

# Project Proposal

## Integrated Water Management Planning Framework

Bid #CMU-17-2579

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**Prepared For:**



## **A. BACKGROUND**

The Hutchins Water Center continues to work with the Colorado Basin Roundtable (CBRT) to develop data sets and guiding frameworks for integrated water management planning (IWMP) in the upper Colorado River Basin. The requesting parties define the goal of integrated water management planning as identifying ways to meet environmental flow needs along with needs of agricultural, municipal, industrial, and residential water users.

## **B. PURPOSE**

This proposal for work builds upon previous integrated management planning tools and discussions led by the Hutchins Water Center. Specifically, we propose to develop an organizational framework for 1) contextualizing the need or opportunity for IWMP in a sub-basin or watershed, 2) structuring and organizing investigations into environmental conditions, municipal/industrial use needs, and agricultural use needs and 3) reporting planning results back to the CBRT for synthesis with results from other watersheds.

## **C. OBJECTIVES**

Anticipated tasks associated with project objectives are outlined below. Importantly and due to our experience with the dynamic nature of efforts in this unique planning arena and the frequently-evolving expectations of the requesting parties, the specific tasks associated with each objective listed below may require supplementation, modification or removal prior to completion of the proposed work.

### Objective 1: Review Scope of Work

*Activity 1:* Review and refine scope of work at project Kickoff Meeting. Interview CBRT subcommittee members to determine more precisely what they would like this effort to result in. Specifically, we will discuss how the developed framework and other deliverables can directly support the development of standards and/or evaluation criteria for grant proposals to the Roundtable

#### *Deliverable:*

- Meeting minutes memorializing discussion outcomes

*Activity 2:* Develop a strategy and timeline for incorporating relevant results of stakeholder engagement activities performed by CMU and CBRT members. We expect that up to scheduled eight stakeholder meetings will focus on the optimal approaches for structuring and executing integrated water management planning efforts. While we will not attend these meetings, we will assist CMU and CBRT in developing questions for stakeholders that solicit the types of input needed to inform the rest of the scope of work.

#### *Deliverable:*

- Memorandum detailing the strategy and timeline for incorporating stakeholder feedback into this effort.

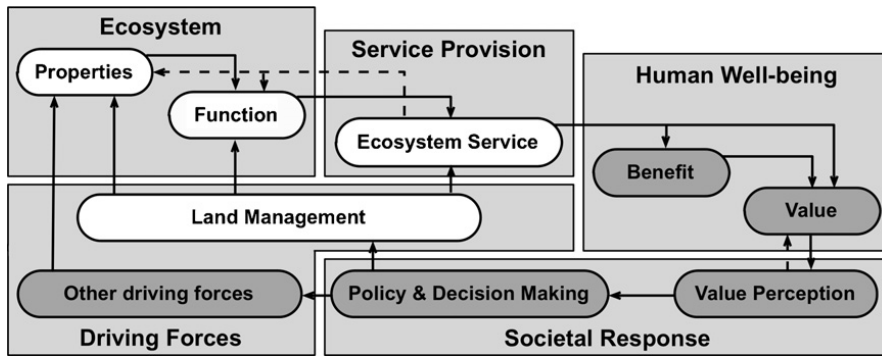


FIGURE 1. CONCEPTUAL MODEL FROM A.P.E. VAN OUDENHOVEN ET AL. (2012) INDICATING THE RELATIONSHIPS BETWEEN ECOSYSTEM FUNCTION AND THE HUMAN WELL-BEING WHERE PLANNING AND DECISION MAKING ARE LARGELY DRIVEN BY THE BALANCE BETWEEN THE DELIVERY OF ECOSYSTEM GOODS AND SERVICES AND THE DEMAND ON THOSE SERVICES.

## Objective 2: Convene Relevant Parties

*Activity 1.* Lotic will organize a work session with Open Waters Foundation, EcoMetrics, Peter Skidmore of the Walton Foundation, CWCB staff, River Network staff, and interested members of the roundtable to discuss the need for and utility of activities to develop organizational frameworks, supporting templates, software tools, spreadsheets, and databases for facilitating the communication of integrated water management planning results across and between watersheds/basins. Special attention will be paid to opportunities for leveraging or integrating available tools (e.g. CDSS models), data sets (e.g. Source Water Route Framework), and other ongoing efforts (e.g. Statewide Water Supply Initiative) in a way that illuminates opportunities or pitfalls associated with the development of the framework described in Objective 3 as a means for meeting the CBRT's goal: to develop a common approach and long-term strategy for evaluating and planning for non-consumptive water use needs.

*Deliverable:*

- Memorandum describing workshop outcomes and any need for adjustment to the scope of services

## Objective 3: Develop Organizational Framework for IWMPs

*Activity 1.* Refine existing frameworks for organizing and reporting on ecological integrity. Many frameworks are currently available for this type of assessment effort. Several have even been developed in and for Colorado streams and riparian areas. Examples of existing frameworks include FACStream, FACWet, the Stream Health Assessment Framework, BLM's Proper Functioning Condition assessment protocol, and the Colorado Natural Heritage Ecological Integrity Assessment (EIA). Each framework or protocol boasts its own benefits and weaknesses. While it is probably disadvantageous to practitioners for CBRT to mandate use of a single, detailed implementation approach for all IWMP efforts, we believe we can learn from the high-level concepts present in the many frameworks in existence to select or develop an appropriate organizational framework that provides a 'common currency' for organizing and reporting planning efforts in the Colorado River basin. The advantage of identifying such a 'common

currency' lies in the ability for CBRT to more effectively collate and compare reporting results from diverse locations and, then, monitor for change at these locations through time. We aim to identify a framework that will be of minimal burden to the end user and will, in fact, prompt practitioners to design and implement more successful IWMP efforts.

*Deliverable:*

- Short literature review discussing existing frameworks for organizing assessments of ecological integrity and providing recommendations for which elements to include in the framework developed for CMU.

*Activity 2.* Refine existing frameworks for organizing and reporting human use needs, expectations, and gaps. There are fewer examples of organizational frameworks for evaluations of human uses and values derived from river systems. We will look to the scientific literature, particularly to recent advancements and discussions in the fields of ecological engineering, stream restoration, and land planning that focus on the relationship between ecological integrity, the delivery of ecosystem goods and services, and human well-being. We will then incorporate any feedback generated through stakeholder interviews by CMU and CBRT personnel to ensure that the selected framework reflects local needs and expectations. While we do not know exactly where this effort will lead, we have completed some conceptual level thinking about what a useful framework may include. By way of example, we provide some of those concepts here (Figure 2). We believe that relevant categories of ecosystem services include *regulating services* (e.g. flood abatement, groundwater recharge, water purification), *provisioning services* (e.g. agricultural production, drinking water supply, capture fisheries), and *cultural services* (e.g. boating recreation, angling recreation, aesthetic values). We believe that qualitative information (e.g. local perceptions and anecdotal evidence) and/or quantitative data (e.g. StateMOD hydrological simulation results, proximity of infrastructure to floodplains) can be used to characterize the relative demand for ecosystem goods and services and that high-level consideration and reporting on the balance between the demand and the delivery of ecosystem goods and services provides important context for understanding the need for IWMP efforts across a geographic area. This approach will also assist in identifying areas where alternative management actions may promote both ecological integrity and the delivery of needed ecosystem goods and services.

*Deliverable:*

- Short literature review discussing existing frameworks for organizing assessments of human use needs for river system and providing recommendations for which elements to include in the framework developed for CMU.

*Activity 3.* Lotic and EcoMetrics will integrate the two activities above and develop criteria and instructions for using the aggregated framework to 1) contextualize the need or opportunity for integrated water management planning on a reach, sub-basin or

watershed, 2) structuring and organizing IWMP efforts, and 3) reporting planning results back to the CBRT for synthesis with results from other watersheds.

**Deliverable:**

- Final report detailing the selected or developed framework and discussing how practitioners and the CBRT can implement it to facilitate development, reporting, and meta-analysis of IWMP efforts across the Colorado River basin.

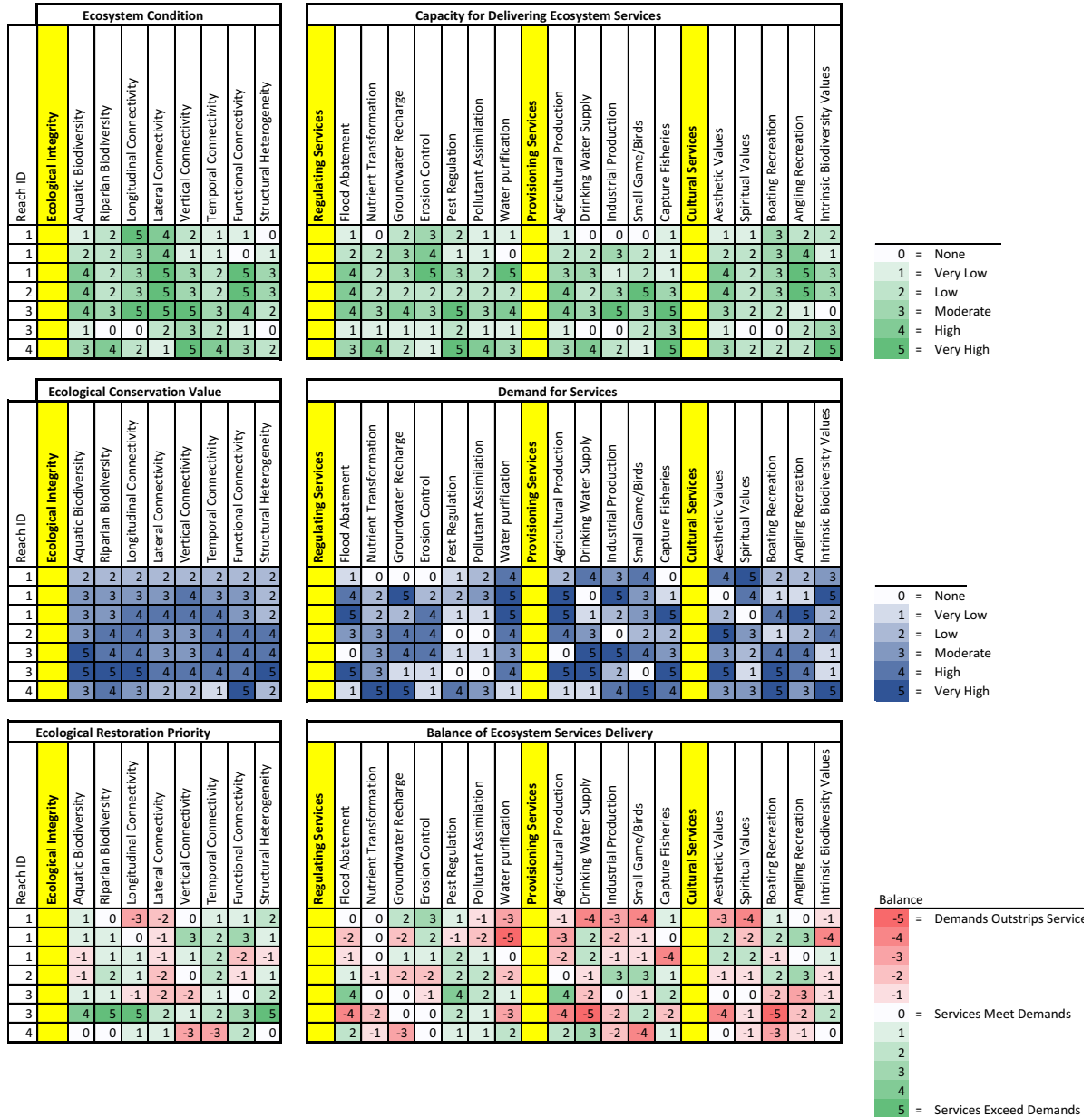


FIGURE 2. CONCEPTUAL FRAMEWORK FOR ORGANIZING AND REPORTING ON THE CONDITION OF ECOSYSTEMS, THEIR ABILITY TO DELIVER IMPORTANT ECOSYSTEM GOODS AND SERVICES, THE RELATIVE DEMAND FOR THOSE SERVICES IN A LOCALITY, AND THE BALANCE BETWEEN SUPPLY AND DEMAND FOR THOSE SERVICES.

## D. PERIOD OF PERFORMANCE AND ESTIMATED BUDGET

Work on this project is expected to commence in November of 2017 and continue for a period of approximately 3 months. Successful completion of some tasks outlined below depends on timely ongoing coordination and collaboration with representatives from the CMU and CBRT. Therefore, the project team's ability to meet the anticipated dates of completion associated with many of the project's deliverables is partially dictated by those entities. Lotic Hydrological estimates a fee of \$19,970 to complete the objectives and tasks outlined above. This cost estimate includes periodic participation in project coordination meetings and anticipated travel time. Further refinement or adjustment of tasks following project coordinator and stakeholder discussions may lead to concomitant adjustment of estimated project costs.

### Estimated Project Budget

Name	Seth Mason	Mark Beardsley	Steve Malers
Firm	Lotic	EcoMetrics	OWF
Normal Billing Rate	\$ 150.00	\$ 120.00	\$ 140.00
Travel Billing Rate	\$ 60.00	\$ 60.00	\$ 140.00

Project Management				Totals
Consultant Team Meetings	5	5	4	14
Interim reporting to CMU	5			5
Final CBRT Work Session	2			
Travel Time	3	5		8
Total Hours	15	10	4	29
Total Cost	\$ 1,680.00	\$ 900.00	\$ 560.00	\$ 3,140.00

Objective 1				Totals
Kickoff Meeting	2			2
Plan for incorporating stakeholder feedback	2	0		2
Total Hours	4	0	0	4
Total Cost	\$ 600.00	\$ -	\$ -	\$ 600.00

Objective 2				Totals
Convene workshop	4	4	4	12
Draft memorandum	5	3	3	11
Total Hours	9	7	7	23
Total Cost	\$ 1,350.00	\$ 840.00	\$ 980.00	\$ 3,170.00

Objective 3				Totals
Select framework for assessing ecological integrity	15	10		25
Select framework for assessing human use needs	20	5		25
Draft literature reviews	8	8		
Draft Final Report	15	10		25
Total Hours	58	33	0	91
Total Cost	\$ 8,700.00	\$ 3,960.00	\$ -	\$ 12,660.00

Direct Costs				Totals
Lodging			\$ -	-
Mileage	\$ 100.00	\$ 300.00		\$ 400.00
Total Cost	\$ 100.00	\$ 300.00	\$ -	\$ 400.00
Total Labor	\$ 12,330.00	\$ 5,700.00	\$ 1,540.00	\$ 19,570.00
Direct Costs	\$ 100.00	\$ 300.00	\$ -	\$ 400.00
Total Cost	\$ 12,430.00	\$ 6,000.00	\$ 1,540.00	\$ 19,970.00

## **E. PROJECT TEAM**

Headquartered in Carbondale, Colorado, Lotic Hydrological (Lotic) generates high-quality data tools and interpretations to inform science-based decision-making in public policy and natural resource management. With a small and responsive staff of engineers and scientists, Lotic provides technical expertise, water resource engineering services, and a firm commitment to scientific problem solving.

Lotic's combined team expertise in river health, GIS and data management, and stakeholder engagement will provide the interdisciplinary background necessary to plan and execute on the vision communicated by the Hutchins Water Center and Colorado Basin Roundtable. Our projects routinely include spatial analyses components and the need to provide clear and effective communication of complex water resource issues to audiences of varying technical skill. We have experience with numerous GIS platforms, database design, programming and coding infrastructure, and web products. Coupling these digital fluencies with our staff's broad foundational background in multi-disciplinary water science allows us to bridge the divide between the unique needs demanded by scientific investigation, management oriented decision-making, and communication to the general public. Lotic will subcontract with Open Waters Foundation and EcoMetrics to leverage the unique skills sets that each of these firms can bring to the project.

EcoMetrics is a leader in the development, testing, and implementation of Colorado's [FACWet](#), [FACStream](#), and Stream Health Assessment Framework (SHAF) functional assessment methods and their staff is well-versed in a wide variety of other common ecological and geomorphological assessment frameworks. Mark Beardsley, the principal at EcoMetrics, is responsible for the design and execution of ecological research projects, hundreds of site-scale assessments, watershed inventories, and several stream and wetland restoration projects that focus on design approaches that promote natural processes and functions. Mark's experience is grounded in a diverse educational background and more than 20 years hands-on field experience as a stream, riparian and wetlands scientist. The systems thinking and organizational framework development experience that EcoMetrics brings to this project will help ensure identification of a well-formulated approach that integrates well with other commonly applied tools, methods, and frameworks.

The Open Water Foundation (OWF) is a nonprofit social enterprise that is working to provide an open source software platform to help organizations make better decisions about water. OWF is working to address complex water resource problems by developing and supporting open source software tools, and helping organizations implement solutions for data management, analysis, and visualization. OWF will support Lotic and EcoMetrics in the development of any spreadsheet tools, software applications, or databases, deemed necessary for the organization and/or collation of data collected by future IWMP efforts.