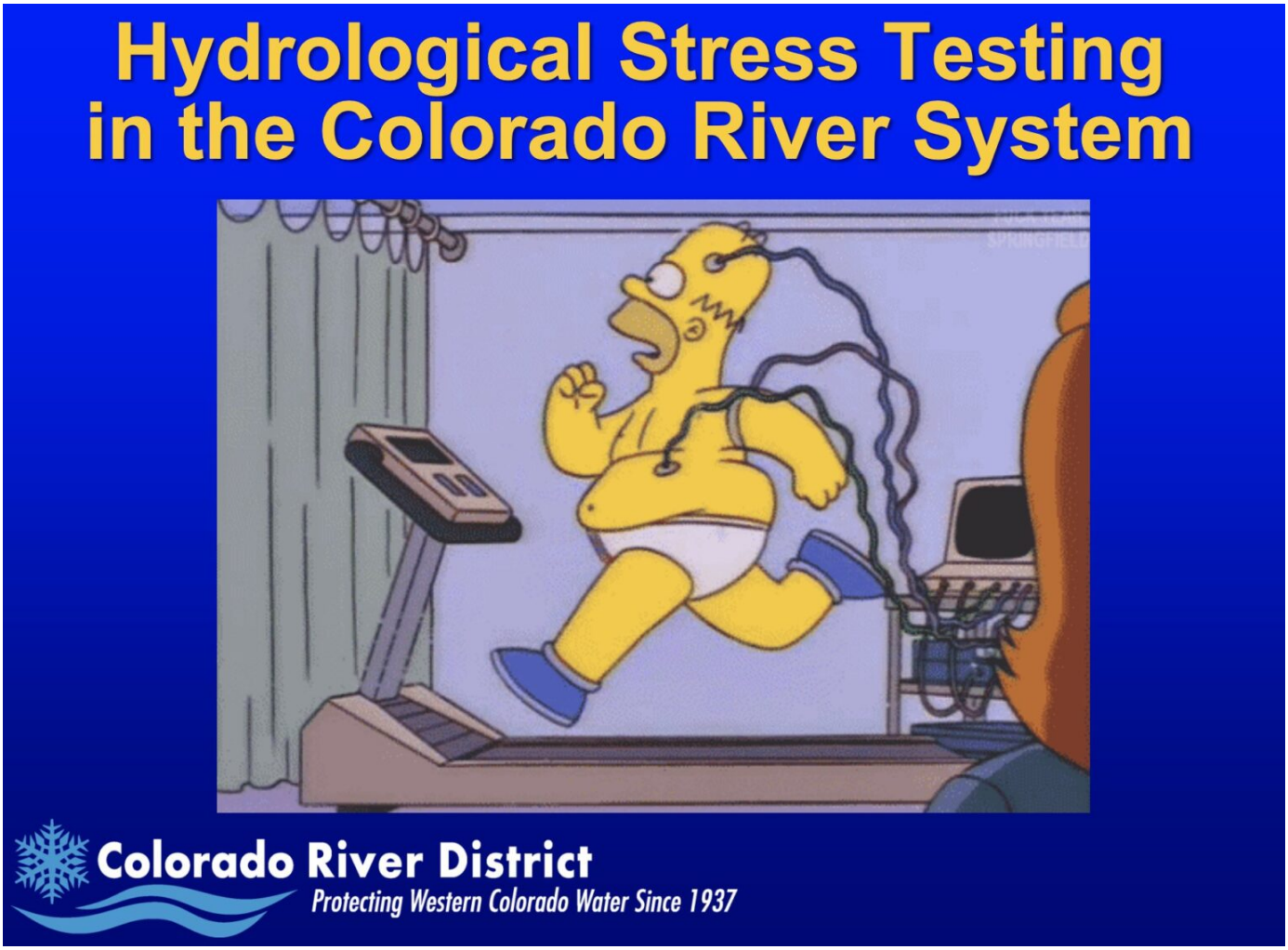
Taking climate change seriously: the Colorado River "stress test"

Posted by on



Courtesy Dave Kanzer and Eric Kuhn, from Eric's 2013 Colorado River Water Users Association presentation

The Bureau of Reclamation Colorado River team did something remarkable in yesterday's release of its new 5-year reservoir levels analysis – the "stress test", a methodology pioneered a decade ago by an Upper Colorado

River Basin technical team that included John Carron of Hydros and Eric Kuhn and Dave Kanzer of the Colorado River District is now the "new normal", to borrow a terrible phrase. From the "5-year projections approach tab" here:

> The method used to generate future inflows in the current projections includes resampling a subset of the historical natural flow record (1988-2019) using the Index Sequential Method (ISM), referred to here as "Stress Test" hydrology. In the past, the full historical record (1906-2019), known as the "Full" hydrology, was used to provide 5-year probabilistic projections. The Stress Tests hydrology scenario applies ISM to a shortened period of the natural flow record, 1988-2019, which removes the earlier portion of the natural flow record and focuses on the recent (approximately 30 years) hydrology. This period has a 10% drier average flow than the Full hydrology. Use of the Stress Test scenario is supported by multiple research studies that identified a shifting temperature trend in the Colorado River Basin in the late 1980s that affected runoff efficiency and resulted in lower average flows for the same amount of precipitation (McCabe et al. 2017, Udall and Overpeck 2017, Woodhouse et al. 2016).

The idea is that the traditional approach – using the entire period of record to model the probabilities of future river

flows – is not longer valid because climate change is changing the river.

John, Eric, and Dave reasoned nearly a decade ago that using a shorter record, focused on our climate-changed Colorado, might better help managers think about and plan for what to expect next. (Dave also famously provided the memorable Homer Simpson image for Eric's CRWUA presentation).

The "stress test" has been creeping into basin management discourse for a while, and Reclamation had already begun publishing stress test scenarios alongside. But the new 5-year flow and reservoir level estimates now are all in on the stress test.

The stress test may not be stressful enough, which was one of the implicit messages in the editorial Brad Udall and I published in Science magazine in May, and which Brad and I made more explicit here. But this use of the stress test is nevertheless hugely important, kudos to the Reclamation technical and management team for this important step.