

Californian Cooperative Ecosystem Studies Unit Task Agreement National Park Service

COOPERATIVE AGREEMENT NO.: P13AC00676

RECIPIENT: University of California Santa Barbara

PROJECT TITLE: Merced River Restoration in Yosemite Valley

PROJECT ABSTRACT:

The purpose of this project is to provide scientific and design support to Merced River restoration efforts in east Yosemite Valley being considered or implemented by the National Park Service (NPS). This work will be accomplished in an area of both great natural resources and intensive human activity, with complex and potentially conflicting goals articulated by the Merced Wild and Scenic River Final Comprehensive Management Plan and Environmental Impact Statement, issued in February 2014. The work will be conducted throughout the 3.5-km reach of the Merced River between Clark's Bridge and Sentinel Bridge. The entire project is anticipated to be conducted over a 3- to 5-year period; this Task Agreement covers only the first phase of the overall project effort.

In this phase, a variety of data-compilation, data-collection, and mapping efforts will be conducted to develop a comprehensive characterization of the reach and associated riparian and floodplain areas, addressing its geomorphic, hydrologic, vegetative, and recreational attributes and conditions. Research questions will be framed relating to the past and future behavior of this river, given a range of potential management prescriptions for riparian areas and under potential climate-change scenarios. A restoration strategy for the reach will also be developed in close coordination with the NPS, with a short-term goal of identifying promising locations and generic treatments for riparian restoration being planned for 2015 and 2016.

Expected outcomes include the preliminary characterization of the physical, biological, and social dimensions of the reach (with completion of final products anticipated under a future Task Agreement); engagement of key stakeholders as identified by the NPS in the scope, timeline, and anticipated products of the work; preliminary guidance on riparian restoration projects presently anticipated for implementation within the reach; and preparation for a variety of monitoring efforts to be conducted opportunistically by the NPS during any high-flow event that might occur during this or subsequent years.

These efforts will also create the foundation for future work under one or more subsequent Task Agreements, future work that is anticipated to include a more focused evaluation of instream river habitat, the potential effects on riverine processes by the existing bridges within the reach, and the potential benefits of (and preliminary designs for) instream or streambank structures to enhance geomorphic and ecological conditions across the river and floodplain. This future work is also expected to include measurable criteria that can be used to evaluate the success or failure of the proposed mitigation methods, estimated costs, and technical guidance on their installation.

PRINCIPAL INVESTIGATOR: Derek Booth, University of California Santa Barbara

TASK AGREEMENT

“Merced River Restoration in Yosemite Valley”

This Task Agreement by and between the National Park Service (NPS) and the University of California Santa Barbara (UCSB) is issued against the Californian Cooperative Ecosystem Studies Unit Cooperative and Joint Venture Agreement, P13AC00676, for the purpose of mutual assistance in conducting a project entitled “Merced River Restoration in Yosemite Valley”.

ARTICLE I – BACKGROUND AND OBJECTIVES

A. Background

The NPS has identified that the Merced River in east Yosemite Valley is in need of substantial ecological restoration. Broad goals are to increase vertical and horizontal channel and riparian zone complexity, narrow the channel to enhance overbank flooding, and mitigate any geomorphic and/or ecological impacts due to bridges. Restoration measures may range from largely passive in nature (fencing areas), to active revegetation and stabilization of banks and strategically-placed large wood or constructed log jams in the channel. The Merced Wild and Scenic River Comprehensive Management Plan and Environmental Impact Statement (MRP, National Park Service, 2014) identifies mitigation of impacts caused by Sugar Pine Bridge to include the option of bridge removal pending a thorough examination of impacts and the degree to which adequate mitigation to instream resources could be achieved through non-removal measures. Sugar Pine Bridge is a stone arch bridge that is part of the Yosemite Valley Bridges Historic District listed on the National Register of Historic Places. Stakeholders identified removal of Sugar Pine Bridge as an adverse impact to historic resources (see MRP, 2014 Appendix J).

The restoration project area lies within the most heavily developed area of Yosemite Valley, and has a long history of intense visitor use along the river. The totality of river impacts laid out in Madej et al. (1991) included trampling of riverbank vegetation, narrow bridge openings, removal of large pieces of wood from the channel, and gravel mining. Overall river width had increased by 38% since detailed mapping in 1919 relative to 4% along less developed reaches downstream, with some areas of the river more than doubling in width (Madej et al., 1994). Though small-scale riverbank restoration efforts have stabilized some areas along this two-mile reach, comprehensive riparian and riverine condition surveys in 2010 found much of this reach to be in the lower third of condition classes observed in Yosemite Valley (Cardno-Entrix, 2012). Comprehensive river restoration throughout this reach outlined in the MRP (Merced River Plan, 2014 Appendix E, Alternative 5) includes establishing a 100-foot riparian buffer, substantial reductions in campground size, rip-rap removal and riverbank revegetation and/or stabilization, and the utilization of large wood or engineered log jams.

The preferred alternative (Alternative 5) in the MRP retains all stone arch bridges mitigating impacts using engineered log jams or strategically placed large wood. Sugar Pine Bridge is retained but is the subject of a more detailed reach-level study to assess the merits of various long-term bridge management strategies, including mitigation methods to minimize geomorphic and ecological impacts as an alternative to bridge removal.

B. Objectives

Investigators from UCSB and NPS staff will collaborate to provide scientific and design support to Merced River restoration projects in east Yosemite Valley including revegetation and bank stabilization strategies and potentially placement of in-channel structures (i.e. large wood or constructed log jams) to mitigate the impacts of visitor impacts, bridges, and other human infrastructure; and to facilitate formation of lateral river bars in areas of severe riverbank loss. This objective includes the specific need to examine the extent and magnitude of physical impacts to the Merced River and associated riparian area caused by Sugar Pine Bridge, and to identify long-term cost-effective management strategies that minimize those impacts.

The project would consist of five phases over approximately a ten-year period. This task agreement covers the first three phases of the project (approximately FY15-20) and is subject to the availability of funding. This agreement initially funds Phase 1. Additional funds for future phases would be added via modifications to this task agreement to accomplish all or a portion of additional phases.

Phase 1. Initial planning, mapping, monitoring, and stakeholder outreach (approximately July 2015 – June 2016)

Objectives:

- a) Develop conceptual desired restoration endpoint
- b) Research restoration needs and collect necessary background data
- c) Identify short-term restoration measures and locations
- d) Conduct initial stakeholder outreach, including stakeholder interviews and stakeholder meeting #1 (fall 2015)
- e) Develop research plan
- f) Initiate mapping elements (geomorphology, vegetation) throughout project reach
- g) Establish high flow monitoring equipment and survey control for anticipated (but uncertain) monitoring of a flood event on the river, intended to evaluate baseline hydraulic and geomorphic conditions at river flows equal to or exceeding the 2-year flood (to be conducted by NPS with direction from UCSB)
- h) Conduct stakeholder meeting #2 (spring 2016)

Phase 2A. Final planning and conditions assessment, and continued stakeholder outreach and monitoring (approximately July 2016-June 2017)

Objectives:

- a) High flow event monitoring during minimum 2-year flood event, if occurring during this period
- b) Continued data collection; completion of conditions assessment and mapping
- c) Conduct follow-up stakeholder outreach, including stakeholder meeting #3
- d) Conceptual designs for restoration/mitigation measures throughout the project reach, and support implementation
- e) Develop objective measures of success for overall reach-scale and site-specific projects

Phase 2B. Analytical and research products (approximately June 2017 – July 2018)

Objectives:

- a) High flow event monitoring during minimum 2-year flood event, if occurring during this period
- b) Conduct follow-up stakeholder outreach, including stakeholder meeting #4
- c) Sediment budgeting for the reach
- d) Channel migration modeling of future conditions

Phase 3. Project designs (Start date is in part flow-dependent: this phase could start as early as July 2018 if flows are sufficiently high in 2016-2018 and funding is available; it could also start as late as July 2019; anticipated end date June 2020 or earlier).

Objectives:

- a) Refine conceptual designs for restoration projects throughout the project reach based on prior experience on installation and performance
- b) Develop 50% design for mitigation and enhancement measures for the specific study reach that includes Sugar Pine Bridge, including alternatives, costs, and evaluation criteria
- c) Conduct follow-up stakeholder outreach including stakeholder meeting #5
- d) Submit final report for Phase 1-3.

(Note that the NPS would be responsible for implementing these mitigation measures, upon which the following phases 4 and 5 are dependent.)

Phase 4. Monitor impacts of mitigation measures.

Objectives:

- a) High flow event monitoring during minimum 2-year flood event
- b) Continued data collection
- c) Conduct follow-up stakeholder outreach, including subsequent stakeholder meeting(s)

Phase 5. Assess success of mitigation measures.

Objectives:

- a) Evaluate success of restoration measures
- b) Assess long-term costs to achieve restoration objectives with bridge retention and removal
- c) Produce final report to the NPS

C. Public Purpose

The Merced River and stone arch bridges over it form an integral part of visitor experience of Yosemite Valley, a UNESCO World Heritage Site. The Merced River Plan, a document prepared with substantial input from the public declares the intent of the National Park Service to protect the natural condition of the Merced River while also protecting cultural resources. The purpose of this agreement is to inform ecological restoration actions along the Merced River in Yosemite Valley which benefits the public by assuring adherence to the Merced River Plan using the best available river science and restoration practice. Park visitors will benefit from this work by being able to experience an ecologically richer riverine and riparian environment in the heart of developed areas within Yosemite Valley. Further, a study of the impacts to river processes caused by Sugar Pine Bridge and potential mitigations serves the public interest because it seeks to balance the protection the condition public resources (the Merced River and a historically significant bridge). The cooperative project proposed here assures that the National Park Service has the best available guidance when undertaking ecological restoration of a significant national resource.