

# **A first-ever call on this Colorado river as water scarcity tightens**



The Yampa River downstream from Steamboat Springs. Photo/Peter Skidmore

## **A first-ever ‘call’ on the Yampa River as the climate veers warmer & weirder**

**by Allen Best**

STEAMBOAT SPRINGS, Colo. – In late August, as reservoirs levels declined across the American Southwest, Erin Light issued something common in most river basins of Colorado but which had never been done on the Yampa River. She issued a “call.”

When a call is issued, those with newer or younger water rights must cease their diversions from the river and its tributaries until the older or more senior rights are satisfied. This system is called prior appropriation. Eighteen states in the West use aspects of prior appropriation to sort out who gets how much water and when.

Light, as the division engineer for Colorado Division of Water Resources, administers the labyrinth of water rights in the Yampa River Valley. Water goes to ranches, a power plant, and other purposes, each occupying a specific place in the pecking order as determined by volumes, locations and, above all, date of adjudication. That's the way it works when a river is under administration. Some Colorado rivers have been under administration since the late 1800s.

Until this summer, the Yampa was different. Those with legally adjudicated water rights took what they thought was theirs. Calls had been placed on tributaries, but not the river itself.

Then in late August, Light announced that those with water rights on the rivers' main stem awarded since 1951 would have to cease diversions until those older, or seniors, had been satisfied. By mid-September, as irrigators slowed their demands and cooler temperatures eased losses from evaporation and transpiration, Light edged the call back to those rights junior to 1960. Last week, she suspended the call altogether.

Droughts hit the Yampa and many other river basins in Colorado hard this year. But this drought may best be viewed as part of an extended 21<sup>st</sup> century drought caused more by temperature increases than precipitation declines. It's part of a clear trend of a warming and more erratic climate.

Ted Kowalski says the water call on the Yampa should be understood within the context of these hotter, drier times in the American Southwest. A former Colorado water official who is now senior program officer for the Walton Family Foundation's [Colorado River Initiative](#), Kowalski calls the Yampa

River the first domino to fall.

Lower streamflows in all the rivers of the Colorado River Basin that produce declining reservoir levels represent the additional dominoes.

This is starkly demonstrated, says Kowalski, by the fact that reservoir storage in the Colorado River Basin has reached its lowest level since the late 1960s. That's when the newly created Glen Canyon Dam was starting to create Lake Powell.

“All of this underscores the importance of developing and adopting and agreeing to drought contingency plans so that we can effectively manage if and when there is less water in the system,” says Kowalski. The work begins, he says, with conservation.

### **Conserving water in the 20th century**

Far into the 20<sup>th</sup> century, conservation had a different connotation in the West. Managing water in the Colorado River Basin meant building dams and creating reservoirs, all with the intent of ensuring none of the water was “wasted” by flowing into the ocean.





Hoover Dam plugs the Colorado River on the Nevada-Arizona border. Photo December 2012/Allen Best

Nearly all this major hydraulic engineering was done on the tab of the federal government. Downstream, first Powell and then Mead, the second largest and largest reservoirs in the nation, respectively, provide most of the storage. If separated by 300 miles and the Grand Canyon National Park, the two reservoirs fundamentally operate in tandem, as a Colorado River Research Group report in August noted. They are “essentially one giant reservoir (bisected by a glorious ditch),” [the report said](#) in a nod to the Grand Canyon.

Reservoir levels rise after big snow years, but in the 21<sup>st</sup> century the more common trend has been decline.

Evidence emerging in recent years suggests the Colorado River’s decline can

best be explained by rising temperatures instead of reduced precipitation. In a 2017 paper, Brad Udall, a senior water and climate research scientist at Colorado State University, and Jonathan Overpeck, the dean of the School for Environment and Sustainability, attributed two-thirds of water declines to temperature rather than precipitation. Not only is more water evaporating, they said, but plants have been transpiring more water.

“This is the kind of drought we will have to deal with in the future,” Overpeck said at a water conference in Santa Fe during April.

Doug Monger testifies to the warmer weather. A native of the Yampa Valley, he remembers 45-below temperatures, once in the 1980s for two days straight. Down the valley in Maybell, the temperature in that same cold spell hit 61 below. (It had also hit that same low in 1979.)

“I always prayed for climate change and global warming,” he jokes.

Now, he’s getting that warming. “We never had 90 degrees, and now it’s nothing to have 90-plus days for five or six days in a row.”

That heat has been taking a toll on the snow. About three-quarters of the precipitation in the Colorado River Basin originates as snow. Colorado itself provides 70 percent of the water in the river.

In the Yampa Basin, most of the snow collects in an elevation band of between 8,000 to 10,000 feet. The river originates on the flanks of the Flattops Wilderness Area as the Bear River, gurgles playfully along at the foot of the Gore Range and then, drawing more water from the usually snow-laden Park Range, hooks westward at Steamboat Springs for a 100-mile journey to Dinosaur National Monument.

Beyond Dinosaur, the Yampa’s water eventually flows into the Utah desert and Lake Powell.

The Park Range has a reputation as the snowiest place in Colorado. A gauge

at 10,285-foot Buffalo Pass, located northeast of Steamboat Springs, reported 80 inches of water contained in the much deeper snowpack by early May on a recent, snow year.

When spring arrives in years such as that, the Yampa gushes through Steamboat Springs well into summer. Flows needed for commercial tubing during summer represent one measure of winter's legacy. Tubers are not allowed to use the river until flows drop below 700 cubic feet per second. That commonly isn't possible until after the Fourth of July.

This year, snowpack was better than in Southwest Colorado. Still, it came weeks early and was altogether modest in its surge. Tubing season in Steamboat began June 11. Commercial tubing season ended a month later, when it is usually starting. City and state wildlife officials asked all tubers and others river users to stay out. The river was dropping to 85 cfs, considered a critical threshold, and warming as it did, hitting 75 degrees, reported the Steamboat Pilot at the time.

“If the river's getting above 75 degrees Fahrenheit, the aquatic life is severely stressed, and this is the time of year when they're feeding, and they're getting ready for winter,” said Kelly Romero-Heaney, the city water resources manager for Steamboat Springs.

No relief came with summer, hot and dry. Clouds produced just a few drops.

### **Water infrastructure in 21st century**

Light, the water engineer on the Yampa since 2006, tells a complicated story of why the first call was made this year and not during prior years. Water rights always get complicated. The immediate repercussion will be that investments will necessarily be made in the devices that assure flows. In the Yampa River it was a point of pride that there was no call, unlike places like the South Platte Basin. But almost everybody agrees it was inevitable.





The Yampa River had almost no flows at Deerlodge Park, at the entrance to Dinosaur National Park, when this photo was taken in mid-August. Photo/Erin Light

That inevitably stems in large part to trends in hydrology. In 20<sup>th</sup> century hydrologic records, three drought years stand out: 1935, 1955, and 1977. Now, in this still young century, there have been three more: 2002, 2012 and 2018.

“When you look at temperatures that were 5 to 10 degrees above average every day, that has to raise eyebrows about what the climate is saying,” she says.

Changes in the Yampa River Basin have not been well documented, but anecdotally at least comport with statewide trends reported in a 2015 report

to the Colorado Water Conservation Board. That report, “Climate Change in Colorado,” says statewide average temperatures had increased 2 degrees F during the previous 30 years, with daily minimum temperatures warming more than maximum temperatures. Timing of snowmelt and peak runoff had shifted earlier in spring by one to four weeks. Snowpack as measured by April readings had been mainly below-average since 2000.

Anecdotal evidence of this abounds around Steamboat. Local ranchers long measured a winter’s severity by how deep it accumulated on their barbed wire fences. The 20<sup>th</sup> century produced many three-wire winters, enough snow to hit the top strand. Three-wire winters seldom come anymore. Last winter snow failed to reach the bottom wire. In some places, there was no snow at all on the ground, says Ken Brenner, who grew up on a ranch south of Steamboat Springs and is now president of the Upper Yampa River Water Conservancy District Board of Directors.

Light says the Snotel automated snowpack measuring sites fail to tell the full story. The stations maintained by the federal government’s Natural Resources Conservation Service record snow and water content at 8,000 to 10,000 feet. Some years, they report robust snow that cannot be seen in snow depths on the valley floor. This leaves locals wondering how this snowpack could be anywhere near normal. The rising levels for snowpack argue for a different monitoring system, says Light, one that captures dynamics of the low-elevation snowpack.

## **Water infrastructure for 21st century climate**

Climate change models predict sharply increased temperatures in coming decades. Models also predict greater variability of precipitation, more extremes of both wet and dry. That could provide an argument for more reservoirs. The Yampa River has just 2 percent of Colorado’s reservoir capacity, but the river provides a much larger percentage of the state’s overall flows. The Gunnison River, with about the same runoff on average, has three giant federal dams, part of the same Congressional authorization in 1956 that



created Lake Powell.

The Yampa, White, and Green Basin Roundtable, a decision-making body created by the Colorado Legislature, agree that instead of giant reservoirs, the basin could benefit from smaller reservoirs, discretely located, such as on tributaries, to serve specific needs, reports Light, the state's liaison to the roundtable.

Monger does see the need for storage on the Yampa River. It could help Colorado manage its water so as to ensure it can meet its commitments to other states in the Colorado River Basin. "Let's keep it in my backyard rather than sending it down to Lake Powell and have it be subject to the Bureau of Reclamation and the Department of Interior," says Monger, a Routt County commissioner as well as a delegate to the Colorado River Water Conservation District. Higher elevation storage, he says, will reduce evaporative losses from Lake Powell, about six and a half feet a year off the surface.

About 90 percent of the Yampa's total annual flows go downstream out of Colorado, ultimately to Lake Powell. That reservoir provides Colorado and other upper-basin states in the Colorado River Basin the ability to meet requirements for delivery of 8.3 million acre-feet annually to Arizona, California, and Nevada at Lake Mead.

That obligation of 7.5 million acre-feet plus the upper basin's share for Mexico was derived by negotiators who met at a resort near Santa Fe in 1922. Disregarding contrary evidence, they assumed at least 16.5 million acre-feet average annual flows in the river and probably more. That rarely has been the case. In the hotter, drier 21<sup>st</sup> century, flows have been just 12.4 million acre-feet, say Eric Kuhn, former general manager of the Colorado River Water Conservation District.

At a recent conference called "[Risky Business on the Colorado River](#)," Kuhn warned against overdrawing Lake Powell, Lake Mead, and other reservoirs.

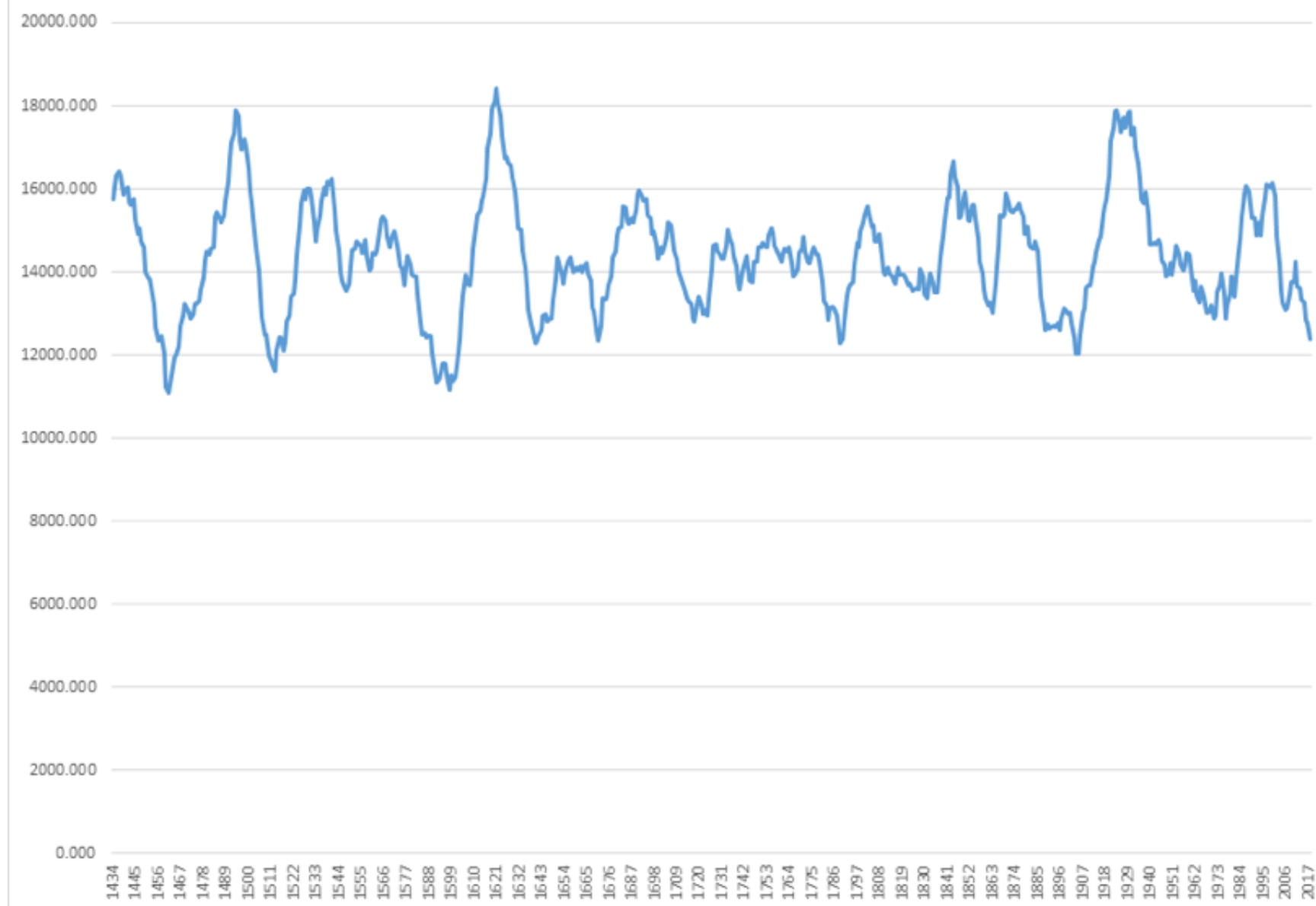
“When you build reservoirs, you have to have some water. You have to have a little bit of money in the bank. We can’t bankrupt the system. We have to find ways to cut back before we bankrupt the system.”

In Vail on Wednesday, Kuhn took his vision of difficulty for the Colorado River a step further. As long as greenhouse gas emissions go untamed, he said, “there is no bottom” to how hot and how dry the Colorado River Basin could become.

It’s not that the past hasn’t also been drier. Kuhn looks to the past to warn against even more difficult times on the Yampa River and in the Colorado River Basin altogether. The evidence comes from examinations of batches of trees at eight different sites in the Colorado River Basin above Lee Ferry, located just above the Grand Canyon and below Lake Powell.

Dendrochronologists can estimate precipitation by the growth of tree rings. Using that technique, they have charted wet and dry periods since 1434.

NATURAL FLOW AT LEE FERRY 19 YEAR RUNNING AVERAGE 1434-2018



Tree-ring research indicates there have been much more severe 19-year droughts in the Colorado River Basin than the current one—and without the impact of human-induced higher temperatures.

“A number of folks claim that the current 19-year period of 2000-2018 is the driest 19 year period on the Colorado River. That’s nonsense,” says Kuhn, pointing to the graph. In the past there have been droughts both longer and deeper. (Above, see estimated river flows at Lee Ferry, at the top end of the Grand Canyon, from 1434 to 2018. For underlying data, see <http://treeflow.org>).

Those droughts occurred without the rising temperatures of today. “If these past 19-year droughts were to happen with today’s temperatures,” he adds, “things could be much worse.”

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