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A "Pulse" Study of the Madrona Pools in Chimenea Creek, Saguaro National Park

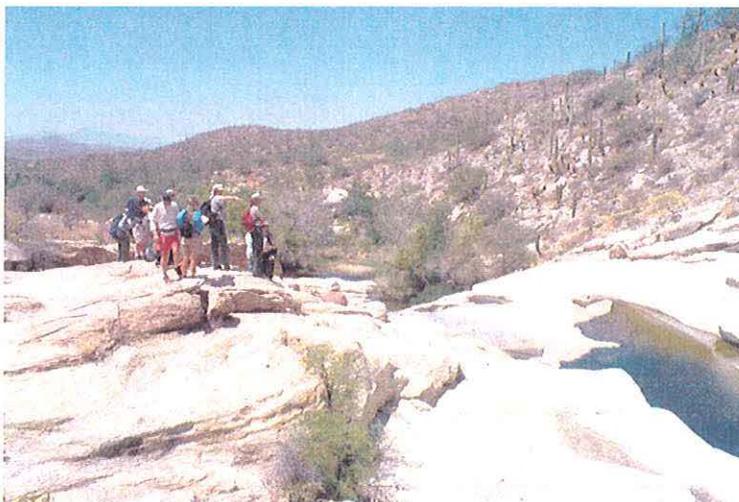


Photo by Taylor Edwards

Lay Report

Western National Parks Association and Saguaro National Park
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Background

The pools at Madrona Ranger Station are the most important riparian resource within the Rincon Mountain District of Saguaro National Park. Located along the park's southern boundary within Chimenea Canyon, the abundant perennial water in this series of pools or "tinajas" have long served a great diversity of plant, animal, and human needs. With the human population of the Rincon Valley rapidly growing, Saguaro National Park is facing increased demand to make this unique and beautiful area more accessible to the public. At the same time, the park recognizes the importance of maintaining the character and integrity of this sensitive area.

In May 2003, Saguaro sponsored what we called a "Pulse" study of the Madrona Pools area. The project brought park staff and outside specialists to camp at the site for one week, with the purpose of taking the "pulse" of the Madrona ecosystem. Our goal was to provide a snapshot of the existing condition of the site, allow for synergy among a group of specialists, and make recommendations to the park. Activities included water quality testing, surveys of mammals, birds, amphibians and reptiles, aquatic invertebrates and plants, and an assessment of potential threats from recreational use.

During the week we also hosted an on-site, 2-day symposium dedicated to information sharing and discussion among over 50 invited guests, each with unique perspectives relative to conservation and management. Besides scheduled discussion sessions, participants in the symposium were given the opportunity to join researchers in daily data collection. The interactions among scientists, park managers, and other interested individuals provided an excellent opportunity to address the project's goals.

Results

Results of this study consisted of an overall site assessment of the Madrona area's physical, biological, cultural, and recreational resources, summarized in a comprehensive technical report with chapters by each of the specialists.

History. Historian Bruce Perger compiled a detailed history of the Madrona Pools area, which has been utilized by European settlers for approximately 150 years, and by early Americans for centuries prior to that. The Park Service used the former Madrona Ranger Station to keep mules and horses and to support firefighting efforts and backcountry operations. However, the Madrona Pools have been inaccessible to most of the public for over 35 years and are now a relatively undisturbed ecological resource.

Hydrology and aquatic ecology. The foundation of any riparian system is of course the water. During the Pulse workshop, hydrologist Floyd Gray from the US Geological Survey, University of Arizona, led a tour to the groundwater source of the perennial flow. Aquatic ecologists Joseph Shannon and Emma Benenati assessed water quality and the algal and macro-invertebrate composition, concluding that the pools contain a remarkably intact (though fishless) aquatic community. A major concern expressed by these scientists was the effects of increased recreational use. Water

turnover in the largest pool was determined to be approximately 7 hours, which suggests that hikers taking even a quick swim could introduce pollutants such as fecal coliforms or the heavy metals present in sunscreen. Swimming also stirs up sediment, which reduces water clarity and limits primary productivity by reducing photosynthesis by algae.

Plants. Botanists Meg Quinn, Danielle Foster, Vicki Gempko, Mark Holden, and Donna King identified 153 species in 51 plant families, including abundant riparian trees such as velvet ash, Arizona walnut, Goodding's willow and Arizona sycamore. These broadleaf, deciduous species create a shady, moist environment that is distinctly different from the surrounding arid desert and provide foraging and nesting habitat for wildlife. The botanists' major concern was about potential future increases in exotic species, which may out-compete natives and impact natural fire cycles.

Reptiles and amphibians. Herpetologists Kevin Bonine and Cecil Schwalbe took special note of the population of lowland leopard frogs. The Madrona Pools have been identified as perhaps the most natural and intact site for this species in the Tucson area. Bonine and Schwalbe noted that, during wet years, individuals from Madrona may move into adjacent drainages and rekindle dwindling populations.

Birds. Ornithologist Courtney Conway found that the riparian woodland at Madrona serves as nesting and foraging habitat for an impressive number (more than 50 species) of birds. The list included many species under special conservation consideration such as Lucy's Warbler, Rufous-winged Sparrow, Gray Hawk, Abert's Towhee, Elegant Trogon, Costa's Hummingbird, Gilded Flicker, Bell's Vireo, MacGillivray's Warbler, and Rose-throated Becard. This is an extremely high proportion of species of conservation concern and highlights the importance of the area to the continued preservation of riparian birds in the desert southwest.

Mammals. Ronnie Sidner and Don Swann added to what is known of the area by capturing and releasing bats and small mammals during the Pulse study. Wildlife cameras used by the park over the past several years have documented coatis, mountain lions, javelina, mule deer, bobcats, and many other mammals, including the only recent record of a Mexican opossum in Arizona north of Interstate 10. Bats captured during the study week brought the number of species recorded in the Chimenea Creek to a total of 17. This number is remarkable by any standard, but may still not be complete.

Social science. With the human population of the Rincon Valley rapidly growing (more than 24,000 new homes are expected in the next few years), human disturbance will become an increasing threat to all the natural resources that the Madrona Pools support. There is growing demand for increased access and a high likelihood that new trailheads and trails will be located closer to the site than at present. During the Pulse study, social scientists Randy Gimblett and Chris Sharp assessed both the impacts that recreation may have on the area and the effectiveness of potential management prescriptions. Participants also visited similar sites with high recreational use, such as Romero Canyon in the Santa Catalina Mountains. Romero exhibited signs of impacts,

including erosion, trampled vegetation, trash, fecal contamination, and exotic species that were generally absent at Madrona.

Symposium. Participants and presenters at the on-site symposium addressed the potential threats and pertinent issues related to management of the Madrona area. Some of these issues included increased demand for water resources that could impact pool levels, fire management of the watershed, and the future of the Park's packing program, historically based out of the Madrona Ranger Station. The purpose of the workshop was not to make decisions on the future of the area, but to identify a range of possibilities. Suggestions from participants included establishing the area as a long-term monitoring control area for comparative studies, promoting minimum impact recreational uses, and establishing an environmental education center at the site.

Scientists who participated in the study also made a large number of recommendations for monitoring and research priorities. The greatest immediate need was for better understanding of the complex hydrology of the site, including studies of the source of water, detailed surveys of the pools, monitoring of flow rates, water volume, water quality, and primary productivity. Additional needs were for long-term monitoring of the most important biological resources, including primary productivity of the pools, bird resources, leopard frogs, exotic species and riparian trees.

It is inevitable that as Tucson's population continues to grow, the park's natural resources will become more and more vulnerable to human disturbance. While the pools at Madrona are confined to a small geographic area, the Pulse study indicated how important they are to the ecology of Saguaro National Park. To people, the pools are also important, because they contain precious desert water that is both a source of beauty and a piece of Arizona – the desert oasis – that has now largely passed into history. To protect the integrity of such a place in the face of increasing demands will require Saguaro National Park to adopt strategies that address a multitude of natural, cultural, managerial, and recreational values. The Madrona Pools Pulse study provided a unique opportunity to begin this process, and our hope is that it will be a catalyst for continued dialogue.

Acknowledgements

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