PR Number: R7130110056
Award Number: P11AT10799 USUCP-63
Park/NPS Unit: Big Bend National Park and Rio Grande Wild and Scenic River

Title of Project: Monitoring Geomorphic Conditions for the Big Bend Reach of the Rio Grande

Administered through the: (pick from drop down list): Colorado Plateau Cooperative Ecosystem Studies Unit Cooperative Agreement Number H1200-09-0005

CESU Partner (pick from drop down list): Utah State University

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Funding Information:
Amount Funded: $16,506

Project Dates:
Start Date: September 1, 2011
Any Other Product Milestone Dates you need to include: (full dates can go in with the project description)
End Date: (please make end date the last day of the month if possible) June 1, 2013

PROJECT ABSTRACT:

This project will monitor rapidly changing channel conditions along the Rio Grande downstream from the Rio Conchos that threatens recreational values and native ecosystem integrity of the Rio Grande in Big Bend National Park and the Rio Grande Wild and Scenic River. On-going research funded by the NPS demonstrates that the Rio Grande has progressively lost channel capacity during the past 60 years. Channel narrowing occurs by accretion of fine-grained alluvium, and deposition is accelerated by flow deceleration in dense stands of non-native riparian vegetation. Some of the recently accreted deposits are eroded during large late summer and fall floods, but flood-induced erosion does not ever totally reverse the magnitude of narrowing that occurs during the periods between flood episodes. Aggradation and in-filling of the channel has caused decreased channel capacity, and flood stages in September 2008 were historically unprecedented yet the measured peak discharge was only approximately of a 12-year

recurrence. Preliminary results point to the extensive alteration of the flow regime -- including large water withdrawals, flood attenuation, and increased base flows -- and invasive riparian vegetation as the drivers of channel narrowing.

Over the past six years, the Borderlands River Restoration Coalition, a partnership between NPS, World Wildlife Fund, Texas Parks and Wildlife, and counterparts in Mexico has completed small non-native vegetation control projects on approximately 35 miles of the river. This partnership has developed innovative techniques for removing exotic and invasive vegetation. The partnership has suggested that the problems of increased frequency of flood inundation caused by sediment accumulation within the river channel may be partly mitigated by managing riparian vegetation.

We will monitor channel conditions in vegetation-removal reaches and in control reaches so as to evaluate the impact of the on-going river rehabilitation program on flood stage, rate and style of channel narrowing, and recovery of desired aquatic habitat caused by large floods. This work will involve establishing monitoring cross-sections, continuous stage recorders, and suspended sediment concentration measurement devices. In addition, this work will involve field measurement of sufficient discharges so as to develop newly calibrated stage-discharge relations in all study reaches. Such data will allow development and calibration of 1-dimensional flow models and facilitate development of 2-D flow models that will allow assessment of the significance of a vertically accreting and narrowing channel and the impact of non-native vegetation invasion and subsequent control. This information is essential to inform upcoming discussions with the International Boundary and Water Commission on dam release scenarios on the Rio Conchos, the largest upstream tributary and the primary source of perennial flows and long duration floods that pass through the Big Bend region.