

Pre-Conference Environmental Flows Workshop

Monday, October 2, 2023, 1:00pm-5:00pm
Westin Riverfront Resort & Spa, Riverside Ballroom
126 Riverfront Lane, Avon, CO 81620

Post-Workshop Notes and Online Resources

Presenters & Slides

- Stacy Beagh, Strategic By Nature, Inc., and Chelsea Silva, River Network, [Rules of Engagement, Anticipated Outcomes, and Colorado Stream Management Plan Peer Learning Network](#)
- Stephanie Scott, Scott Solutions Consulting, [Environmental Flows Cohort Teaser](#)
- Seth Mason, Lotic Hydrological, [Environmental Flows in the Stream Management Planning Process](#)
- Stacy Beagh, Strategic By Nature, Inc., [Peer Learning Activity on Barrier & Opportunities with Environmental Flows in SMPs](#)
- Seth Mason, Lotic Hydrological & Jay Skinner, Western Resource Advocates, [How to Measure Flows 101](#)
- Hattie Johnson, American Whitewater, [Workshopping American Whitewater's Flow Preference Assessment](#)
- Tony LaGreca, Colorado Water Trust, [Steps Beyond Flows Assessment & Evaluation](#)

Additional Resources

- **(link to be added soon!)** Flow Recommendations in SMPs – Opportunity Analysis. (2023). White paper for River Network, prepared by Stacy Beagh, Strategic By Nature, Inc., and Seth Mason, Lotic Hydrological.
- [Table of Available and Potential Tools to Protect and Restore Flows](#). (2021). Colorado Water Trust.
- [Assessing flow regime resources](#) on coloradosmp.org
- [River-based recreation resources](#) on coloradosmp.org
- [Flow targets workshop materials](#) from 2021 Pre-Conference Workshop at Sustaining Colorado Watersheds.

Notes from the Workshop

Notes provided below are from the pre-conference workshop. Notes are not comprehensive and should be understood as a snapshot of the content covered during the workshop.

Group Agreements and Colorado SMP Peer Learning Network

- The Colorado Stream Management Plan Peer Learning Network (PLN) provides SMP leaders and coalitions around the state with a venue for information sharing, problem solving, and peer learning. All events hosted by the Peer Learning Network are posted to coloradosmp.org, an online Resource Library for stream management planning hosted by River Network and Colorado Water Conservation Board.
- Group agreements for the wet meadows tour and SMP/IWMP field trip:
 - Be respectful
 - No side conversations, phones in room

- Suspend judgement, have open mind
 - Step up, step back
 - Hold back, see who else has questions; speak up and share
 - Listen to understand
 - Engage
 - Take care of your own needs
 - Have fun!
- Quick note from Chris Sturm, CWCB, on SMPs versus watershed planning
 - What resonates? SMP? Or environmental and recreational flows assessment?
 - Watershed planning is not just SMPs. It is first year college, 101 stuff. Understanding our watershed. Building our stakeholder groups.
 - SMP is graduate level stuff. Bring that in after we do our assessments.
 - Chris Sturm, CWCB, would like us all to scrub the word “management” out of our messaging and approach to watershed planning.

Environmental Flows Cohort Teaser

- This presentation introduced the Environmental Flows Cohort, program goals and outcomes, what to expect for the 2024 program, commitment and expectations, program values, and the application process.
- Facilitators and trainers for the cohort include staff/consultants from River Network, Colorado Water Trust, Western Resource Advocates, Scott Solutions Consulting, and Lotic Hydrological.
- The cohort program will be guided by a steering committee.
- Feedback from this “teaser” will help inform the cohort.
- Program audience: local stakeholders who are interested in stream health and currently or are interested in watershed planning.
- Goal: Support coalitions’ in understanding how to establish environmental flow recommendations for their rivers.
- Applications will open in early 2024.
- Questions from workshop participants:
 - Who should apply?
 - Ideally, applicants are someone from your organization who will be in their position long-term rather than volunteers, interns, or board members that are term limited.

Environmental Flows in the Stream Management Planning Process

- This presentation provided background information on the “why” behind doing an environmental flows cohort.
- Water Plan was foundational for getting SMPs going throughout the state.
- In 2021, River Network surveyed the world as we know it on Stream Management Plans across the state. From 2015 to 2021, \$8 million had been invested in SMPs.
- River Network asked a community of stakeholders why only 7% of SMPs resulted in environmental flow recommendations. We then put together a white paper with feedback from these stakeholders answering that question.
- The wheel on slide 6 is a guide for recommending how we approach SMPs. We reflected on this wheel and where we needed to pay more attention if we wanted to increase the number of flow recommendations. Critical up front steps were identified (see slide 6).

- Critical considerations
 - Identify known or expected flow issues that you want to address.
 - Contemplate alignment between scope and scale of your planning effort and the granularity of the known/expected flow issues.
 - Articulate planning objectives that respond to the issues/scales identified (and look out for mismatch in objectives).
 - Budget for assessment activities that relate flow behavior to priority issues/geographies at the relevant scale.
- Process
 - The process outlines steps to help you meet flow recommendations.
 - Technical process = thinking about conditions.
 - Stakeholder process = reflecting on the conditions, engaging different stakeholders.
 - Feedbacks between the technical process and stakeholder process.
- Common challenges
 - Apprehensions and misunderstandings
 - Mismatches in project scope/scale
 - Lack of motivation
 - Lack of knowledge
- Expected benefits
 - Addressing existing water supply deficits
 - Preparing for future scenarios (e.g., with uncertain climates, increasing populations)
 - Evaluate impacts of specific actions
 - Link flows to recreation and economy
 - Graphs on slide 15 are from American Whitewater. They are outputs from boatable day analysis. Top graph shows how structural modification of a bridge could improve number of boatable days.

Peer Learning Activity on Barrier & Opportunities with Environmental Flows in SMPs

- Participants were split into small groups and each given a barrier to the environmental flows process. The groups discussed the common barriers to flow recommendations and considered the application of the barriers to their own SMPs and potential opportunities to overcome the barriers.
- Group activity share out summary
 - Barrier: Lack of knowledge. Opportunity: Find out what local knowledge there is, rely on the experts to help out.
 - Barrier: Competing values. Opportunity: Separate the assessments and the non-consumptive needs, the science from the values.
 - Barrier: Apprehensions. Opportunity: Use language, messaging, terminology that is targeted to the audience. For example, “additive flows” instead of “environmental”. Nurture relationships, build trust, this takes lots of resources.
 - Barrier: Overappropriated streams. Opportunity: Engage all water users, administration – figure out who needs to be involved. From there, be flexible – if there is an impenetrable piece, be flexible on scope.

- Barrier: Differences in scale. Opportunity: Consider how to prioritize where to focus time and energy. Look for a good project to start with. Start from a larger scale and then shrink down once you define your priorities. Starting big helps you understand the connections.
- Closing thought: The water community in CO loves to punt when barriers come up, but to move things forward takes action. Don't wait for others to do it. The group that is punting needs to give you a good reason as to why they are punting. Bold actions are required.

How to Measure Flows 101

- This presentation covers an overview of the technical side of flows, including various approaches used to characterize impacts to environmental and recreational uses associated with streamflow alteration, and methods used to set management targets/objectives for supporting and protecting those uses.
- Caution: We can all learn from the San Miguel example. The San Miguel group did their technical assessment without engaging their stakeholders. Then, they took the completed assessment to the stakeholders and the stakeholders were furious that they weren't involved from the start. Do not do the technical work without first working with your stakeholders!
- Assessments are choices
 - There are whole books on flow assessment techniques, but selection of a method depends on budget, spatial resolution, and data needs.
 - Risk rating approaches based on hydrological alteration
 - Environmental flow threshold setting methodologies
 - Environmental response function development
 - Relating streamflow to recreational user preferences
- Hydrological risk rating-based approaches
 - Indicators of Hydrological Alteration (IHA) is an approach where you evaluate characteristics of hydrograph in one case vs another. Then you look at the change between preferred case and other case. IHA is a fair course approach – involves 70 statistics.
 - Watershed Flow Evaluation Tool takes the IHA concept and proves it out with more local data. Can map changes as risks for specific things like trout biomass. This is a fairly simplistic approach.
- Environmental threshold-setting
 - Identifies a single flow level you do not want to go beneath.
 - Usually these flows correlate to hydrologic regime.
 - Indicated on slide 7 is wetted perimeter. You end up with a set of values for wetted perimeter. The inflection point should be where you manage to, where you do not want flow to go beneath.
 - Tennant Method relies on characteristics of hydrology, not regime. Very simplistic approach.
 - R2Cross is endorsed by the state so well known.
- Response function development
 - Developing a curve instead of a threshold. This makes identifying needs more complex.

- Entails characterizing hydraulic characteristics to different life stages and species. Can do this work and then model across different flow states, aggregate that data to get a curve.
- This could be a topic of the cohort discussion – how you decide the threshold on the curve using this approach?
- Recreational use opportunities
 - American Whitewater uses this approach for whitewater rafting.
 - Involves surveying recreation users. Get preferences across flow states. Generate response curves to delineate flows. Can map specific flow states to likelihood of enjoyment of users.
 - Then bin days into different categories.
- Apply assessment results carefully!
 - Regardless of the approach, you are getting specific conditions and needs that rely on specific assumptions.
 - You may need to do more than identify flows – e.g., [the “zinc belch” – a la Eagle River superfund site](#).
 - Assessments do not provide all the information you need.
- R2Cross Methodology: Reach ID and Transect Selection
 - Survey cross sections, slope, do flow measurement.
 - Furgeson – can use pebble count or not.
 - R2cross is a standard setting technique.
 - Riffles start to feel the effects of low flow first. Riffle habitats are most productive biologically as well.
 - Site selection: relatively straight river section, unobstructed, avoid channel complexities. Nice, clean riffle cross section with uniform flow.
 - In past, we based flow regime on one cross section.
 - Now, we try to use 2-5 per reach. Try to capture natural variability.
 - Once you select sites, you measure velocity, collect survey info to describe shape of stream, slope.
 - We do not need to have flow recs for every section.
 - State statute says “preserve natural state to reasonable degree” which usually means fish data.
 - Best to do R2Cross work at receding end of hydrograph – not at peak flow or base flow, but in the middle.
 - Graph on slide 15 shows model versus measured.
 - Threshold setting: The staging table is where rubber hits the road. From the table, the eRAMs model will generate threshold flow numbers.
 - Jay Skinner’s goal: Provide training on data collection techniques, assist with data collection.

Workshopping American Whitewater’s Flow Preference Assessment

- American Whitewater shared tool for identifying recreational flow needs. Then, workshop participants were split into small groups for an activity with half the group focused on recreational goals and the other half focused on environmental goals. Groups had to build

hydrographs using sticky notes based on their goals, and then worked together to build a hydrograph that met both recreational and environmental flow goals.

- American Whitewater has mostly looked at boating but would like to move into other types of recreation like fishing and tubing.
- Slide 8 – Suggestion that after the workshop, participants go to the [Upper Gunnison Boatable Days page](#) and play around with the example.
- When balancing env and rec, important to consider the impacts to physical nature of the stream.
- What do we do next? American Whitewater is working on a Water Plan Grant to help inform next technical update to the Water Plan, make these tools available to the public, and identify locations at risk.
- Currently in first phase of identifying spatial data, looking at other forms of recreation. They will create a recreational geodatabase and the goal is to have a recreation map with hotspots.
- Suggestion from participant: Consider combining this work with education for recreators, e.g. don't fish when too hot, etc.

Steps Beyond Flows Assessment & Evaluation

- This presentation focused on what can you do once you complete flows assessment and evaluation.
- Colorado Water Trust works within prior appropriation systems.
 - Prior appropriation: Industrial, municipal, and agriculture were identified as recognized uses and provided water rights. But there was never a recognized use of environmental flows. Because no use was recognized, there was no way to appropriate and environmental flows were junior to industrial, municipal, and agricultural uses. This model can lead to dry riverbeds.
- Tools to increase in stream flows
 - Infrastructure improvements
 - Efficiency improvements
 - Non diversion agreements
 - Reservoir releases
- Infrastructure improvements
 - Abrams Creek: Trout Unlimited worked to pipe irrigation diversions – found ditch was leaking up to 40%. Created new In Stream Flow (ISF) with a 2015 change date. Flows supported the cutthroat trout.
 - Stuben Creek – two diversions, one up high that ran to one lower down. They piped the structure and changed the intake, upgraded the infrastructure and the water user was able to release water /abandon it and now has more reliable supply. Uncertain of change date but may be 1800s.
- Efficiency improvements
 - Crop switching
 - Verde River in AZ- alfalfa to barley. Converted large acreage with farms to reduce need and updated infrastructure.
 - Kernza in CO – wheat grass is perennial with deep roots and requires less water than alfalfa and can be weaved in. But the question remains is if there is a market.

- Efficiency irrigation
 - Flood to sprinkler – can go from 50% efficiency to 70% efficiency. This is expensive though.
- Non diversion agreements
 - Simple agreements but challenging in CO because they don't protect water users. This is a non-use agreement because you use it or lose it.
 - TU winter flows
 - TU worked to save Rio Grande cutthroat trout. Worked with irrigators downstream of the reservoirs. The project uses a retiming of use model.
 - Water conservation program – state statute tool
 - Protects water users.
 - Anyone can apply for it through conservancy districts.
 - Nondiversion agreements, split and nonseason.
 - You do not get a “zero” for not participating if you do this with the conservancy district.
- Reservoir releases
 - Most of projects mentioned above are small; reservoirs are for large changes.
 - 15-mile reach environmental release project
 - Contract for water not for environmental practices. They lease hydropower water to release it for another dam. Release at a time when it is valuable for endangered species such as humpback chub. Can move hundreds of cfs!
 - Arkansas River voluntary flow management program
 - Reservoir water belongs to municipalities, and they will bring water downstream regardless. Evaporation loss is huge in lower reservoir. But everyone wants to raft the river.
 - State, Bureau of Reclamation, and others worked out a deal to fill holes in the hydrograph from end of June to August 15. Big win for rec.
- Tools to protect in stream flows
 - ISF program began in 1973 and is a Colorado water law that allows you to protect water.
 - Options are to appropriate or acquire.
 - State appropriates new ISFs.
 - Acquisition is where the state acquires permanently or temporarily a water right.
 - Appropriations keep flows from getting lower.
 - Acquired are more senior water rights.
 - ISF map in CO on slide 13 – ISFs are everywhere.
 - ISF also allows CWCB to watch flows and be sure that they can protect flows if someone tries to get new water right.
- Recreational in channel diversions
 - Whitewater folks wanted to know they would have stability in installed recreation diversions like created rapids.
- Acquisitions and water right change
 - This is the Water Trust's niche.

- Peabody ditch – rancher on Blue River wanted to do something conservation-oriented. Donated land to USFS and donated water to the CWT. CWT got the water changed from ag use to env flow. Helps the Blue River.
- Alamosa River – change of water rights below a reservoir that is released at end of season to maintain end-of-season flows. CWCB uses the water to extend the season. A flow target was set. Incrementally, these acquisitions add up to meet that predetermined flow target.
- Little Cimarron – CWT purchased water rights on this river. Instead of buy and dry, they did a split season decree. So can irrigate early on and then in July have ability to do the ISF.
- Temporary loans or water conservation programs
 - This is a statute that is on the books.
 - In 5 out of 10 years can use for ISF.
 - Does not require a transfer. Allows users to monetize their assets.
 - If thinking about flow recs, and there is an ISF of 10cfs. Do not look at that number as a ceiling! Can look at an improved flow rate.
 - This was a big recent change.
 - Example is the Yampa River Env Release Project
 - CWT been working there a long time.
 - Can release water 5 out of 10 years. Improve rate is quite large.
 - These help to stop the river closures due to high temps in water because more water in river.