The utility industry is one industry—we are all bound together by water. As an old friend Tom Lane once said, “There is only one water.” The problem is that we tend to see only our own issues, as opposed to the bigger picture that may affect others and that hurts all of us. We need to see that bigger picture and the interrelated concepts among utilities.

For example, we are in the midst of hurricane season here in Florida. We know what challenges weather can bring and we know many of the impacts—just look at Louisiana and the Northeast. Florida’s utilities have worked together to create the Florida Water/Wastewater Agency Response Network (FlaWARN) and are willing to help with materials, equipment, and people when problems occur. Our goal is to keep everyone—and everything—operating.

Because Florida gets the majority of its water from groundwater, we think little of the many utilities that rely on surface water for their supply. Nationally, over half of the 91 percent of people served by a water utility are served by a surface water system, which has a host of potential impacts that are generally different, but no less consequential, than ours. Let’s take a look at an example.

A Changing Landscape

Many of you know that over the past 15 years or so I have spent time in Colorado and other places in the West. My goal is to hike over 100 miles at elevations over 8,000 feet. Many

Fred Bloetscher, P.E., Ph.D.
Chair, FSAWWA

Photo 1. Kawuneeche Valley in 2005 when the trees were green.

Photo 2. Kawuneeche Valley in 2018, with lots of beetle-killed trees.

years I have gotten into the middle to upper 90s. I have over 100 miles in many years if the bar is 6,500 feet—144 in 2017 when I went to Yellowstone National Park.

With the exception of a few desert locations, the vast majority of places I hike are forested. Forested land makes up 766 million acres, or 33 percent, of the total land in the United States. Over 53 percent of U.S. surface water supplies have their beginnings in these forested areas.

Rocky Mountain National Park is my most-frequent visit, and it’s heavily forested between 7,500 and 10,500 feet. When I went out in 2007 with my wife (her first trip to the Rockies), the mountains were generally covered with green lodgepole pines (see photos 1 and 5). Two years later, it was the mountain pine beetle that killed millions of acres of pine trees because the temperatures never got low enough to kill them (see photos 2 and 6). Millions of acres in the West, from Canada to Mexico, have been hit hard by beetle infestations that occur because the trees are old and the temperatures do not get cold enough in the winter. I recall telling my wife that all the dead trees were a huge fire hazard.

Then 2020 happened. A lack of precipitation (increasing fire risk), low humidity, wind, higher temperatures, and human activity caused the East Troublesome Fire in Grand County, Colo., which grew by 100,000 acres in 24 hours, barely skirting Grand Lake by virtue of heroic efforts by firefighters, and nearly reaching Estes Park on the other side of the park to the east. Two people died, hundreds of structures were lost, and well, there was a lot of burned forest.

The next set of photos (3, 4, 7, and 8) tells you much of what you want to know (or not). Temperatures were reported as high as 3800 degrees via satellite. I cannot fathom that kind of heat.

Grand Lake got lucky, as did Estes Park, but today, there are millions of acres at risk, and the fires have created a serious threat to many rural communities. We lost Paradise, Calif., (not a small town by the way) a couple years back when high temperatures caused power lines to sag, and the failure of people and power companies to clear debris below the power lines ignited a fire. We also lost historic Greenville, Calif., in 2021.

**Solutions Won’t Be Easy**

A published study by the Ecological Society of America found that “protected forests—those that had not been thinned—had lower levels of burn severity despite having higher amounts of biomass and fuels” (Bradley et al., 2016). So, thinning and clear-cutting are not solutions. Clearing under power lines helps, but we will need more power lines to deal with increased population dispersion and power demands.

Across the U.S., the average number of wildfires has been 64,000 per year (fewer than in 1990), but the average acreage burned has increased (CRS, 2021). Summer heat, less rainfall, less snow, and impacted trees create the risk. Of more concern, however, is that most of the fires have been caused by people as opposed to nature (Where is Smokey the Bear when we need him?).

The situation has not been helped by the millions of acres of trees killed by pine bark beetles, which has increased the potential for

*Continued on page 24*
fires (see the comparative photos from 2007 to 2021). The beetle damage is something that anyone who has hiked the Rockies has noted, with miles of dead trees. The beetles thrive when temperatures are not really cold, in drought conditions, and when trees are stressed. Sounds like the West today.

Cutting all these trees quickly has been impossible to manage without severe damage to the land, although the Grand County (Colo.) newspaper notes that much of the accessible beetle trees have been harvested and the lumber industry is looking in a new direction.

Aside from the remaining trees, changes in summer heat intensity and less rainfall in the summer and early fall increase the risk of fires. Clearly, this is a long-term climatic issue that has changed the forest paradigm. Loss of forest increases runoff, creating flooding and water quality concerns.

The loss of trees and habitat is only the obvious impacts. From a water supply perspective (Ball et al., 2016) it’s been found that “wildfire activity is one of the largest drivers of aquatic impairment, though it is not routinely reported by regulatory agencies.”

The obvious water quality impacts relate to ash, which can pass into the lungs, exacerbating asthma and a host of other health impacts. After a rain occurs, the ash runs into the rivers and downstream to water intakes—and fish gills. Downstream, the damage to ecosystems due to ash and silt runoff and the impacts to fish and water supplies will continue for years.

The lack of tree cover increases water temperatures, which endangers native fish that adapt to cold waters. Temperatures in the Rocky Mountain waters climb into the high 70s in the summer in Fraser, Colo., which is way too warm for stressed mountain cutthroat trout (so daytime fishing is suspended regularly). Warm water is prone to algae and is more difficult to treat. The National Climate Assessment indicates a substantial increase in temperatures by 2070, and California, Nevada, and Arizona are all areas that will be challenged. Fire in the mountains will increase and we have all seen the crisis that unfolded with fires this summer.

## Water Supply Challenges

Ash is a huge issue for water purveyors. The fire-retardant materials that firefighters wear may be toxic and they can leach into water supplies. Firefighters require protective equipment that creates toxic compounds that may endanger their lives. Some question if aerial firefighting has value, given the number of times the target may be missed (reportedly up to 80 percent of runs are misses).

The fire danger to water systems also includes volatile organic contaminants (VOCs) and semi-VOCs that occur as a result of the heat and the attraction of plastics for organic compounds. Precursors for disinfection byproducts are a major issue for water suppliers.

The fire in Paradise two years ago, which burned over 18,000 structures and killed 85 people, also revealed the ugly truth that the intense heat may impact high-density polyethylene and polyvinyl chloride plastic pipes. The plastic pipe melts under intense heat, and benzene, toluene, styrene, and dichloromethane are among the compounds detected above the drinking water standards. Testing after a fire is critical, and the burial depth of pipe may be an issue as well.

## We’re All in This Together

So we all agree that fires are bad, but what is my point here in Florida? Summer and fall are the height of hurricanes in Florida and it’s also the height of fire season in the Rockies. Much of our focus here is protecting our water systems and keeping the water flowing to our customers; that is the goal of utilities in the mountains as well.

Why should people in Florida care about fires in the West? Because we all have challenges, albeit they may be different. One-size-fits-all solutions never work—there is always nuance. We focus our attention on our own issues, but many others have different challenges that they face. We need to listen to each other, even within Florida, where the length of the state makes a huge difference in some of the issues we face.

We are not alone, and in many cases, we can learn from each other. Just because the situation seems different does not mean we should not pay attention.

## References

- Bradley, C.M.; Hanson, C.T.; and DellaSala, D.A. 2016. “Does Increased Forest Protection Correlate to Higher Fire Severity in Frequent Fire Forests in the Western United States?” *Ecosphere* 7(10); e01492.