

Grand Canyon National Park Natural Resource Linkages to the Adaptive Management Program

Earth Science and Hydrology

Title of Project: Routine sampling of 20+ tributaries along the river corridor near the confluence with the Colorado River

Objectives: Field parameters (base funded) with occasional lab processing as funding/partnership opportunities permit including bacteria, isotopes, nutrients, metals, and radionuclides. New sites have been visited over the year to complete inventory efforts of WQ at seeps and springs along the corridor.

Geographic Area: River Corridor

Sponsor(s): GRCA

Approximate Funding and Sources: Base funded with contributions from other sources as available (\$8,000)/year.

Title of Project: Long-term Discharge Monitoring at S. Rim Seeps and Springs

Objectives: Maintain stream gauges at 3 tributaries and collect discharge (and other water quality data) at 10 tributaries, 8 times per year.

Geographic Area: South Rim Redwall-Muav Aquifer Springs

Sponsor(s): GRCA

Approximate Funding and Sources: Base and Fee-Demo (\$50,000).

Title of Project: Complete and publish results of Water Chemistry Study from 30 plus sites, in cooperation with USGS. Sample additional wells in Tusayan and Williams areas as funded.

Objectives: Ground Water Flowpath Studies

Geographic Area: South Rim Redwall-Muav Acquiifer Springs and wells

Sponsor(s): GRCA

Approximate Funding and Sources: Fee Demo, NPS-WRD, WAQAM (NPS, USGS Partnership Program) (\$200,000).

Title of Project: Conclude Geologic Mapping funded by GRCA/WASO-Water Resources Division in cooperation with USGS (looking at Ground Water flow pathways in Grand Canyon).

Objectives: To understand hydrogeology/ground water flow pathways

Geographic Area: Regional, Coconono Plateau and beyond

Sponsor(s): GRCA, NPS-WRD

Approximate Funding and Sources: NPS-WRD (\$200,000).

Title of Project: Conclude pilot project: Grand Canyon Springs/Ecosystems Coupled Models (NAU, USGS-BRD, NPS cooperators)

Objectives: To understand hydrogeology/ground water (GW) flow pathways and the effects of modeled GW decreases to the ecosystem.

Geographic Area: Cottonwood Creek, S. Rim GRCA

Sponsor(s): GRCA

Approximate Funding and Sources: Fee Demo (\$140,000).

Title of Project: Recently completed (not published yet) - Biologic Inventories of 20 Seeps and Springs along the South Rim. Solicited by the Park, cooperative effort with GCWC (Dr. Larry Stevens), and the State.
Objectives: To understand hydrogeology/ground water flow pathways and the potential effects of modeled ground water decreases to the ecosystem.
Geographic Area: South Rim Redwall-Muav Aquifer Springs
Sponsor(s): GRCA
Approximate Funding and Sources: State of Arizona, WPF, and NPS-WRD (\$200,000).

Title of Project: Delineate desired future conditions of targeted riparian ecosystems (in progress).
Objectives: To identify impacted areas along the river corridor and mitigate those impacts.
Geographic Area: GRCA
Sponsor(s): GRCA
Approximate Funding and Sources: Identified Need, currently unfunded.

Title of Project: Cave and Karst Resource inventory work with partners (multi-discipline).
Objectives: Inventory work.
Geographic Area: GRCA
Sponsor(s): GRCA
Approximate Funding and Sources: Base funded and partnerships (\$8,000).

Wildlife Resources

- Continue funded Mexican Spotted Owl (MSO) surveys and radio tracking for Park planning and Endangered Species Act compliance purposes;
- Continue Condor nest watch and tracking (an overflights and Recovery issue for GCNP);
- Park project and Action Plan required surveys, or ESA consultation needs, that include big horn sheep, mountain lion, peregrine falcon, bald eagle, goshawk, small mammals, small vertebrates, and SWWFL populations in GCNP;
- Invasive species control and eradication on Bison herd on North rim;
- Continue with development of a Mexican Wolf Recovery Plan;

Air Quality

Continue air quality monitoring (including photography and optical visibility measurements, ozone, speciated fine particulates, wet and dry atmospheric deposition, visible and ultraviolet radiation, and meteorology) at six sites on south rim and two additional sites in canyon as part of various National Park Service and other national programs. Participate in state and regional air quality planning and organizations (especially the Arizona Department of Environmental Quality and the Western Regional Air Partnership). Funding through Grand Canyon N.P. Air Resources Division, USGS, USDA UV-B Monitoring Program.

Vegetation Management

Development of a Vegetation Management Plan with the following components:

1. Invasive species and native plant communities inventory, assessment, and treatment options

2. Listed T&E species, and other species of special concern
3. Vital signs identification as part of a network level effort.
4. Vegetation mapping -- only focused on the completion of a grad sect analysis contract as current priority due to lack of funding. (No commitment to Inventory and Monitoring funding to continue these efforts.)
5. Vegetation sampling and monitoring -- preliminary draft only
6. Hazard tree management
7. Forest restoration (tied to park Fire Management Plan)

Implement "Trans-canyon corridor planting and vegetation maintenance" compliance document which provides vegetation management guidelines for NPS and concession staff to follow. This project will include work at the developed areas (Indian Garden, Phantom Ranch, Cottonwood, and Roaring Springs) within the trail corridor, including those areas assigned through a concession contract (i.e., Xanterra at Phantom Ranch). There is a need for a larger comprehensive site plan for these sites that includes trail, vegetation, and building maintenance. However, current staff and funding limitations prohibit this type of large-scale planning. In the interim, general vegetation maintenance will commence in September 2005 and will adhere to the guidelines set forth in the Indian Garden Cultural Landscape Report, with preparation for future vegetation planting beginning but only occurring on a limited basis until funding is acquired and additional interdivisional planning occurs.

** Funding of the above projects, when available, comes from the 20% Fee Demo Park program.*

Continue "Tamarisk Management and Tributary Restoration" program. This work focuses on the parks' tributaries and side canyons, with the removal of over 140,000 tamarisk trees removed from over 80 project areas to date. The current phase includes 35 project areas and expands the project to include other high priority species. An **Arizona Water Protection Fund grant of \$189,000** supports this phase, which is being completed in partnership with the Grand Canyon National Park Foundation. A new grant of more than **\$250,000 was recently submitted** to continue the project and to expand the efforts onto Hualapai Tribal lands, with development of this partnership. The efforts would further expand the number of target species to include all known, or newly-discovered populations of date palm (*Phoenix dactylifera*), reynoua grass (*Saccharum ravennae*), Russian olive (*Elaeagnus angustifolia*), Russian thistle (*Salsola tragus*), sahara mustard (*Brassica tournefortii*), sowthistles (*Sonchus* spp.) and tree of heaven (*Ailanthus altissima*) within the 30 target project areas and also within the main Colorado River corridor.

Continue **Rapid Site Inventory Program in the Colorado River corridor**. Rapid site inventories are a fundamental tool for understanding backcountry recreation patterns, impacts, and issues. Because they provide a big picture examination and can be accomplished fairly quickly, they are typically the first recreation study recommended for evaluating use in a backcountry area. They also provide a baseline set of data for long-term campsite monitoring program. Each of 45 campsites is inventoried to record basic site information such as the presence of social trails, access trails, litter, human waste, archeological resources, invasive plant species, the number of tent sites, and site quality. The inventory also rates the appropriateness of the campsite by recording the site's distance from the main trail, water sources, and archeological sites. These data build upon the more detailed Rapid Site Assessment data that is available for a smaller subset of the campsites in the river corridor. This effort is funded, in part, by the CRMP implementation funds at \$20,000. The program recently underwent a PEP review, June 2005, in cooperation with GCMRC.

Continue **Condition Assessment and Restoration Prescription program**. Park vegetation managers have been revisiting many of the previously "rehabilitated" sites within the Colorado River corridor. They have re-taken photographs and begun to analyze change over time to determine which methods have most effectively mitigated human impacts. This effort currently lacks funding but has been supported by many volunteers and the Colorado River Fund's Cooperative Resource Conservation Program. Crews continue to document current site

conditions in order to prepare for future rehabilitation efforts. GRCA staff are involved in GCMRC's review of its recreation monitoring program and hope to assist with the development of protocols and standards. Work is supported by NPS program budget (\$10,000) as time and funding allows.

Also, we continue the Vegetation Inventory and Monitoring Program in the backcountry. There is currently no funding for this effort; however, vegetation managers and volunteer botanists have been compiling species lists from many of the side canyons and have been documenting rare plant populations in order to update the park's information, including what is included in NPSpecies. The data will be used to initiate long-term monitoring efforts. Several of these species occur in the Colorado River corridor and others occur in areas that river visitors and backcountry users can readily access. Work is supported by NPS program budget (\$10,000) as time and funding allows.

Title of Project: Archeological site excavations
Objectives:
Geographic Area:
Sponsor(s):
Approximate Funding and Sources: \$1.2 million