

## Participant Questions about the South Arkansas River Stream Health Assessment 7/30/2021

Answers provided by Mark are in purple (7/31/2021).

### Questions Related to the Stream Health Assessment

1. How was the letter grade determined for some of the more subjective categories, such as succession/regeneration of riparian vegetation and habitat connectivity, and have any grades been challenged since creating the report?

All the variable grades are determined by best professional judgment interpreting available information in light of the grading criteria. I am not sure that the riparian vegetation and habitat connectivity variables mentioned above are necessarily any more subjective than the others. None of the variable grades in the South Arkansas report have been challenged, as far as I know, but I hope they are because that is how new information is added and evaluations better refined.

2. A lot of GIS data was presented in the report. What tools/data did the authors primarily use for creating the report, besides information in the 2014 SAWC report, and are they publicly available?

There is an amazing amount of publicly available data. Here are a few we used in the report: CDPHE water quality reports and 303d list, USGS and CDNR stream gauge records, USGS StreamStats, CDNR diversion records, Google Earth, historical aerial photography, LiDAR datafiles from the state, CNHP restoration toolbox...

3. One of the underlying assumptions from CWCB guidelines is that the "natural" condition is the desired endpoint. While that might be reasonable on some rivers, my observation is that changing land uses might indicate a different set of preferred beneficial uses that might require a whole different target for some of the RHA criteria. This is probably heresy, but I would enjoy a discussion about this.

I enjoy discussions about these topics as well, so here goes... I don't believe CWCB guidelines assume that the desired endpoint of a plan or project must be the natural condition. They sponsor many plans and projects with desired endpoints (goals/objectives) that are explicitly things like improving diversion efficiency, increasing artificial water storage, enhancing recreation, and protecting life and property, to name a few. These kinds of activities, more often than not, lead to a less natural condition and less healthy riverine ecosystem. The way I read CWCB guidelines is that river health (and the benefits and ecosystem services that healthy streams provide) should at least be considered in stream management plans (and actions), alongside whatever other stakeholder issues and benefits are targeted. I don't want to speak for CWCB, but I think they would agree that actions that improve stream health (or cause less harm) are preferable to those that degrade stream health.

I agree that changing land uses (and the ever-changing needs and desires of people) do indicate differing sets of preferred beneficial uses. And it follows that management targets should evolve to track these changes. Accurately assessing and communicating what people want from their rivers is what the SMP stakeholder process is all about.

River health, on the other hand, is an objective ecological concept. A foundational principle (an underlying assumption, if you prefer) in ecological health assessment is that system health is inversely proportional to the degree to which artificial stressors impair natural processes. River health does not depend on what people want the river to be, and the criteria for evaluating it does not change when people change their minds about what benefits they prefer or what current land uses demand. For example, we may want (or even need) a river to be channelized and contained to, say, protect a town from erosion or flooding, but that does not mean this section of river suddenly becomes healthier or more natural when it is effectively channelized and contained.

There is no reason that stream management plans can't prioritize actions that manipulate stream systems in ways that make them less natural (like by channelizing and containing it as in the example; or by removing water, or managing flow, or introducing nonnative species....) if there are important benefits to be gained, but doing so must be understood as a tradeoff in terms of river health that is proportional to the degree that the actions disrupt natural processes.

4. The variables and sub-variables evaluated in the stream health assessment are grouped differently and have slightly different focus areas compared to the FACStream and COSHAF frameworks. In addition, Riverscape Dynamics seems to be a new variable that has not been included in other FACStream-based river health assessments for SMP/IWMPs. Was this decision driven by the local community, by site-specific factors on the landscape, by the desire to integrate the stream health assessment with fluvial hazard zone mapping, or other reasons?

If you just want a simple answer to the question posed, it is that the decision to use Riverscape Dynamics was made for "other reasons"—to refocus evaluator's bias away from ideal static channel form and towards the importance of natural geomorphic process dynamics in general. Many thanks to Peter Skidmore, Karin Boyd, Seth Mason and others who fueled long discussions on this topic!

I think the comments and question above are more about what COSHAF is and why it keeps changing. Yes, COSHAF is evolving as more and more people use it and add their thinking. This is progress! FACStream 1.0 is technically a published document (albeit in some obscure EPA way that I do not even understand or know how to cite), but COSHAF lives, academically speaking, only in its published uses in actual assessment reports. Personally, I like it this way because no one has ultimate authority. A lot of thought and plenty of tinkering by smart people have gone into the various applications of the framework. I hope it continues to evolve and improve with each use.

FACStream was developed by Brad Johnson, Jessica Doran, and me specifically for the EPA for use in evaluating stream mitigation actions in regulation of Section 404 of the Clean Water Act. In trying to meet the demands of federal regulators for this specific purpose, FACStream became, in my opinion, too prescriptive and cook-book-like.

COSHAF is the name Brad and I put on the basic framework from FACStream. Another version was called RHAF (River Health Assessment Framework) where it was used on the Poudre in Fort Collins. COSHAF is just a framework. Its purpose is to provide the evaluator a list of the important things to consider when evaluating holistic river health (the variables) and some very basic guidelines for how to grade them consistently. The rest is up to the evaluator. As such, it is not a method or an algorithm (which is what the regulators wanted FACStream to be). Evaluators must use their

experience and knowledge to interpret information and make their own rational and defensible judgments.

In FACStream and the original COSHAF, there were originally 3 main categories of variables (watershed, riparian, and stream). The stream and riparian categories were consolidated in later versions to give just categories (watershed and reach) because the distinction between channels and riparian areas is arbitrary, often artificial, and frequently misleading.

Riverscape Dynamics, as used in the South Ark assessment, is similar to Stream Dynamics in the Colorado Basin IWMP framework. It basically replaced the original Stream Form and Stability variables to reflect the growing appreciation of fluvial geomorphological dynamics versus stability of a static ideal channel form. Riverscape hydrology is essentially the old Floodplain Connectivity variable with just a name change for semantic reasons because there is so much confusion about both the term "floodplain" and "connectivity". There are plenty more subtle and not-so-subtle variations in the detailed structure of the framework...

5. There does not appear to be a recreation potential component in the RHA scoring. We are trying to figure out how to quantify this as a benefit of stream remediation projects. We may be unique given that the City of Boulder Open Space and Mountain Parks department is a major riparian landowner, and recreation is a core part of their mission.

Correct. This framework evaluates the health of the river ecosystem. Recreation potential would require a separate evaluation. See the answer to #3.

### **South Arkansas Project-Specific Questions**

6. Riparian land ownership is a key driver for project prioritization. The report mentions that the City of Salida owns one piece of riparian property. Does the city have a strong enough desire to improve open space and recreation in the city to consider investments in conservation easements, property swaps, etc.? If not, who would take ownership of projects outside the ranch that the city owns? Is there an over-arching organization with sufficient resources to fund projects?
7. Would the city be willing to broker water rights purchase and sale. Specifically, purchase upstream water rights and re-sell to down stream user. This is complicated, potentially (but not necessarily) expensive, and time consuming but has the potential to keep more water in the stream through some critical segment of interest. To justify this effort, a "before and after" version of RHA scoring could quantify the benefits.
8. Now that the report is complete and avenues of restoration efforts identified, what have been the next steps to accomplishing those efforts and what groups have been involved?