



Riparian Vegetation Post-doctoral Position

U.S. Geological Survey, Grand Canyon Monitoring and Research Center (USGS)
Flagstaff, Arizona

Identifying trends in riparian and marsh vegetation downstream from Glen Canyon Dam and making linkages between vegetation response and changes in river channel dynamics

We seek a highly motivated post-doctoral scientist to lead a program of research focused on riparian vegetation response to varied dam operations. Establishing linkages between vegetation changes and changes in associated physical and cultural resources (e.g., sandbars and campsites) will be part of this research. The successful candidate will have Ph.D. in ecology, plant ecology, botany, forestry or other field pertinent to the research proposal and be capable of conceiving, formulating, and conducting research pertinent to the Research Proposal. The researcher has experience working independently and as a full member of a research team and must have a demonstrated ability to plan and execute research tasks by clearly defining problems, developing and executing research plans, and has a proven record of publications in peer-reviewed journals. Review of applicants will begin on **December 31, 2012 and will continue until a suitable candidate is found. Preferable start date is early March 2013.**

Background:

Riparian vegetation dynamics along the Colorado River downstream from Glen Canyon Dam have direct and indirect effects on the quality of other resources within the riparian zone, such as available campable area, sediment dynamics, and wildlife populations. Thus, the status of riparian vegetation and its relationship to other resources is a primary information need for the stakeholders in the Glen Canyon Dam Adaptive Management Program to evaluate how dam operations are affecting downstream resources. The primary objective of this post-doctoral research opportunity is to identify trends in riparian and marsh habitats along the Colorado River downstream from Glen Canyon Dam as related to dam operations. Additionally, the focus of this research is on the linkages between vegetation changes and changes in associated physical and cultural resources, such as sandbars and campsites. The overarching question to be addressed by this research program is: *Are there flow regimes that could be released from Glen Canyon Dam that would influence the trajectory of riparian communities along the Colorado River in desirable directions?*

Project Description:

An approach that will be emphasized in this project as well as in future monitoring and research along the Colorado River, is the use of vegetation response guilds (*sensu* Merritt et al. 2010). Response guilds can be used in a monitoring framework to evaluate riparian vegetation response to dam operations and the potential effect vegetation may have on the status of other resources, such as sandbar stability and campsite availability. The classification of response guilds downstream from Glen Canyon Dam can aid in modeling and identification of contracting or expanding areas of riparian vegetation, simplification of the riparian community, and simplification or narrowing of the river channel. The response-guild monitoring approach is conducted along other rivers in the Colorado River basin within the National Park system. Thus, the proposed work will be complementary to work elsewhere and will permit comparison of vegetation response across river segments subject to different flow regimes in the watershed.

In addition, monitoring approaches should be designed to distinguish changes in riparian vegetation associated with defoliation and mortality of the invasive shrub *Tamarix* by biological control insects. The release of several species of *Diorhabda* in western U.S. river systems to control *Tamarix* began in 1999 and has succeeded in significantly reducing tamarisk cover along the Colorado and Green Rivers in Utah (Dennison et al. 2009). Though introductions of this biocontrol agent were discontinued in 2009, the beetle continues to spread within the upper Colorado River watershed and has expanded into Grand Canyon, Nevada, and elsewhere including parts of the Rio Grande watershed in New Mexico, Texas, and neighboring states in Mexico. *Tamarix* mortality and the reduction in *Tamarix* cover by beetle defoliation provide the opportunity for expansion of desirable native plants, because the habitats previously occupied by *Tamarix* are now available to other species. However, the available niche space might also be occupied by undesirable non-native species. Depending on the nature of post-beetle colonization patterns by native and non-native plants, wildlife populations and ecosystem processes might be benefited or harmed. Additionally, the nature of future fluvial geomorphic processes such as changes in channel cross-section shape, the magnitude of lateral instability, and flood plain formation rates might be accelerated or reduced, depending on the nature of the post-beetle plant communities. Thus, the future characteristics of the riparian ecosystems of these rivers will be determined by decisions about dam reoperations and surface-water diversions as well as the characteristics of the beetles' spread and effectiveness.

Development of a robust monitoring approach is integral to this project. The preliminary framework for monitoring includes fixed and random sampling sites within four segments of the river (Glen Canyon, Marble Canyon, eastern Grand Canyon, and western Grand Canyon). Nested within each river segment are the dominant small-scale geomorphic features (e.g., pool-debris fan, eddy-separation bar, eddy-reattachment bar, run-channel margin) that are the focus of sampling. Sampling in the National Park Service's Inventory and Monitoring Program for large rivers.

Appointment Details:

Term of appointment is two years with the possibility of a third year contingent on funding and adequate progress by the applicant; start date is as soon as possible, preferably no later than **15 March, 2013**. Review of applicants will begin on **December 31, 2012**. Salary is **\$69,000/yr** (GS12) + full benefits. Local and professional travel costs are covered. The postdoc will be primarily based in Flagstaff, AZ. Occasional travel to Ft. Collins, CO is also anticipated for collaborative purposes. The incumbent will be working closely with riparian plant ecologists from USGS, the National Park Service, and the US Forest Service to continue to monitor riparian vegetation through the Grand Canyon. Further, the incumbent will work with GCMRC hydrologists and geomorphologists and collaborators to develop flow-vegetation relationships. Such models will be used to examine the current and past distributions of plants and to probabilistically model future distributions under changing climate, flow, and geomorphic conditions. Incumbent is expected to generate new or creative approaches to conducting the research. Furthermore, the incumbent will be encouraged to pursue additional research opportunities to help develop a program focused on the effects of river regulation on riparian vegetation in the Colorado River Basin and elsewhere.

Institutional Background:

This Postdoctoral position is with the USGS Grand Canyon Monitoring and Research Center (GCMRC; www.gcmrc.gov); the primary science provider of the Glen Canyon Dam Adaptive Management Program. The construction and operation of Glen Canyon Dam has fundamentally altered the physical template of the Colorado River (e.g., sediment inputs and water clarity, water temperature, and geomorphology), which has in turn affected biological resources of concern such as introduced and native fishes, and the riparian vegetation community. Scientists at GCMRC develop and implement research and long-term monitoring of physical, biological, and cultural resources downstream from Glen Canyon Dam needed to inform the adaptive management process.

Collaborators:

Barbara E. Ralston, Deputy Director, USGS Southwest Biological Science Center
Patrick Shafroth, Research Ecologist, U.S. Geological Survey, Fort Collins, CO
David M. Merritt, Riparian Ecologist, U.S. Forest Service, Ft Collins, CO
Todd Chaudhry, Watershed Stewardship Program Manager, Grand Canyon National Park,
Lori Makarick, Vegetation Program Manager, Grand Canyon National Park,
Dustin Perkins, Program Manager, Northern Colorado Plateau Inventory and Monitoring Program,
National Park Service, Gunnison, CO.

A full time vegetation technician will be available for field assistance and data entry/analysis. This position involves approximately 20% field work.

How to Apply:

Interested candidates should send inquires, letter of interest, curriculum vitae, unofficial transcripts and contact information to Scott Vanderkooi (svanderkooi@usgs.gov) and Barbara Ralston (bralston@usgs.gov). Review of applicants will begin on **December 31, 2012 and will continue until a suitable candidate is found. Preferable start date is early March, 2013.**