In assessing an article for three of the NOS tenets as well as three of the practices for the CCMS, I chose to work with a resource that we are considering for our unit on Climate and Weather. All references in this paper, unless otherwise noted, relate to the citation for Henry Fountain.

NGSS NOS-----

Empirical Evidence

A key component in science is an understanding that knowledge flows from evidence. In his work on the drought impact to the Rio Grande, Henry Fountain pulls evidence from a myriad of sources. David Gutzler, a climate scientist from UNM, points to “spring runoff” being “about one-sixth of average” and the “drying (beginning) a couple months earlier than usual.” The observations suggest data on a larger scale as they point to trends that explain the issue at hand.

More specifically, Fountain pulls from Jonathan Overpeck, an author of a study focused on the hydrology of the Colorado River. As a comparator, Overpeck demonstrated that “flows from 2000 to 2014 were nearly 20 percent below the 20th century average, with about a third of the reduction attributable to human-caused warming.” Here again, the article paints its canvas with a nod to the value of empirical evidence when conveying scientific information.

Investigations and Models

As mentioned above, Fountain articulates key aspects of the study conducted by Jonathan Overpeck. This is critical as many vehicles of media merely state new information, but fall well short of conveying the matter in which the information was obtained. In those instances, the value of the ‘practice of science’ is devalued while here, Fountain emphasizes it.

Later in the article, forecasting is presented through use of modeling. Gutzler comments on predictions of “a total rise of six degrees or more by the end of this century.” While modeling is rarely 100% accurate, it is a powerful tool of science (as well as math) to use evidence/patterns deduced and make application to future trends.

Human Endeavor

Often, the press is happy to drill down any scientific endeavor/discovery to one person. In Fountain’s article, the reveal is that in any pursuit of knowledge there are multiple players involved. He meets with climate scientists as well as numerous farmers. He shares the work of academic professors and pulls perspective from regional hydrologists. In addition, he adds in ecosystem perspective from Thomas Archdeacon, a US Fish and Wildlife Biologist. It is very compelling how Fountain weaves in the contribution of many players that ultimately advance the work of science.

Common Core Math Practices--

Constructing Viable Arguments

Fountain raises several arguments where numerical trends in terms of humidity, precipitation and length of growing season can all connect to an impact of drought. The cyclical nature of Rio Grande, with warming increasing over time, results in “wet years less wet and dry years even drier.” Later in the article, he further argues via two sources: Gutzler and Overpeck. “Warmer air causing more snow to turn to vapor” and a “longer growing season…has an effect…as plants take up more water, further reducing stream flows.” These arguments incorporate scientific concepts against the backdrop of numerical analysis.

Reasoning Abstractly/Quantitatively

With math, the proof is in the numbers. In science, the numbers provide guidance and perspective. In this article, Fountain does provide examples of using quantitative reasoning in order to support his position. In the evidence section from the first page, I referenced statements surrounding a study. The mathematical references supported percent changes over time, quantifiable measurements, such as temperature and flow rates. In this vein, the author aligns scientific discovery with the language of mathematics and uses the quantification of evidence to tell the story.

From an abstract angle, Fountain introduces other impacts to the consequences of reduced flow rates. The US Fish and Wildlife focus efforts on preserving the Rio Grande silvery minnow. As a result of this work, the organisms is federally protected. Along with that, other species of organisms along the river also benefit. This connection provides a link that work based on quantitative analysis could have impact in a manner not planned. In this instance, it could have positive outcomes.

Model with Mathematics

This practice from the math common core is almost reciprocal to that of the NOS. As stated before, Fountain references models used to determine climate change impact to watersheds, such as the Rio Grande. Along the way, he presents predictions considering economic, environmental and legal results. This is an excellent example of how science and math couple to produce logical arguments through the use of models.

Sources:

Fountain, Henry. “In a Warm West, the Rio Grande is Drying Up.” 24 May 2018, https://www.nytimes.com/interactive/2018/05/24/climate/dry-rio-grande.html