

#	Question	Answer
1	Can you use sandbox to study alluvial fans?	I would assume so. The video showed it was able to replicate a delta formation. Depends on what you mean by "study," but you can definitely demonstrate their formation.
2	Does the water in that tank percolate down and create a watertable, or is the plastic media hydrophobic?	The tables are roughly 6-9 inches deep, so you do get some groundwater movement.
3	Is it possible to incorporate vegetation in the sandbox?	Yes, Emriver had a whole toolbox full of different "props" that could be played with in the model to simulate vegetation, culverts, bridges, levees, etc.
4	Is the channel evolution model (or the stream evolution model) applicable to all rivers around the world? Do these relationships hold true for gravel dominated braided rivers or should it be applied with caution when working outside of fine grained environments?	The CEM and SEM can represent gravel/bed rivers as well as fine-grained systems. However, degradation tends to be worse in fine-grained systems because bed armouring somewhat limits incision in coarse-grained alluvial streams.
5	Often we use riparian reforestation and instream shade as an approach to reduce river thermal load under the understanding that solar radiation is an important source of river water heating. Can you speak to the net effects of Stage 0 restoration on river water temp? Does solar load increase with increased water surface area exposed to the sun but is offset by increased hyporheic flow?	During and immediately following restoration, before the wetland and floodplain forests re-establish, solar radiation does increase, but the shade comes back with time. But more importantly, reconnecting the channel to its hyporheic aquifer allows river water to flow underground! That's great for cooling it in summer and warming it in winter. Thank you Colin. It sounds like the upshot is that Stage 0 is likely to yield net cooler water after veg reestablishes and hyporheic flow increases. Makes sense.
6	Can we model the output on design surface (theoretical surface) as well?	Yes, 2-dimensional models are great for simulating the wide, multi-channel channel-wetland complexes characteristic of returning a river to its Stage Zero condition.
7	Are the stage 0 concepts applicable to river systems worldwide?	In principle, yes. That said, the general process-response templates provided by the CEM and SEM are just that - generalised templates. In detail every river is unique and to understand and model it the general models must be bespoke to properly represent the river and its individual catchment context. Along the same lines, is stage zero applicable to confined, steep streams?
8	Were there any ESA complications/issues with that diversion?	Yes - measures had to be taken to ensure that habitat and passage for ESA-listed species are not interrupted at any point along the restoration trajectory.
9	How do dams play into the Stage 0 concept?	The SF McKenzie example Kate is now describing is just a few kilometres downstream of Cougar Dam. The dam provides environmental needed minimum flows and its water release twoer is used to blend water from different depths in the reservoir, so that the river downstream doesn't get too hot for salmon during the summer. So river restoration can leverage the capacity of a dam to regulate flows and water temperatures.
10	Rivers have been isolated from there floodplains for many reasons, not just incision. Often this is because communities want to reduce flood impacts (e.g. channelisation, levees). Reversing these 'protections' is contentious. Basically - people use floodplains. Restoration is often about compromises.	Absolutely - restoring rivers involves making trade-offs as well as gathering in multiple benefits.
11	Were any of the temp or productivity measurements taken in the winter?	Yes. At several Stage zero restorations, temperature is monitored 24/7, 365.
12	For Grady. Im a fan of your Youtube channel and had seen the full 2 part vid of your sand table work. You did a comparison of a constant flow evolution vs. pulsing flows to show the differences. Can you comment on the differences WITHIN treatments as its my view that even within these controlled sandtables, we are dealing with a very chaotic system. Thank you Sir.	My experience with the tables is pretty limited, but many of the demonstrations we set up were run twice to get all the shots we needed. I was surprised at how consistent the tables behaved if you kept the slope and flow rate consistent. Many of the shots you see in the video are cut between two separate runs of the same demo, and you would have to pay close attention to notice the differences.
13	Were any significant natural hazards and their impacts considered when determining the efficacy of the project?	
14	What are some of the positive impacts of restoration in reducing flood risks on downstream communities?	Very good question Wesley. This is a real benefit of this work Hi Ian. Thanks for your reply. Appreciate if case studies could be shared. In the UK, 'Natural Flood Management' involves more managed flooding than flood management. Reconnecting floodplains in 'flood suitable' areas, takes pressure off the defences protecting flood vulnerable communities downstream. This is the essence of managing flood RISK rather than trying to prevent flooding.
15	What were the anthropogenic factors that led to the south fork becoming a zombie river? Were they just form factors or process factors? If the latter, were they addressed?	Wood removal, beaver removal, dam construction upstream, berming off side channels for riparian tree harvest, etc. So form and process factors. Yes, process impairments were analyzed and addressed to the extent practicable.
16	For the South Fork River, have there been any negative downstream impacts associated with deposition at the project site? (I.e. did it become "sediment starved"?) This is a concern we hear from folks that are skeptical about using this approach in an urban environment (where we've already diminished the sediment sources to a river with development).	Sediment is still moving through the system, it's just NET depositional. On 7 Stage 0 projects this has not been an issue at all.
17	What's been your experience implementing this type of restoration close to critical infrastructure? I'm finding there's pushback due to the perceived maintenance burden risks to downstream bridges/culverts.	If infrastructure is located too close to the channel, it's going to be at risk from flooding and/or erosion per se. The best management solution is to move the infrastructure and relocate it out of harm's way. Where rivers and infrastructure must share the same space, it's necessary to keep people and property safe as the top priority. Thanks!
18	Is anyone aware of notable Stage Zero-type projects in the American Midwest? Sure would be nice to have precedent for our regulators, haha..	Yes! Contact my old friend Art Parola and my former Doctoral student Mike Croasdaile at the University of Louisville, Kentucky. They've been reconnecting rivers to their floodplains for 20 years. Long before 'Stage Zero' was even a thing!
19	What would be some of the downsides of Stage Zero Restoration?	Potential short-term impacts such as temperature increases.
20	When carbon sequestration was measured at McKenzie, did it take into account potential increase in methane emissions from restored wetlands?	
21	I'm interested in the panel's opinion of how you can implement some of this thinking to urban areas and degraded streams	I'm interested in the panel's opinion of how you can implement some of this thinking to urban areas and degraded streams When infrastructure constraints within a valley limit what you reconnect, we start to design Stage 8 projects - an anastomosing condition, but connected at a lower base level elevation. There is a concept of reclaiming the river and room for the river with a number of examples of reclaiming urbanised land to reclaim the floodplains to give the river its natural room to move and have floodplain capacity.
22	What is the link to Grady's youtube channel?	The channel is called Practical Engineering, should pop right up Thank you! https://www.youtube.com/@PracticalEngineeringChannel
23	What are the expected/observed geomorphic effects in the river channels downstream of reaches in which Stage Zero measures have been implemented?	Most of the rivers where I work are in arrested degradation so they aren't really changing downstream.
24	There are fish passage concerns for stage-0 restoration in systems with low summer flows but high snowmelt spring flows - how would you consider these concerns?	We've done Stage 0 restoration in a stream with a 5-10 cfs base flow. I would argue that by bringing the water table back up, fish passage is actually improved. Lots of wood slows the water down and "stacks it up". The answer to both issues to reconnect channels to their floodplains so that there are 'slow water' refuges during peak flows and a fully hydrated hyporheic aquifer to maintain low summer flows and keep water cool underground.

25	Is it preferably to maintain a variety of reach types in a river, some sediment transport reaches, some stage zero?	YES!!!!
26	Hello, are there examples of Stage 0 river restoration applied to river/creek diversions at old or abandoned mine sites?	We are implementing the second phase of a project that goes through abandoned gravel mines. The project is called Finn Rock Reach on the McKenzie River in Oregon
27	Much of the presentation has been on natural geomorphologic processes and potential restoration of near natural geomorphologic processes and reconnection of lowflow channel (and its movement) with (across) the floodplain. Very many of the world's cities, major urban development, and agricultural development exist on floodplains. Does the panel have any thoughts on how as an industry, we can develop better understanding within urban and regional development planning authorities and indeed private sector developers to better allow maintaining and more importantly adapting to allow for these processes in urban areas? Should and how do we 'retreat' from planned future and existing urban development on floodplains?	Related: In urban, built floodplains where stage 0 is not feasible, is there any environmental benefit for flood retention facilities that pushes water onto the floodplains in areas upstream of the built environment even in the absence of channel/floodplain modifications?
28	Are there any regulatory frameworks to protect the long-term land use plans of the river restoration area from unplanned urbanisation and environmental degradation?	Yes, in The USA land owners can either sign up for an easement that allows their property to be flooded more often. Or a non-profit can buy land that is flood-prone and unproductive.
28	Are there any regulatory frameworks to protect the long-term land use plans of the river restoration area from unplanned urbanisation and environmental degradation?	Appreciate your reply Colin.
29	Hi Kate could you share the title of the paper?	
30	Could someone expand on the engineering practicalities of creating the channel blockages required to kick start Stage Zero reaches? Were there concerns relating to the failure of such blockages in flood events greater than the design event?	It's possible to reconnect the channel to the floodplain using low-tech, muscle powered approaches like 'beaver dam analogues' (BDAs) and 'post assisted logjams' (PALS). For these approaches visit Joe Wheaton's website at Utah State University. But that type of restoration takes years to decades to be effective. The faster approach is pretty brutal, but it works - you fill in the incised channel using big yellow machines. The US Forest Service have shown that the fish can be back and spawning within months!
31	Question for Chris: What is the appropriate level of detail required to model this approach (say in HECRAS 2D) to satisfy fish passage design?	live answered
32	How is the FEMA regulated floodplain and the no-rise addressed at these stage zero project in the Pacific Northwest?	We've had to design Stage 8 projects in FEMA-regulated rivers to show no-rise.
33	How have you monitored instream habitat features at these projects after construction? Most field surveys are linear in nature and I could see this becoming complicated in a system with more multi-branched or ephemeral features	
34	Excellent, thank you! Could I try double or nothing and ask about anything closer to Michigan? Really looking forward to the SEDHYD workshop next week	Very cool!
35	For Wychus Creek example, how do you then control the floodplain from expanding without incising of the new channels?	Because high flows are spread across the full width of the floodplain, the stream power per unit width is very low. It's a depositional environment, not an erosive one and a really big flood will deposit lots of sediment, rather than tearing up the channels. But the downstream base level control is important: if there isn't a natural downstream control (like a landslide runoff, or a geological outcrop, or a tributary fan) then an artificial one might fulfil that purpose. But it's not ideal. Finding a natural downstream control and grading the channel-floodplain to that is best and safest.
36	For Grady, you said you were in San Antonio? Are there any stage zero projects or general fluvial geomorph practices going on in that area?	I'm not familiar with any Stage 0 projects in Texas, but San Antonio was the site of one of the largest ecosystem restoration projects of its time in the United States with the San Antonio River. The project is part of the UNESCO World Heritage Site of the Spanish missions connected by the river. Really worth a visit.
37	How did the practitioners of Stage 0 restoration convince decision makers, especially in more developed or urbanized landscapes?	The only way practitioners and decision-makers come to understand and value river-wetland corridors is for them to visit some and realise just how much richer and diverse they are than single-thread streams!
38	all of the presentation is with condition the floodplain is still green and woods, what is our best action if the flood plain is there's many house that build	In places where the former floodplain - which is now a terrace - has been developed, restoration to Stage 8 is a Great option. This was done in central Belfast, Northern Ireland, creating an urban greenway that is loved by the people who live and work along it.
39	I know the topic today is focused on restoration, but does anyone on the panel have any thoughts on how to most effectively prevent the degradation of rivers that was shown in the case studies today? Are there policies to manage new development or preserve natural areas that panelists think is most effective?	Protection of wide riverine corridors & wetlands combined with strategies to manage stormwater from development (with a focus on hydromodification)
40	Thanks! I'm a fan of the channel and originally from San Antonio, but got into geomorph way after moving.	live answered
41	How would you approach modeling a stage 0 restoration in HEC-RAS?	Has to be 2D IMO, and don't expect high precision.
42	How do you pitch this to Rosgen-fixated regulators? Regulators are #1 concern at this point	Get them out to visit stage zero
43	Is it even desirable to model such floodplains with the same granularity that we model 1-D models? What are the outputs one would be looking for in modeling these systems?	Is it even desirable to model such floodplains with the same granularity that we model 1-D models? What are the outputs one would be looking for in modeling these systems?
44	Cheers guys! Great to see you presenting in this part of the world. PNW pride!	*single channels, not 1-D models