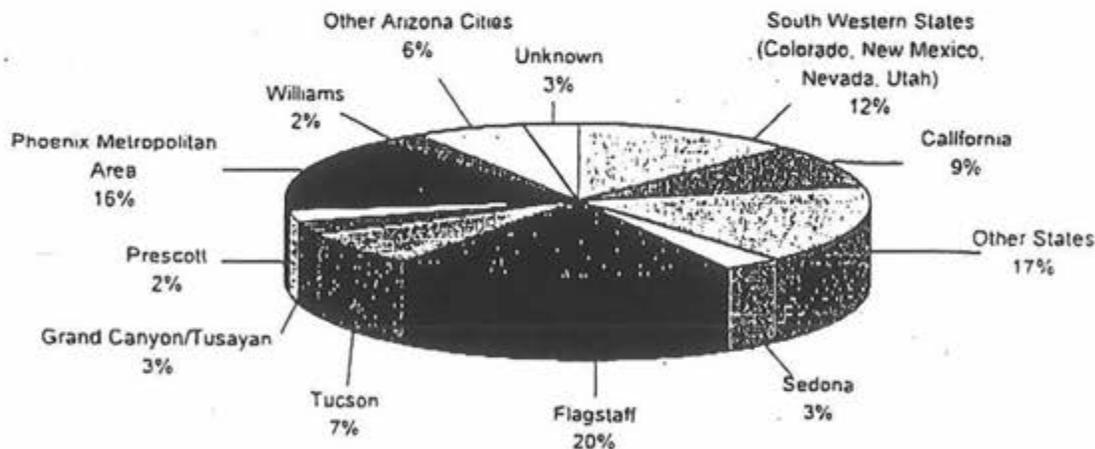


Figure 1. Distribution by location of comment letters on the Supplement to the Draft EIS.

What the Public Told Us

The 2,940 individual comments were categorized according to the issues shown in Table 1. The majority of comments (60 percent) expressed support or opposition to one or more of the alternatives presented in the SEIS (Alternative F, G, or H). Most

of the remaining comments addressed one of the following issues: socioeconomic resources, surface and ground water, development plan assurances, visitor experience in and around Grand
(Continued on next page)

Canyon National Park, decision considerations, economic analysis, and hydrological analysis. The percentage of comments regarding each issue is shown in Figure 2 below.

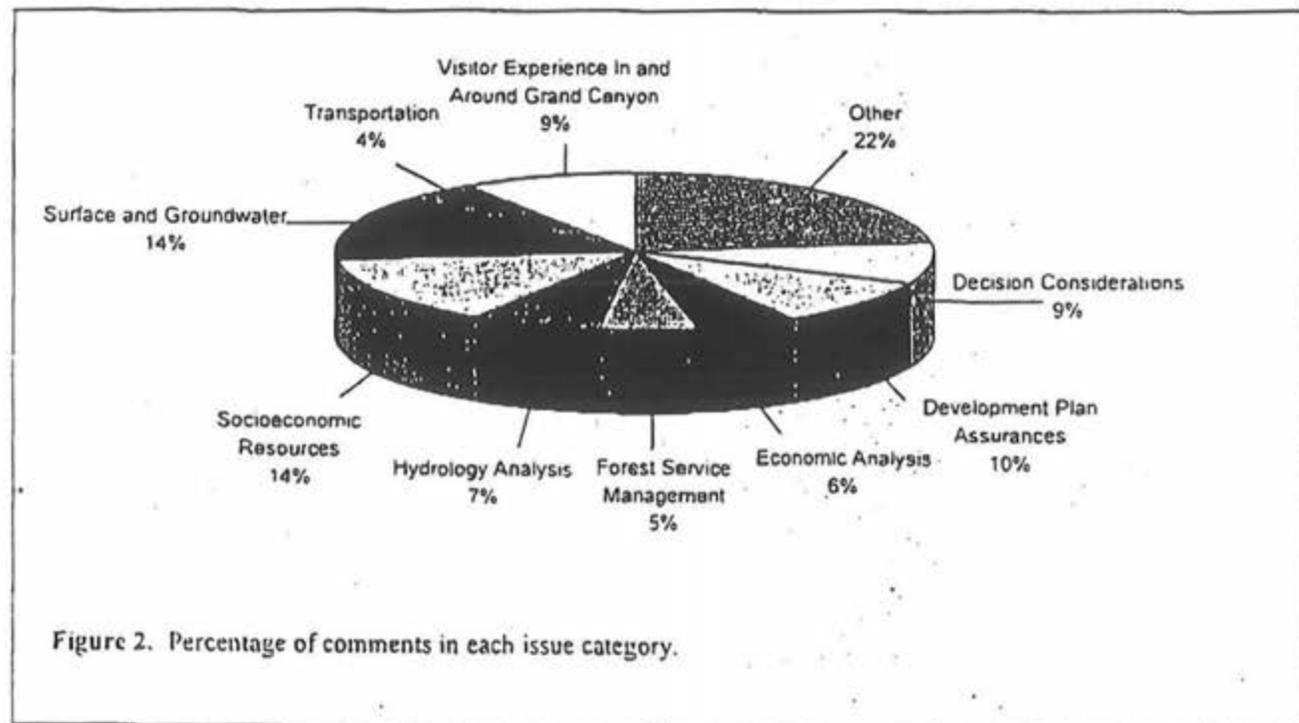
Of those comments expressing support for or against an alternative, 83 percent supported Alternative H; six percent opposed a land exchange (Alternative G or H); and five percent supported a non-exchange alternative (Alternative F).

Outside of comments that expressed an alternative preference, the issue categories of socioeconomic resources and surface and ground water received the most comments. The majority of comments on socioeconomic resources related to potential impacts on other communities, housing, and community infrastructure.

Many comments expressed a concern that additional commercial development in the Tusayan area would negatively impact the economies of Williams and Flagstaff. A number of comments also expressed the concern that the alternatives presented in the SEIS did not adequately meet the area's housing or community needs.

Most comments relating to surface and ground water dealt with water supply. In particular, comments expressed concern over the availability of groundwater and the effect of groundwater withdrawal on Grand Canyon seeps and springs. Many commentors also expressed concern over the feasibility of the water supply system proposed under Alternative H and noted that the Kaibab National Forest should be more specific in defining "emergency situations" in which Canyon Forest village (CFV) would be permitted to use groundwater instead of Colorado River water.

The third largest category of comments related to development plan assurances. Most commentors expressed a desire that the Kaibab National Forest require and receive legally binding guarantees from CFV regarding certain elements of Alternative H, should it be chosen as the selected alternative. Elements of Alternative H that commentors felt required additional assurances included: no new wells on exchanged land; no further commercial development beyond that proposed in the alternatives; environmentally sustainable building design and building practices; and the provision of community facilities and services.



HAVASUPAI ASSESSMENT OF CANYON FOREST VILLAGE PROJECT

EXECUTIVE SUMMARY

In assessing the environmental effects of the proposed Canyon Forest Village project and expanded development in and around Tusayan, the Havasupai have concerns about the expected reductions in the flow of springs within Grand Canyon National Park. The affected springs have important religious and cultural values which the National Park Service is obligated to protect from the perspective of its own mission as well as that of its trust responsibilities toward the Havasupai Tribe.

The National Park Service (NPS) risks the impairment of resources for which it claims rights under the Federal Reserved Water Rights Doctrine in order, among other things, to improve its administration facilities and move them outside of the Park. While such an action might benefit some park resources, that benefit should not be acquired at the cost of other important resources, especially those which are also important to the Tribe. Furthermore, this action is not consistent with efforts of the NPS throughout the United States to protect the reserved water rights associated with the resources it's mandated to leave unimpaired for the enjoyment of future generations.

It appears that the NPS has already allowed some level of resource impairment to occur because of "emergency" water deliveries to Tusayan. These water deliveries, continuous for many years, have allowed the population of Tusayan and its use of water to grow over time. Both the continuous use of NPS water and the growing dependency on that use appear to be contrary to law and NPS policy. Resource impairment has likely been compounded by the effects of the numerous wells developed since 1989. This project, as presently envisioned, would aggravate that situation and increase the damage to park springs. So, too, would additional ground water-dependent development withdrawing water from the Redwall-Muav aquifer.

The Havasupai do not disagree with the need for a carefully planned and managed development of the Tusayan area, including the development of water for resident, NPS and visitor use. However, an alternative water source, one which avoids impacting the springs, should be used. It is clear, too, that only by taking this kind of approach will it be possible to accommodate visitors and residents without excessive damage to this delicate ecosystem.

INTRODUCTION

Environmental documents produced by or for the proponents of the Canyon Forest Village project (the project) recognize the fact that reductions in flow from important springs in Grand Canyon National Park (the park) will be a consequence of developing and using water from underground sources. With little or no disagreement over that point, the proponents offer that such impacts are inconsequential. The effects of water withdrawal from the Redwall-Muav aquifer will be dispersed over a large area and effects at individual springs will be minimal, perhaps even difficult to measure¹.

With no real disagreement over the occurrence of an impact, it would appear the project should only move forward if the consequences of that impact are acceptable to the parties potentially affected. There are among those parties two groups which deserve particular deference - namely, the Havasupai Tribe and the people of the United States. Significance of impacts should not be determined only by those who have an immediate interest in the project, but also by those whose interest will remain after the passing of this and many future generations. Special deference must be accorded these "in perpetuity" interests if there is any reasonable chance that important water resources or water-related attributes will be adversely affected by the actions under consideration.

THE NATIONAL PARK SERVICE AS MANAGER AND PROTECTOR OF NATIONALLY IMPORTANT NATURAL RESOURCES

The National Park Service (NPS) mission is generally viewed as two missions; one to protect for future generations and the other is to provide enjoyment to present-day Americans. What appears to be, and is, a conflict in the NPS's *raison-d'être*, is also its rationale for taking or not taking actions. By design, the NPS must always try to balance use against preservation. In so doing, it often makes decisions unfavorable to some interest or group. The NPS decision on the Canyon Forest Village project will be a severe test of its ability to accomplish its dual mandate. Great pressures, internal as well as external, are being brought to bear upon the agency in a time of severe budget constraint. Great care must be exercised to preserve unimpaired the resources in its charge while the NPS provides the American Public with opportunities to enjoy the remarkable resources of Grand Canyon National Park (Park).

AN NPS DILEMMA

In the Canyon Forest Village project the NPS finds itself on the horns of a dilemma. On the one hand, it stands to directly benefit from the project. Important issues such as employee housing and resource impacts could be addressed positively if the project moved forward. The removal of NPS administrative facilities from their present location within the Canyon is generally believed to be an action that would produce some resource protection benefits. The creation of decent housing and office facilities is also viewed as valuable and long overdue. It is self-evident that the NPS will be a direct beneficiary of this project and that the benefits to be produced will satisfy legitimate needs.

The other horn of this dilemma is found in the NPS's responsibility. In its most basic expression, the NPS responsibility is found in its fundamental purpose as defined in the NPS Organic Act (39 Stat 535, 16 USC § 1 [16 USCS § 1]);

¹ Errol L. Montgomery & Associates, Inc., 1996. Assessment of Hydrogeologic Conditions and Potential Effects of Proposed Groundwater Withdrawal for Canyon Forest Village Coconino County, Arizona.

... which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (emphasis added).

The NPS responsibility for the Park can also be found in the Grand Canyon National Park Enlargement Act (Act), the legislation creating Grand Canyon National Park (88 Stat 2089, 16 USC 1 § 228). In the Act Congress gave recognition to the *...entire canyon ...including tributary side canyons and surrounding plateaus ...*, as a natural feature of national and international significance and directed its further protection *...in accordance with its true significance.*

As might be expected, these responsibilities, to use and protect, lead to internal and external conflict. In the arid West, few other Park resources display this conflict more clearly than water. Water issues at the park are long-standing and have resulted in a series of laws and policy decisions which, to some extent at least, have attempted to balance present day needs against the protection of resources for future generations. However, one point is consistent in all of those laws and policies, water could be taken from the park only to meet emergency needs and then only to the extent that environmental damage did not result.

THE NPS VIEW OF THE IMPORTANCE OF PROTECTING THE RESOURCES IN ITS CARE

To appreciate Congressional and NPS views of the importance of avoiding or minimizing the use of park water resources outside of the Park, a review of the history of Tusayan's use of NPS water may be instructive. For practical purposes that history may be viewed as dating from July 1970, when Tusayan businesses requested authorization to purchase water from the Park. In analyzing the request, the Park identified small amounts of water that could be provided if issues related to authority to sell water, water rights, the nature and extent of development in Tusayan, and the establishment of a Tusayan water conservation association could be resolved.

The issue surrounding the authority to sell water was resolved on August 18, 1979, by the NPS Act for Administration (PL 91-183, 84 Stat 825) which authorized the Secretary of the Interior to,

...contract for the sale or lease of services and resources (including water) available within an area of the national park system to public or private parties which provide public accommodations to persons visiting the park area, if he [the Secretary] determines that reasonable sources are not available (emphasis added).

However, the legislation did not give the Park carte blanche. There were significant concerns, so Congress applied restrictions to the authority it created. Section 3(e) authorized the NPS to

...enter into contracts which provide for the sale or lease to persons, States or their political subdivisions of services, resources, or water available within an area of the national park system, if such person, State, or its political subdivision -

- 1) provides public accommodations or services within the immediate vicinity of an area of the national park system to persons visiting the area; and*
- 2) has demonstrated to the Secretary that there are no reasonable alternatives by which to acquire or perform the necessary services, resources, or water (emphasis added).*

The Director of the NPS issued Standards for Implementation of the new authorities found in PL 91-383². The Standards reiterated items 1) and 2) above and required that additional conditions be met before exercising the authorities granted under PL 91-383. The additional conditions were:

- 1) *The services provided by the applicant are of direct benefit to the park, or to the National Park Service for the direct or indirect benefit of park visitors;*
- 2) *It has been determined that the applicant has no reasonable alternatives to the use of park resources or services;*
- 3) *Effects of use of the resource or service on the park's environment, administration, management and protection, and visitors have been examined and these effects have been determined to be acceptable emphasis added);*
- 4) *When it is determined that use of water by the applicant will be in accordance with laws and regulations governing ownership and use of Federal water rights;*
- 5) *Reasonable charges based on prevailing rates for similar services or resource use have been set;*
- 6) *An application docket containing a draft of the special use permit, background materials and recommendations has been received by the Washington Office for submission to appropriate congressional committees for review and concurrence prior to any legally or morally binding commitments; and*
- 7) *The permitted use is revocable and terminable within a specified period of time and no permanent property rights are conveyed to the user for any resource or water within an area of the National Park Service.*

In 1971, and after enactment of PL 91-383, the Park received a request for water from Tusayan when water deliveries from the City of Williams were temporarily curtailed. An emergency Special Use Permit was issued for the period of the emergency. The permit was renewed monthly through October 1971. Another brief period of water delivery occurred in 1972. However, Tusayan's requests for water during the period 1973 - 1976 were denied because the Park determined alternative sources of water were available.

PL 91-383 was amended by PL 94-458 on October 7, 1976 as follows:

- 1) *In subsection (e), after 'within an area of the national park system,' insert 'as long as such activity does not jeopardize or unduly interfere with the primary natural or historic resource of the area involved' (emphasis added)*

The Standards of Implementation were rescinded by special Directive 78 - 2 of March 30, 1978. The Special Directive stated as follows:

...in the granting of permits for services, resources or water, the Directors of the Regions will have exercised this authority satisfactorily when the following conditions have been met:

1. *The services provided by the applicant are of direct benefit to the park, or to the National Park Service for the direct or indirect benefit of park visitors;*
2. *It has been determined that the applicant has no reasonable alternative to the use of park resources or services (emphasis added);*
3. *Effects of use of the resource or service on the park's environment, administration, management and protection, and visitors have been examined and*

² November 24, 1970 Memorandum by Director, National Park Service

Visitor experience in and around the Grand Canyon comprised approximately nine percent of comments. Many of these comments expressed the sentiment that the type and appearance of existing commercial development in the Tusayan area lowers the quality of the visitor experience and expressed concern that additional commercial development would continue to detract from the Grand Canyon experience. Some commentors felt additional lodging and accommodations would extend the visitor stay and compound existing congestion problems. Many comments suggested that limits be placed on the number of visitors to the park. Several commentors also felt the Insight

Center as proposed under Alternatives G and H would duplicate the educational facilities currently being developed within the Grand Canyon National Park and/or would create an unnecessary attraction to the area which would increase visitation and length of park visits.

Decision considerations as an issue category also received approximately nine percent of comments. Most of these comments suggested that this EIS decision is one of national importance and a balance between local and national issues should try to be achieved in making a decision on the selected alternative.

Alternative Preference	Decision Considerations	Sustainable Design Elements
Socioeconomic Resources <ul style="list-style-type: none"> • Grand Canyon/Tusayan Area • Other Outlying Communities • Housing • Employment Opportunities • Crime Rates • Community Infrastructure • Phasing • Construction 	Hydrological Analysis Economic Analysis Forest Service Management <ul style="list-style-type: none"> • Public Recreation Opportunities • Fire Management Programs • Land Ownership Management • Miscellaneous 	Response to Comment Document Cultural Resources Miscellaneous Prefer No New Development Near Grand Canyon Biological Resources <ul style="list-style-type: none"> • Vegetation • Wildlife • TES Species
Surface and Ground Water <ul style="list-style-type: none"> • Water Supply • Water Transportation • Water Cost • Grand Canyon Water Resources • Water Rights • Water Quality 	Transportation Issues Outside the Scope of EIS Native American Concerns <ul style="list-style-type: none"> • Native American Marketplace • Economic development and employment opportunities 	Desired Conditions Implementation of Alternative F Alternative Descriptions Environmental Justice Conflict of Interest
Development Plan Assurances <ul style="list-style-type: none"> • Water (incl. well development) • Commercial Development • EPTE/Kaibab Institute • Miscellaneous 	Mitigation and Monitoring Appraisal New Ideas for Alternatives	
Visitor Experience in and around GCNP <ul style="list-style-type: none"> • Grand Canyon Experience • Visual Quality • Air Quality • Light Pollution • Noise • GCNP Management • GCNP Visitation 	National Environmental Policy Act (NEPA)	

Table 1. Categories and subcategories of comments received on the SEIS (categories, but not subcategories, are listed in descending order according to the number of comments that each received).

**HAVASUPAI ASSESSMENT OF CANYON FOREST
VILLAGE PROJECT**

Prepared by

Owen R. Williams, P.H.
P.O. Box 911
Richland, WA 99352-0911

11 September 1997

Eph. 2

these effects have been determined to be acceptable. The environmental impacts of the use or service will be assessed and an environmental impact statement prepared if required according to NPS Guidelines for Environmental Assessment and Statements;

4. When it is determined that use of water by the applicant will be in accordance with laws and regulations governing ownership and use of Federal water and rights;

5. Charges have been established for services, resource or water use that permit recovery of the full cost to the government of providing the services, resource or water use in accord with 31 U.S.C. 483a and OMB Circular A-25;

6. An application docket containing a draft of the special use permit, background materials and recommendations has been received by the Washington Office for submission to appropriate congressional committees for review and concurrence prior to consummating any legally or morally binding commitments. The application docket should reflect multi-binding commitments. The application docket should reflect multi-disciplinary regional involvement and clearance of the proposed application;

7. The permitted use is for a short term period (one year or less) and is revocable at the discretion of the Secretary at any time without compensation and no permanent property rights are conveyed to the user for any resource or water within an area of the National Park Service. Water use agreements provide for National Park Service review and approval of planned development by the applicant that would create increased water demands (emphasis added).

The Special Directive also noted

...that while Public Law 91-383 conditionally allows the Secretary of the Interior to authorize the sale of services, resources or park water, the Secretary's primary commitment, as mandated by the congress, is the preservation and protection of National Park System resources which includes the conservation of System area water resources and related water dependent environment. In this regard, Service management policy limits water development and use, assuming no adverse impact on the natural environment, to the minimum required to meet visitor and employee water needs. In essence, water is a vital part of the park environment and a natural resource the Service is committed to protect and in reality cannot be 'excess' or 'wasted' water, as viewed by some applicants (emphasis added).

NPS management gave further evidence of its intent with respect to the use of water from park units through a May 10, 1978, memorandum from the Acting Regional Director to all areas, offices and the directorate of the Western Region by emphasizing the following aspects of Special Directive 78-2:

1. The environmental impacts must be assessed and an environmental impact statement prepared, as required, according to the National Park Service guidelines. The cost of this effort should be the responsibility of the applicant.

2. The application docket containing a draft of the special use permit must receive both park and Regional concurrence prior to submission to the Washington Office for Congressional committee review.

3. The permitted use for a short time period is defined as one year or less and is revocable at any time (emphasis added).

Special Directive 78-2 is still in effect, subject to annual review and renewal.

The issue of park-supplied water was addressed again in 1978 when the Park's enabling legislation³, 40 Stat. 1177 (16 U.S.C. 222), was amended by adding the following:

Under such terms and conditions as he (the Secretary of the Interior) deems advisable and consistent with the requirements of section 483a of title 31 hereof... [and] "...without derogation of any of the water rights of the United States and notwithstanding any provision of law to the contrary, to sell by contract water located within Grand Canyon National Park for the use of customers within Tusayan, Arizona, to a nonprofit entity authorized to receive and distribute water within Tusayan, Arizona by the laws of the State of Arizona, upon his determination that such sale is not detrimental to the protection of the resources of Grand Canyon National Park or its visitors and that appropriate measures to provide for such protection, including a right of immediate termination, are included in the transaction. (emphasis added)

The amendment was offered by Arizona Senators DeConcini and Goldwater because the "Secretary of Interior lacks authority under the law to divert national park resources to uses outside the parks, except on an emergency basis." (Congressional Report, Vol. 124, pp. 36217, 1978). Senator DeConcini expressed the following reasons for amending the Park's enabling legislation;

- *[The] amendment would grant the secretary [the] discretion in a single narrow instance that could, in effect, avert an emergency and would provide the water that is crucially needed by an isolated community.*
- *Tusayan, Ariz., is a small community adjacent to the Grand canyon National Park. Service to park visitors is essentially its whole reason for being.*
- *The present water supply and facilities are adequate for both park needs and for the provision of surplus water to Tusayan. Providing that surplus to Tusayan, under suitable controls, will benefit both the community and the park.*

Senator DeConcini went on to add

this amendment does not mandate service to the community, it simply extends and clarifies the authority of the Secretary in this singular circumstance. It grants the Department full discretion in the provision of that service. The Department must, in any contract, fully recover the cost of such service. The contract may and should provide for conservation and re-use within Tusayan. Further, the Secretary is directed to limit the expansion of water demand in order to prevent deterioration or invasion of park resources, and secure the best possible relationship between planned activities within the park and land uses in Tusayan (emphasis added).

³ An Act To Validate Certain Land Conveyances, and for Other Purposes, November 3, 1978, (Public Law 95-586, 92 Stat. 2495)

As a result of Public Law 95-586, a Memorandum of Agreement (MOA) between the NPS and the Tusayan Water Development Association (TWDA) was signed on February 8, 1980.

The MOA stated that sales may only be made "if it is not detrimental to the protection of the park resources or its visitors" and included "the right of immediate termination of the Agreement." The MOA also stated that the TWDA may not acquire any on-site water rights, legal or otherwise.

Agreements have been renewed each fall since 1980.

NPS MAY BE AN ACCOMPLICE TO THE IMPAIRMENT OF ITS RESOURCES

Beginning with the water deliveries of the 1970s, the Park has seen reliance upon its springs steadily grow. It has provided water to a growing population of park visitors while providing it, too, to an expanding population in Tusayan. It has had to watch as the ecology of Roaring Springs Creek, Garden Creek and Bright Angel Creek have been modified⁴ by human depletion and augmentation to satisfy the time variable needs of water users⁵. The adverse consequences of water diversion and addition have been minimized as more and more people have grown accustomed to access to abundant, inexpensive water.

In less than three decades the National Park Service has found itself pushed inexorably into a corner. The Park's housing and administrative facilities have aged and decayed. Its infrastructure, including the water delivery system, has deteriorated and begged for replacement while funds to accomplish it have become less and less available. And so it has gone over the years - resource impacts occur, concerns are marginalized, and populations dependent upon Park-water continue to grow.

NPS WATER RIGHTS

Across the country, the NPS has made claims to water rights in both surface and underground sources based on the Federal Reserved Water Rights Doctrine⁶. The basis of these claims has generally been the need of the water for reservation purposes such as protecting the natural environment from impairment for the enjoyment of future generations. The NPS has gone to great lengths and spent substantial sums of money to litigate exactly this point. Further, the NPS routinely protests applications by others who propose to develop and use water, both surface and underground, when the NPS feels such water development would adversely affect springs and the resources and resource attributes dependent thereon. Anticipated effects even as small as those proposed for this project would certainly be opposed by the NPS.

⁴ Usher, H.D., Leibfried, W.C., Blinn, D.W. and S.W. Carothers, 1984. *Final Report - A Survey of Present and Future Impacts of Water Depletions and Additions on the Aquatic and Terrestrial Habitats of Roaring Springs, Bright Angel, Garden and Pipe Creeks, Grand Canyon National Park*. CX 8000-9-0032, U.S. Dept. of the Interior, Western Region, San Francisco, CA, April 1984.

⁵ Phillips, B.G., Johnson, R.R., Phillips, III, A.M., and J.E. Bowers, 1979. *Resource Values of the Aquatic and Riparian Vegetation of Roaring Springs, Grand Canyon*. In: Second Conf. On Research in the National Parks, San Francisco, CA, Nov. 26-30, 1979.

⁶ Federal Reserved Water Rights, a creation of the U.S. Supreme Court, are rights created by implication when the Congress or President withdraws lands from the Public Domain for a specific purpose. The right so created is only for the amount necessary to accomplish the reservation purpose(s), comes from the amount of water unappropriated at the time of land reservation, derives its priority date (date of first use) as of the date of the reservation's creation, is not lost by non-use, and can be used for Federal Purposes that may not be recognized as beneficial under state law. Note: It has been argued that Tribes have rights in addition to and superior to reserved rights; specifically, those based on aboriginal water use.

The NPS has been joined as a party to adjudications throughout the West, including several in Arizona. A major issue of concern to the NPS is the inability of current Arizona water law to protect NPS springs and ground water from the adverse impacts of out-of-park ground water pumping. The law, as it presently stands, is archaic and hydrologically erroneous with respect to ground water. The deficiencies of Arizona law with respect to ground water have even been recognized by the Arizona Supreme Court. With this the situation, and with the future of reserved and state water rights for ground water in limbo, it is even more surprising that the Park is willing to risk increased impairment of its springs.

While it may be argued that Native American aboriginal use rights exist in the springs administered by the Park⁷, it is clear the NPS holds inchoate rights under either Federal (reserved) or State law. Depletion of spring flow could and should be viewed as injurious to NPS water rights and to the resources the Park is mandated to protect. Even though some impairment in some resources may be viewed as an acceptable trade-off to accomplish the second of the dual missions, policy and law have been explicit in identifying the need to keep such impairment to the absolute minimum possible. What is being proposed by this project would clearly impair Park resources and the magnitude of such impairment is, at best, a guess at this point in time.

ADDITIONAL RESPONSIBILITIES OF THE NPS

The NPS also has responsibilities as an agency of the United States Government with respect to the Government's trust relationship to the Native Americans of the Havasupai Tribe. The Statute transferring lands from the Tribe to the People of the United States provided for the Tribe's continued use of sites of religious and cultural significance.⁸ As with most treaties with Native Americans, the United States gave respectful deference to the Tribe's religious and cultural practices. The rights of Tribal members to engage in these religious and cultural practices in usual and customary places, recognized by treaty and similar agreements, have been protected by this country's judicial system. Further, as noted above, agencies of the United States, such as the NPS, share in the Government's trust responsibilities toward Native Americans. They provide reasonable access to and protection of sites having tribal religious and/or cultural significance. And it seems entirely reasonable to expect that such protection includes the prevention of any diminution in the flow of Tribally important springs (e.g., the Havasupai were the "Indians" after whom Indian Garden Springs was named.)

The intent of Congress, with respect to the protection of both the Park and tribal lands is found in the above cited Act wherein Congress directs that the use of Havasupai lands ... *shall not be inconsistent with or detract from park uses and values...*⁹ The Act goes on to say the lands are to ...*remain forever wild and no uses shall be permitted ... which detract from the existing scenic and natural values ...*¹⁰

The applicant's analyses have shown that Hermit, Indian Garden and other unnamed springs will be affected by the wells proposed for development in support of the project. However, these effects, like those of the Trans-Canyon water diversion and delivery system, are marginalized. The expectation of a future equilibrium condition in which spring flows no longer decline is deceptive. Each withdrawal from the ground water system affects its mass balance so that outflow (spring discharge plus pumping withdrawals) equals inflow (recharge from precipitation or other sources) plus the change in water in storage (gain or loss). These wells plus others in place or to be placed will be part of this formula. With enough withdrawals all flow from springs could cease.¹¹ Since 1989 six wells have been developed which withdraw

⁷ 16 USC §228b

⁸ 16 USC §228i

⁹ 16 USC §2281(4)

¹⁰ 16 USC §2281(7)

¹¹ This is not intended to be alarmist. The application of simple math shows that, absent a change in precipitation or storage, the existing equilibrium will be disturbed until spring flow and pumping are

water from the same formation (Redwall-Muav)¹² as that targeted by the applicant and supplying springs with religious and cultural importance to the Havasupai People.

The last decade has seen an unprecedented increase in the number of ground water withdrawal points and the amount of depletion. Ground water development has proceeded and is proceeding willy nilly because of the apoplectic state of Arizona law with respect to ground water. At their current pace, events will overcome the NPS and it will rapidly lose its ability to control the situation. The NPS may soon be unable to fulfill its responsibilities to protect the Canyon's spring resources for either the enjoyment of future generations or the use of Native Americans in their exercise of court-recognized rights to practice their religion and maintain their culture.

CONCLUSION

At this time, the United States, in the bodies of the NPS and the National Forest Service, has an opportunity to achieve many objectives including those for the People of the United States, the residents of Tusayan (present and future), the developer, the natural resources of Grand Canyon and the Havasupai People. However, choosing a course which adds to the depletion of springs important to the Park and the Havasupai is not the way to achieve those objectives. An alternative water supply, developed for the use of the park visitor, the Tusayan resident, reasonable commercial development, and park administration is available and should be developed and used in a planned and managed way.

What is needed for all interests to be satisfied while springs and spring-dependent resources and activities are protected, is an organized approach for providing water to the Grand Canyon's South Rim, at least. The planned and coordinated development, operation and management of such a system is fully within the reach of the combined resources of the parties interested in present and future development around Grand Canyon. However, such an approach should begin with a plateau-wide study of water development alternatives and their impacts upon the natural resources and economy of the greater Grand Canyon Area. A strategy for development and resource protection is needed before significant additional development occurs on the periphery of the Park. In addition, all interested parties must have an opportunity to actively participate in its creation and implementation. The main point to bear in mind is that only through a more innovative approach can environmentally wise and economically sound development occur, while the NPS simultaneously meets its responsibilities to the People of the United States and to the Havasupai.

balanced with inflow. So to reestablish equilibrium, pumping increases will be balanced by spring flow decreases and all wells withdrawing from the same aquifer contribute to this effect.

¹² Montgomery & Associates, 1996.

**COLORADO RIVER WATER SUPPLY
ALTERNATIVE FOR ADDITIONAL
DEVELOPMENT IN THE
GRAND CANYON/TUSAYAN AREA OF
NORTHERN ARIZONA**

Prepared for:
**HAVASUPAI TRIBE OF THE
HAVASUPAI RESERVATION, ARIZONA**

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Executive Summary

In the process of addressing reasonable alternatives on how best to provide for improvements to transportation, housing, community facilities, and visitor services in the Grand Canyon/Tusayan area of northern Arizona, the Forest Service has taken a narrow view of the alternatives available for providing water to the potential development area adjacent to the community of Tusayan. The only water source analyzed by the Forest Service in the draft EIS is groundwater south of the proposed development area, even though withdrawal of groundwater in that vicinity may adversely affect important springs within Grand Canyon National Park itself, and may adversely affect the water source which is the lifeblood of the Havasupai Indian Reservation to the west. Direct diversion from the Colorado River within Grand Canyon National Park is a reasonable alternative to using groundwater, and therefore this surface water source should be considered by the Forest Service in the final environmental impact statement for Tusayan growth.

Introduction

The National Park Service and the Kiabab National Forest are cooperating on an analysis of alternatives regarding growth in the Grand Canyon/Tusayan area. The focus of the analysis is a land exchange concept which would allow for newly-created private land in the vicinity of Tusayan to be developed to provide for improvements to transportation, housing, community facilities, and visitor services.

As a first step in this process, the Forest Service has prepared a draft Environmental Impact Statement (EIS) to address reasonable alternatives. The draft EIS discusses five alternatives (A - E), two of which involve land exchanges which would facilitate significant development adjacent to the community of Tusayan. The draft EIS explains that five new groundwater wells would be necessary to supply water to new developments on the exchanged lands. One subject of discussion in the draft EIS is the potential impact that pumping from the new wells would have on nearby water sources. As stated in the Executive Summary for the draft EIS at page 5:

“Additional groundwater pumping in the Grand Canyon/Tusayan area for new development could affect aquifer flow dynamics and could affect spring flow and other water-related uses and values in Grand Canyon National Park and on tribal land.”

The purpose of this analysis is to address the legal and administrative feasibility of an alternative water source for the new development -- the Colorado River. Use of river water would obviously avoid heavy reliance on groundwater and therefore would also avoid adverse hydrological impacts within Grand Canyon National Park, the Havasupai Indian Reservation, and on adjacent federal and state lands.

A. Secretarial Authority and Water Rights Priorities

Any discussion of an effort to obtain rights to use water from the Colorado River must begin with an understanding of the law which governs such uses. Since water diverted within the Grand Canyon National Park would have to come out of the State of Arizona's Colorado River apportionment, it is important to thoroughly understand the foundation for Arizona's apportionment and how rights within Arizona may be obtained.

Pursuant to federal statute, a contract with the Secretary of the Interior (Secretary), and a decree from the Supreme Court, Arizona has an apportionment of 2.8 million acre feet (maf) per year from the Colorado River. Arizona's share of river water comes out of the 7.5 maf apportionment to the lower basin states of Arizona, California, and Nevada provided for in the 1922 Colorado River compact, which was ratified by Congress in the 1928 Boulder Canyon Project Act (BCPA). 43 USC 617 et. seq. (copy attached as Exhibit A).

The BCPA provided for a process of dividing the 7.5 maf lower basin apportionment by interstate compact. Section 4 (a), 43 USC 617 c. Section 4 (a) of the BCPA set forth a suggested division of the lower basin apportionment: 4.4 maf to California; 2.8 maf to Arizona; and 300,000 acre feet to Nevada; but the three states did not enter into the agreement proposed by Congress. Rather, in the 1940's the Secretary entered into contracts with the states of Arizona and Nevada for the amounts suggested in the BCPA. Although the Secretary did not enter into a contract with California, he did contract with user entities within California for the 4.4 maf per year, and California legislatively limited its right to 4.4 maf per year.

In 1963 the Supreme Court issued its opinion in the case of Arizona v. California, 373 US 546 (1963), and shortly thereafter issued the decree which governs water uses in the lower basin. 376 US 340 (1964) (copy attached as Exhibit B). The 1963 decision and the 1964 decree affirm the lower basin state apportionments proposed in the 1928 BCPA and as set forth in the Secretary's contracts, and therefore Arizona presently enjoys an annual entitlement of 2.8 maf per year from the Colorado River.

Section 5 of the BCPA (43 USC 617 d) provides the Secretary with authority to allocate and contract for the delivery of water within the lower basin. Included in Section 5 is the statement that: "No person shall have or be entitled to have the use for any purpose of the water stored as aforesaid [in Lake Mead] except by contract made as herein stated." The only qualification on this requirement is provided for in Article II (D) of the 1964 decree (exempting federal establishments and Indian tribes). Accordingly, all users of water within the lower basin, except for federal enclaves and Indian tribes with decreed rights, are required to have contracts with the Secretary.

The Secretary has been allocating and contracting for water within the lower basin for many years, and that process is now essentially completed. Within Arizona, Colorado River uses are divided into two broad categories: 1) rights used along the river, and 2) rights provided for within the Central Arizona Project (CAP). Roughly speaking, Arizona and the Secretary have arranged for approximately 1.3 maf per year to be used along the river within Arizona, and approximately 1.5 maf per year to be used by CAP contractors. The CAP does not have a fixed entitlement, but instead has a variable water right which allows it to use in excess of 1.5 maf per year if there is unused water along the river within Arizona which can be diverted and used by CAP contractors.

As a result of the enactment of the CAP legislation in 1968, the Arizona Colorado River priority system is somewhat complex. This priority system is set forth in present-day water delivery contracts entered into between the Secretary and water user entities. An example of such a contract is the one with the Marble Canyon Co., dated May 1, 1996 (copy attached as Exhibit C).

As set forth on pages 9 - 11 of the Marble Canyon contract, the Secretary manages Colorado River priorities within Arizona largely in terms of pre-1968 rights and post-1968 rights. When the CAP legislation was enacted, approximately 164,500 acre feet of water remained to be allocated along the river within Arizona (out of the 1.3 maf). The priority system basically provides that the pre-1968 entitlements within Arizona will have priority over the post-1968 rights. Since the 164,500 acre feet component was, and remains to be, allocated after 1968, that water essentially shares priority with the CAP entitlements. The exact nature of this sharing is not relevant to this memorandum, but is explained from the Bureau of Reclamation's (Reclamation) perspective in the 1996 memorandum attached as Exhibit D.

Out of the 164,500 acre feet of water, all but about 3,000 acre feet has been allocated and covered by contracts (for example, to Bullhead City and Lake Havasu City). The approximately 3,000 acre feet remaining will be allocated by the Secretary pursuant to his authority under section 5 of the BCPA. Although the Secretary will likely be guided by allocation recommendations from the Arizona Department of Water Resources (DWR), he is not bound by the BCPA to follow those recommendations. It is difficult to say where and when the 3,000 acre feet will be allocated, but it is likely that some or all of that supply will be earmarked for presently-unauthorized users pumping subflow of the river within Arizona (Reclamation has threatened to shut down such pumpers via federal regulatory process, but formal regulations have not yet been promulgated).

B. Water Availability

In light of the above-outlined background, there are essentially three alternatives for obtaining Colorado River water for outside-of-the-park new development in the Tusayan area: * 1) obtain an allocation from the Secretary out of the 3,000 acre feet remaining from the Arizona lower basin apportionment; 2) purchase and transfer an entitlement that is already in existence via contract or court decree; and 3) obtain an allocation of CAP municipal and industrial (M and I) water, or obtain a long-term lease of high priority CAP water (M and I or Indian priority).

The first alternative would involve the process of convincing Arizona DWR and Reclamation that some portion of the remaining Arizona apportionment should be used for this purpose. One reaction might be that this component of the Arizona lower basin supply is solely intended for users along the river below Hoover Dam. However, the Marble Canyon contract, executed in 1996 (Exhibit C), demonstrates that such is not the case. That water delivery contract provides for 70 acre feet per year of 4th priority water (out of the approximately 164,500 acre feet post-1968 component), to be diverted at a diversion point on the Colorado River near the Marble Canyon facilities. Obviously in that situation both Reclamation and Arizona DWR concluded that justification for the allocation existed and sufficient water was available within Arizona's remaining apportionment to provide for that delivery.

It might also be suggested that since this would be 4th priority water it would not be sufficiently reliable for the M and I type of use contemplated in the Tusayan area. However, within Arizona 4th priority water has in recent years been allocated to municipal users such as Bullhead City, Lake Havasu City, and Marble Canyon Co. Obviously Arizona DWR, Reclamation, and these users believe that 4th priority water is sufficiently reliable to provide for M and I uses in the great majority of years. Also, the Tusayan area developers could use groundwater as a backup supply for use in years when priority 4 water may not be available. Such groundwater use, on only an intermittent basis, would be far less impactful than five full-time water supply wells.

Finally, it might also be suggested that the remaining 3,000 acre feet is needed to legitimize presently illegal users pumping subflow within Arizona along the border below Hoover Dam. Anticipating the day that such users will be threatened with

* This memorandum does not address the alternative of the National Park Service providing water to the Tusayan area development from existing Park Service sources, under present Park Service authority from Congress to provide water for use outside park boundaries under limited circumstances. The primary reason for this omission is that the existing Park Service supply is not from the mainstream of the Colorado river, which is the focus of this analysis.

termination, Arizona DWR has attempted to keep some water in reserve so as to cover such uses when Reclamation eventually promulgates regulations. The argument made is that such users have a history of Colorado River use within Arizona, and therefore they deserve some deference in regard to allocation of the remaining Arizona supply. However, it is also fair to note that such users have other alternatives, as set forth below. For example, if they wish to continue using Colorado River water, it is entirely possible that it would be feasible for them to purchase and transfer existing contract or decreed rights. In other words, the allocation decision Reclamation will eventually make is basically a judgment as to the highest and best use of Arizona's remaining supply, based on the advice of Arizona DWR. Given the importance of the Grand Canyon to Arizona, the highest and best use of some of that remaining supply may very well be at the Tusayan area, as opposed to along the Colorado River below Hoover Dam.

The second alternative would be to purchase and transfer an established Colorado River right from some other location within Arizona. This could involve, for example, the acquisition and retirement of farmland within a Colorado River water-using irrigation district, such as the Mojave, Yuma, or Welton Mohawk districts. Another example would be the purchase and transfer of a present perfected right from within Arizona.

Under Section 6 of the BCPA (43 USC 617 e) Congress provided for the recognition of water rights which had been perfected in accordance with state law prior to 1928. such rights were referred to as present perfected rights (PPR's), and the PPR's within the lower basin were eventually set forth in a 1979 supplemental decree from the Supreme Court. 439 US 419 (1979) (attached as Exhibit E). The 1979 decree lists 15 such Arizona rights in quantities ranging from 42 acre feet per year to 1,140 acre feet per year, with priority dates generally in the early 1900's.

There is no formal regulatory process for acquiring and transferring such rights. Reclamation presently addresses such matters on a case-by-case basis and has indicated a willingness to engage such transactions. In 1994 Reclamation issued draft regulations which would have governed such transactions, among other things, but those draft regulations were never promulgated as formal federal regulations. Nevertheless, it is my view that this would not be a difficult or cumbersome process, and given the small quantity of water involved would not encounter significant environmental compliance problems (beyond the issue of growth in the Tusayan area).

It is also helpful to note that the Arizona miscellaneous PPR's are pre-1968 priority rights and therefore enjoy a greater reliability than priority 4 rights. Thus, this source may be particularly attractive to Tusayan area developers if they wish to avoid the cost of backup groundwater facilities.

The third alternative would be to obtain a CAP water entitlement, either permanently or through a long-term lease. The CAP was constructed to provide water to Indian and non-Indian users in central Arizona. Obviously, providing a CAP allocation for use directly from the river in northern Arizona is not what was originally envisioned when the CAP was developed. However, in recent years the Secretary has given consideration to using presently-unallocated CAP water to resolve water supply problems in northern Arizona (for example, as a part of the proposed Little Colorado River Indian water rights settlement). Such considerations have resulted in some significant policy and operations analysis within Reclamation, and that work product could be very useful in analyzing feasibility in this situation. For example, it has been recognized that any use of CAP water along the mainstream (without using the CAP conveyance system) may nevertheless carry some sort of annual CAP operation, maintenance, and replacement (O,M, and R) payment burden so as to not disadvantage users within the CAP system.

The CAP water allocation system is a complex arrangement of Indian, non-Indian M and I, and non-Indian agricultural water delivery contracts. Most of the CAP water has been allocated by the Secretary and covered by contracts, however about 65,000 acre feet of CAP M and I priority water remains to be allocated. Although non-Indian municipalities and Arizona DWR may prefer to see that water allocated to central Arizona cities, the Secretary, the Bureau of Indian Affairs, and interested Indian tribes would prefer to see that water allocated to Indian communities for settlement purposes. Nevertheless, given the importance of Grand Canyon National Park to Arizona as a whole, and particularly to the overall tourist industry, it may be feasible to convince authorities that a relatively small component of the unallocated CAP M and I water supply might be appropriately used for this purpose.

Finally, another option within the CAP system would be to enter into a long-term lease of CAP water from an Indian community that is willing to lease some of its CAP supply. An example of such a lease is a recent transaction between the Del Webb Corp. and the Ak Chin Tribe. In that situation Ak Chin agreed to lease about 10,000 acre feet per year to Del Webb for 100 years. A similar transaction could be arranged with the Tusayan area developers, with a diversion of that supply from the mainstream within Grand Canyon National Park. A number of CAP tribes in central Arizona have statutory authority from Congress to enter into long term leases of their CAP water supplies.

In light of the above, it is clear that considering the Colorado River mainstream as a source of water for the proposed Tusayan area development is reasonable from both legal and administrative points of view.

C. Delivery Coordination with the National Park Service

Even though economic and engineering feasibility is beyond the scope of this analysis, it may be helpful to note that diversion and delivery of mainstream Colorado River water to the new development area could work in concert with the needs of the National Park Service. Since diversion and delivery directly from the mainstream of the Colorado River will require new infrastructure within the park, the question is whether the Park Service might be able to join forces with the Tusayan area developers in order to improve their own water supply situation at the same time.

At the present time the park obtains its potable water supply from springs emanating mid-way up the north rim. This supply is piped down and across the river, and then pumped up to the south rim complex. Maintenance of this system is difficult and costly and the National Park Service has been considering alternatives that might be less burdensome and less expensive, including groundwater wells south of the park.

In light of what is being proposed in the Tusayan area, one suggestion is that the developers and the Park Service could achieve economies of scale benefits by combining their needs and sharing the costs of a joint diversion and delivery system. However, any diversion by the Park Service directly from the mainstream would need to be based on some sort of water right claim or perfected water entitlement, sufficient to satisfy Reclamation and the Secretary. Since the rights of federal enclaves in the vicinity of Grand Canyon National Park (above Lake Mead and below Lee's Ferry) have never been adjudicated, and since no such adjudication is planned, such use would need to be based on a *claim* by the Park Service that it has an unquantified federal reserved water right to mainstream water for park M and I purposes. The question is, would other users within the lower basin protest such action?

As I see it, such a claim and diversion/use by the Park Service should not be opposed by other users, or by the State of Arizona, for the following reasons: 1) the amount of water needed is relatively small, and therefore it is really rather inconsequential; 2) the Park Service has a justifiable position for claiming the need for river water for park visitor purposes under the federal reserved rights doctrine, and obtaining the water is likely to be economically feasible; 3) a discontinuance of the diversion from the north rim springs would allow previously diverted/consumed water to flow to the river, and thus the river and downstream users would be kept whole; and 4) given the importance of the Grand Canyon National Park to the southwest region, and to Arizona in particular, action to provide for expansion and improvement of park services would, I assume, be generally supported in Arizona, Nevada, and California.

In any event, given the potential for expansion of services in the Tusayan area, and given recent efforts by the Park Service to assess its water supply system, it appears that the idea of sharing a joint diversion and delivery system should be given serious consideration by the Forest Service, the Park Service, the Tusayan area developers, and interested parties.

D. Conclusion

In summary, from legal and administrative perspectives three viable sources of Colorado River water appear to be available for use at the proposed Tusayan area development. Given the relatively small amount of water needed (maximum of 147 million gallons per year), all three of these alternatives appear to be appropriate for serious consideration in this EIS process.