

Facing the Realities of Water Limitations in Western US for Forage Crops

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ABSTRACT

Water is the key to the American West. Food security is as vital to our homeland security as our nation's other strategic interests, and the production of food and fiber on Western irrigated lands is critical to our nation's ability to feed itself.

The Global Agricultural Productivity Report in 2022 quantified the difference between the current rate of agricultural productivity growth and the pace required to meet future world food needs; that report found that current efforts to accelerate global agricultural productivity growth are inadequate. In July 2022, the State of Food and Nutrition in the World report showed that after years of seeing global hunger numbers drop, it is back at record levels and rising. World leaders fear global price spikes in food, fuel and fertilizers will lead to widespread famine, prompting global destabilization, starvation and mass migration on an unprecedented scale.

In the U.S., a bewildering set of forces appear to be aligned against keeping domestic agricultural lands in production, even as our country is now importing more agricultural products than it exports. Arizona and California are paving over and compromising productive farmland at the fastest rate in the U.S.

The U.S. is facing yet another record-breaking drought year in the West. Undoubtedly, the Western drought has reduced the amount of water for many users, including irrigated agriculture. However, in places like California and Oregon, much of the water that once flowed to farms and ranches is currently being re-directed by the federal government for environmental purposes. In other words, federal water policy is shutting down water availability for hundreds of thousands of acres of productive farmland. In the Colorado River Basin, competing interests have mounted a sustained campaign on agricultural water use, and often point to alfalfa as an example of one crop that uses too much water and should no longer be produced.

At a time when the future of Ukraine and other countries' ability to help feed the outside world is at risk, our ability to increase productivity is being further curtailed – due in part, to our own government and competing demands. The grim global hunger conditions we once expected to encounter in 2050 may now hit us decades sooner. This paper seeks to explain this critical issue further, and provides recommendations intended to protect irrigated agriculture as a growing number of faraway critics downplay and even criticize the importance of using water to produce affordable and safe food and fiber.

Key Words: agriculture, alfalfa, California, climate change, Colorado River, conflict, food insecurity, forage crops, inflation, irrigation, policy, water, Western United States.

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INTRODUCTION

The multiple-year drought we are facing in many parts of the U.S. – coupled with other domestic and global developments– is already affecting the availability and price of food for many Americans. Rising food prices and global hunger are linked to the war in Ukraine, extreme climate events like the Western U.S. drought, and other global stressors.

Putin’s war in Ukraine has decreased and destabilized worldwide agricultural commodity production and availability. Rising input costs, combined with the ongoing energy and supply chain crises, continue to impact food supply and demand. Those Western producers who do have water have seen production costs increase by as much as 25%, because of rising fuel prices and transportation costs. The fertilizer input costs are going through the roof right now, too – in most places, at least two to three times more expensive than it was last year.

Numerous experts predict a recession in the next 12-18 months. Consumer prices rose 0.4% in September, up 8.2% from a year ago, and more than expected despite federal rate hikes. Excluding food and energy, the core consumer price index accelerated 0.6% and 6.6%, respectively. This is the largest yearly gain since August 1982.

All of these factors have combined to cause significant inflation and global food shortages that loom on the horizon.

FAMILY FARM ALLIANCE BACKGROUND

The Family Farm Alliance is a grassroots organization of family farmers, ranchers, irrigation districts and allied industries in 16 Western states. The Alliance is focused on one mission: To ensure the availability of reliable, affordable irrigation water supplies to Western farmers and ranchers. We are also committed to the fundamental proposition that Western irrigated agriculture must be preserved and protected for a host of economic, sociological, environmental and national security reasons – many of which are often overlooked in the context of other policy decisions.

A PERFECT STORM: WESTERN DROUGHT, INFLATION, WAR IN UKRAINE AND GLOBAL FOOD INSECURITY

A. Global Hunger Crisis

At the global level, hunger is on the rise, and the world community is not prepared to address this looming crisis. The 2022 *State of Food Security and Nutrition in the World* report² prepared by the United Nations Food and Agriculture Organization found that an unprecedented count of up to 828 million people went hungry in 2021, an increase of 46 million from the previous year, and a leap of 150 million people since the start of the COVID-19 pandemic. Even before the latest inflationary woes hit us and after years of seeing global hunger numbers drop, global hunger is back at record levels and rising.

² <https://data.unicef.org/resources/sofi-2022/>

Our organization has been tracking the Global Agricultural Productivity (GAP) Report since 2010, when it first quantified the difference between the current rate of agricultural productivity growth and the pace required to meet future world food needs. That report predicted that total global agricultural output would have to be doubled by the year 2050 to meet the food needs of a growing global population. The *2022 Global Agricultural Productivity (GAP) Report* was released last month by Virginia Tech College of Agriculture and Life Sciences. The 2022 GAP Index found that total factor productivity (TFP), which increases when producers increase their output while using the same or less inputs, is at its lowest level of growth to date. The overall message of the GAP report is that vulnerable agricultural systems rest on fragile foundations. Reversing the downward trajectory of global agricultural productivity growth, the report says, demands urgent action from policymakers, leaders, donors, scientists, farmers, and others in the agri-food system. In short, the 2022 GAP report found that current efforts to accelerate global agricultural productivity growth are inadequate.

We are now seeing increased reports of world leaders sharing fears that global price spikes in food, fuel and fertilizers will lead to widespread famine, prompting global destabilization, starvation and mass migration on an unprecedented scale.

Sri Lankan President Gotabaya Rajapaksa fled the country last summer, just days after thousands of protesters stormed his residence over the nation's crippling economic crisis. Sri Lanka for months has grappled with severe food and fuel shortages and skyrocketing inflation. Domestic food production also took a hit by the government's April 2021 decision to ban the importation of chemical fertilizers and agrichemicals, in an apparent shift to organic agriculture. By the time the ban was partially reversed in November, farmers reported a 40 to 50 per cent loss in rice crops. Farmers in the Netherlands this year took to the streets in anger, protesting sweeping environmental policy change that threatens to upend the extraordinary agricultural productivity of the tiny country, which ranks second only to the U.S. in global exports.

B. War in Ukraine

When war first broke out in Ukraine in early 2022, world leaders feared that sanctions and destroyed ports could take nearly 30% of the world's grain supply out of production or off the market this year. The World Bank initially forecasted that Russia's invasion of Ukraine could drive 40 million additional people worldwide into extreme poverty and food insecurity this year.

Global cereal grain prices actually dropped this summer, due to improved production prospects in North America and Russia, and the resumption of exports from Black Sea ports in Ukraine in June. The grain deal was brokered with help from the United Nations (U.N.) and Turkey, which sought to ensure safe passage of grain from Ukraine to vulnerable nations that rely on Ukraine for grain exports. It was seen as critical for food insecure nations to avoid widespread famine and starvation, as Ukraine is a breadbasket for Europe, Africa and the Middle East. Russia in late October 2022 temporarily put the agreement brokered last June on hold, but resumed the Black Sea agreement a few days later.

Now, global grain stocks are pushing towards a decade low. Shipments were too few, and harvests from other major crop producers (U.S., France, and China) are smaller than initially expected due

to poor weather in key agricultural regions. These factors are shrinking grain harvests and cutting inventories, heightening the risk of famine in some of the world's poorest nations. The bleak global economic outlook, coupled with higher fertilizer prices, “pose serious strains for global food security,” Maximo Torero, the Chief Economist for the United Nations Food and Agriculture Organization said last August.

Hunger-stricken African countries are struggling with reduced wheat imports due to Russia's war in Ukraine. However, one country - Zimbabwe - is looking to build a small strategic reserve for the first time in its history. Zimbabwean President Emmerson Mnangagwa in April described Russia's war in Ukraine as a "wake-up call" for countries to grow their own food (*Associated Press*).

C. American Farmland is Disappearing

Closer to home, the American Farmland Trust (AFT) reported in “Farms Under Threat 2040: Choosing an Abundant Future” earlier this year that Americans are paving over agricultural land at a rapid pace. From 2001-2016, our nation lost or compromised 2,000 acres of farmland and ranchland every day. “Farms Under Threat 2040” shows we are on track to convert over 18 million acres of farmland and ranchland from 2016-2040—an area the size of South Carolina.

If recent trends continue, 797,400 acres of California's farmland and ranchland in 2040 will be paved over, fragmented, or converted to uses that jeopardize agriculture. Two-thirds of the conversion will occur on California’s best land, and the top two hardest-hit counties will be Riverside and San Bernardino in Southern California. Fresno County, the nation’s leading agricultural county by gross value, is in third place, and the 17th fastest in the nation, in terms of farmland lost to other uses.

The latest study from AFT shows that Arizona and California are paving over and compromising productive farmland at the fastest rate in the U.S. According to the AFT report, Maricopa County, Arizona – which includes Phoenix and its many suburbs - is losing farmland at a faster rate than any other county in the nation.

According to recent and alarming USDA data, foreign ownership and investment in U.S. agricultural land has nearly doubled over the past decade, 2010 through 2020. As of December 31, 2020, this represents 2.9 percent of all privately held agricultural land and 1.7 percent of all land in the United States. While investors from Canada, Germany, and the United Kingdom are regularly among the top foreign investors, investors from countries such as China and Saudi Arabia have increased their investment in U.S. agricultural land. One of the largest groups of foreign investors is renewable energy companies, causing some to raise concerns that farmland will be further removed from production.

D. The U.S. Agricultural System is Importing more than it Exports

The Western U.S. is a critical part of what has long been a proud national agricultural powerhouse, where our country consistently has run an agricultural trade surplus. But in 2019, for the first time in more than 50 years, the U.S. agriculture system ran an agricultural trade deficit, importing more than it exported. The USDA forecasts the U.S. will again run a deficit in 2023 for the third time

since 2019. This growing deficit is driven primarily by our dependence on imported Mexican fruits and vegetables (*Politico Pro DataPoint*). Increased reliance on foreign food has never been a policy our Nation has intentionally embraced in the past.

A bipartisan group of lawmakers from Florida in September 2022 asked the US trade agency to investigate what they called a “flood” of fruit and vegetable imports from Mexico, saying it poses a direct threat to the state’s agricultural industry. Republican Senators Marco Rubio and Rick Scott, together with more than 20 representatives, filed a petition to open an investigation using the same law that former President Donald Trump used to impose tariffs on billions of dollars of imports from China (Bloomberg, September 2022). The Biden Administration responded by saying it would set up an advisory panel to suggest how to help produce farmers in the southeastern US but did not act on the request to launch a formal trade investigation into Mexican imports. (Bloomberg, October 2022).

E. The Western Drought Has Led to Widespread Farmland Fallowing

The U.S. is facing yet another record-breaking drought year in the West. Farmers and ranchers in some of these areas received little to no water from federal water projects this past summer. Major reservoirs in California and along the Colorado River and Rio Grande have reached or are approaching historic lows. The government has also regulatorily withheld water from producers in places like the Central Valley of California, Central Oregon and the Klamath Basin. Our farmers that are largely responsible for keeping the nation’s produce aisles stocked are being forced to leave fields fallow or reduce livestock herds.

A research team from the University of California (U.C.) Merced studying the California drought found conditions between 2020-2022 to be warmer than previous dry periods. Heat waves and stress led to large crop losses. Their drought assessment revealed a 2022 water shortage in the Central Valley of 2.6 million acre-feet, which resulted in 695,000 idle acres of farmland, with more acreage impacted. The ravaging drought has left hundreds of thousands of acres of Sacramento Valley farmland unplanted this year, causing dramatic harm to people, fish, waterfowl, shorebirds, and other wildlife. Researchers at U.C. Davis published a report entitled “Continued Drought in 2022 Ravages California’s Sacramento Valley Economy”, which projected that the 2022 drought impacts on farm production are likely to cause a loss of about 14,300 jobs and about \$1.315 billion in economic value added in the Sacramento Valley.

Central Arizona Project (CAP) irrigators - due to operating guidelines on the Colorado River - expect that about 100,000 acres of farmland will be fallowed in 2023. Most of these lands (approximately 40,000 acres) currently produce cotton, but a significant portion – roughly 20,000 acres, according to CAP producers - will be alfalfa fields.

Undoubtedly, the Western drought has reduced the amount of water for many users, including irrigated agriculture. However, in places like California and Oregon, much of the water that once flowed to farms and ranches is currently being re-directed by the federal government for environmental purposes. In other words, federal water policy is shutting down water availability for hundreds of thousands of acres of productive farmland.

At a time when the future of Ukraine and other countries' ability to help feed the outside world is at risk, our ability to increase productivity is being further curtailed – due in part, to our own government.

THE DEMONIZATION OF ALFALFA AND WESTERN IRRIGATED AGRICULTURE

Water developed for Western irrigated agriculture is often eyed by other competing water demand sectors as the default “reservoir” to meet other needs, such as sustaining urban growth. Alfalfa is a favorite target of some in academia, journalists, critics of irrigated agriculture like anti-animal agriculture extremists, and Western cities, who use varying levels of sophistication to justify their criticisms of growing a forage crop in the West, particularly in times of drought.

For example, the journal “Nature Sustainability” published an article in 2020 titled, “Water scarcity and fish imperilment driven by beef production”, which concluded that long-term water security and river ecosystem health “will ultimately require Americans to consume less beef that depends on irrigated feed crops”. This article was led by Brian Richter (the president of Sustainable Waters, a global organization focused on water scarcity challenges) and Dominique Bartak with Water Asset Management (whose investment team uses private, institutional capital to target water scarce regions and promote “regenerative farmland” in the U.S. Southwest), with a cohort of academic support.

A. Colorado River Crisis Puts Forage Crops in the Crosshairs of Critics

The critical focus on alfalfa has intensified in the wake of U.S. Bureau of Reclamation (Reclamation) Commissioner Camille Touton’s June 14, 2022 appearance before a Senate committee, where she called on water users across the Colorado River Basin to take actions to prevent Lake Powell and Lake Mead from falling to critically low elevations that would threaten water deliveries and power production.

When the states failed to meet the mid-August deadline set by Commissioner Touton for them to propose 15% to 30% cuts to their water use, critics of irrigated agriculture ramped up their focus on the perceived easy “fix” to the complicated challenges facing the Colorado River: stop growing crops that use lots of water...like alfalfa.

The “shot across the bow” against alfalfa production was fired by the witness who testified immediately after Commissioner Touton at the June 14th Senate hearing. The general manager of the Southern Nevada Water Authority (SNWA), whose member agencies serve more than 2.2 million residents in Southern Nevada, summarized the impressive urban efforts to reduce per-capita water use and further suggested that farmers reconsider growing crops like alfalfa. The solution, he said, is working toward “a degree of demand management previously considered unattainable.”

He also noted that SNWA is planning to serve a population that will swell to 3.8 million by 2072.

In August, SNWA followed up with a strongly worded letter to the Biden administration, demanding action on several fronts, including creating “beneficial use criteria for Lower Basin

water users, eliminating wasteful and antiquated water use practices and uses of water no longer appropriate for this Basin's limited resources".

In the following weeks, a steady stream of media coverage, including a 1,600-word essay in *High Country News*, have carried a similar message: Growing less hay is the only way to keep the Colorado River's water system from collapsing.

Some in academic circles and the media like to play the role of social engineer and suggest that alfalfa production be abandoned in favor of "higher value" crops, or ones that use less water. Simplistic examinations of alfalfa in terms of water demand vs. supply must be enhanced and balanced with discussion of productivity, economic return, food production, and the environment to be truly productive. A former Imperial Irrigation District (IID) board member once said that the definition of a low-value crop is one that's grown with the water someone else wants.

B. "Exporting water" to Asia via Alfalfa Sales

In recent years, some journalists have also advanced the message that the field crops grown in California's Imperial Valley are exported to Asia, implying that precious water is being shipped overseas through these crops to foreign countries. This issue is also one that is more complicated than it might initially appear to be.

According to Jay Lund of the University of California at Davis Center for Watershed Sciences, the concept of virtual water is misleading in the overall discussion of global trade and the water needed to support economic activities throughout the world. "Talk of virtual water distracts from serious discussion of economic, environmental and hydrological objectives and processes important for real water and environmental systems to function," said Dr. Lund. "Virtual water discussions are all the more counterproductive coming in the midst of a very real and serious drought."

Still – alfalfa producers continue to be subjected to public criticism in media outlets.

"\$880 million – the value of hay shipped overseas last year from Colorado River Basin states, most of which went to China, Japan and Saudi Arabia," the *High Country News* opinion piece recently claimed.

The National Geographic reported in 2012 that 12% of Colorado River Basin hay is exported, which implies that 88% of Basin hay was sold for domestic use, for a jaw-dropping \$2.147 billion. In the Imperial Valley, that value can be higher; generally, between 20% - 30% of the hay that is produced there is exported to other countries. The remaining 70% - 80% of the hay that's grown in the Imperial Valley is for domestic use for dairies and livestock all over the United States, especially in California.

Recent state level hay export data is made available from USDA Foreign Agricultural Service (FAS)³. This data indicates that Colorado, New Mexico and Wyoming are not significant exporters

³It is important to note that the FAS state-level export data is fraught with asterisks. This is because sales of commodities to and from international trade partners are recorded at the national border, so the exact amount of a product produced by a State and then exported is difficult to track with absolute accuracy. Although a State's actual

of hay. Export values for the first six months of 2022 are up for the U.S. at large (up 11%), as well as the states of California (up 11%) and Arizona (up 41%). This is the result of higher per unit prices – export volumes are down 1% for both the U.S. at large and California. Export values for the first six months of 2022 are down in both value and volume for Utah (-44% and -50%, respectively) and Nevada (-46% and -52%, respectively).

It should be noted that exports occur less from inland regions – like Colorado, Idaho, Utah and Wyoming – because of the proximity of states like Arizona, California and Nevada to outbound ports.

There are certainly other products made in the Colorado River states that are exported to other countries. America’s five biggest export products by value in 2021 were refined petroleum oils, crude oil, petroleum gases, cars and electronic integrated circuits. Taiwan Semiconductor Manufacturing Company (TSMC), headquartered in Taiwan and which makes chips for Apple Inc. and other customers, announced plans last year to invest \$3.5 billion in its second U.S. manufacturing site in the Phoenix, Arizona area. Intel Corp., the only major U.S. producer of microchips, announced plans in March 2021 to build two chip factories in Arizona at a cost of \$20 billion. The company has had another facility in Arizona since 1980. U.S. semiconductor manufacturing has long been established in Arizona, and the state has more than 200 production facilities in addition to Intel and the new TSMC plant.

It takes a lot of water to run a plant that manufactures electronic integrated circuits. Roughly 10 gallons of water are needed to make a single computer chip. That may not sound like much, but multiply it by the millions of chips made each year, and the result is a large and rapidly growing demand for water. It’s difficult to determine exactly how much Colorado River water is going to support chip manufacturing in the Southwest, but the volume is not insignificant.

What is disturbing is that no one seems to be decrying the “export” of Colorado River water to other countries via these products. Regardless of whether cars, computer chips, or alfalfa is sold to another country, water is required to produce all of them. The economic benefits associated with the production of these items is enormously important to the American workers who create them. It also matters to their communities, which benefit from the economic “ripple effect” of these production activities.

POLITICAL REALITY CHECK?

Unfortunately – until very recently - few in the media have taken the time to inform their readers on the consequences of drought and downsizing Western agriculture—namely water shortages, devastation to rural communities and lifestyles, food insecurity and higher prices at the supermarket.

agricultural export value cannot be measured directly, USDA’s Economic Research Service estimates State exports of total and selected commodities based on U.S. farm cash receipts data. State shares of U.S. farm receipts are updated annually in calculating State-level international export values. This means that sometimes a state may be assigned exports based on their production that may not have actually come from their state. The moral of the story - perhaps - is that USDA data doesn’t always give us a perfect picture and so everyone needs to be careful when they talk about it.

Ironically, perhaps it's because Western irrigated agriculture has been so adaptive and successful at providing plentiful, safe and affordable food that it is now jeopardized. Most policy makers and media pundits believed there could never be a problem with food production in this country. The last Americans to experience real food shortages were members of the so-called Greatest Generation and their parents. For the most part, they have left us, taking with them the memories of empty supermarket shelves and Victory Gardens.

When the issue has never been personalized, it's easy to be complacent. However, that may soon change, and it already has for millions of people living in other countries.

The grim global conditions we once expected to encounter in 2050 may now hit us a decade or more ahead of schedule. It would seem logical that a top global priority should be ensuring the ability of world food producers – especially those in the American West - to meet the future food demands of the U.S. and the world. While the state of the economy remains the top concern of 38% of American voters (with inflation and the cost of living the #1 concern), few of our political leaders and most in the media are not connecting the dots between these concerns and our own government's policies that are directing water away from some of the world's best producers.

The Biden administration in September 2022 hosted a hunger conference and released a 44-page report outlining a national strategy to improve food access and affordability, integrate nutrition and health, and empower consumers to make healthy food choices. Unfortunately, the strategy ignored the deeper issues of rising food costs, global hunger, and the role of American producers in tackling these challenges. The only mention of "inflation" was in reference to the "Inflation Reduction Act" recently signed into law by President Biden. No mention was made of the Western drought and its impacts on agriculture. There was no discussion as to why water that was originally developed to support farming and ranching in parts of California and Oregon has been redirected to questionable environmental needs, in the midst of unprecedented drought.

Current world events are leading more Americans to reconsider their priorities and ponder just how safe and stable we really are. Political reality is starting to set in, as average Americans – already battling increased inflation, higher gas prices, and soaring food costs – are resetting their priorities on issues that likely have a much more substantive impact on their daily lives...like safe, affordable food.

Fallowing U.S. farmland means increased reliance on food production in other countries with lesser production standards. A clear sentiment of the urban public is locally sourced foods. Fallowing any land during a time of crisis should be temporary, or we risk losing control of our reliable and safe U.S.-grown food supply. The expulsion of Sri Lanka's president from his country in July and the downfall of Britain's prime minister in October should, as the *New York Times* recently reported, "serve as a warning to all of the political peril that awaits those who fail to address the erosion of living standards, no matter the cause".

WESTERN DROUGHT POLICY CONSIDERATIONS

Americans are facing rising food costs and the potential for global famine looms on the horizon. The recent national infant formula shortage has further underscored the importance of a

strong national domestic food supply system. Meanwhile, our own government has regulatorily withheld water from producers in places like the Central Valley of California, Central Oregon and the Klamath Basin. Many producers in the Southwestern U.S. are bracing for yet another year of severe drought and unprecedented water shortages.

The Western drought continues with no real federal policy action other than to limit irrigation supplies to farmers and residents. We need to prepare for future droughts, and not simply react to current hydrologic shortages. In the Rio Grande Basin, New Mexico's Elephant Butte Reservoir was only 7.1% full at the beginning of this month. Major reservoirs in California and along the Colorado River have reached or are approaching historic lows, threatening the ability to generate hydropower, particularly at Lake Powell, behind Glen Canyon Dam. Our farmers and ranchers that are largely responsible for keeping the nation's grocery store aisles stocked are being forced to leave fields fallow or reduce livestock herds.

There are things that the federal government can do to alleviate this disaster and better prepare and manage for future droughts. Federal investments in improving and building new water supply infrastructure – partnering with the Western states and non-federal water users – can help prevent or reduce the impacts of future droughts. Moving away from flow-based single species management to collaborative watershed-based approaches that respect all uses will help prepare Western water stakeholders for a more predictable and secure future. We need to act, and act now, to accomplish these tasks.

Western irrigated agriculture has been dealing with changes in climate and hydrology for over a century. But the prognosis for water supplies in the future is not positive and will continue to negatively impact this important source of our Nation's food supply, the economic engine for most of our rural Western communities. Coupled with the growing demand for existing water supplies from burgeoning cities and the environment, irrigated agriculture is fast becoming a target for one thing – water. We must look to several solutions in order to maintain food security for the nation and economic wellbeing of the Western landscape:

- Invest in Western water infrastructure – new water storage and improved conveyance facilities, groundwater recharge, water conservation, water management improvements, water reuse and desalination can all help alleviate the stress on our existing water supplies, especially for agriculture in the growing West;
- Invest in technology – we must manage our water supplies better through more efficient and effective use of technology to improve the modeling and predicting of weather patterns, snowpack, and runoff forecasting, as well as using technology to manage our water storage and distribution to improve efficiencies in utilizing our precious water resources; and,
- Improve regulatory processes at the federal level to expedite permitting and get these new water projects to construction within a reasonable period of time at a reasonable cost, as well as create collaborative partnerships between federal, state and local entities interested in finding solutions to our water-climate problems through adaptive strategies that can work on the ground.

Perhaps the only silver lining is that this unprecedented drought crisis will hopefully draw public and political attention to Western agriculture's critical role in providing a safe and reliable food supply, boosting the national economy, and continuing the country's stature as the world's premier food basket. Certainly, the drought helped drive Congressional action in the past year, where the Infrastructure Investment and Jobs Act signed into law in November 2021 by President Biden included \$8.3 billion for Western water infrastructure. The Inflation Reduction Act signed into law this year included another \$4 billion to address the Western drought, with priority placed on Colorado River challenges.

We can only hope that further political attention leads to necessary, reasonable policies that support farmers and investment in rural communities, including water infrastructure and increased water-storage capacity. The Family Farm Alliance and other Western agriculture and water organizations believe the drought underscores the urgent need to take immediate action to help better manage impacts to water resources from drought in the West.

COLORADO RIVER BASIN WATER MANAGEMENT POLICY CONSIDERATIONS

In the Colorado River Basin, there are many tiers of control. The Upper Basin includes the states of Wyoming, Colorado, Utah and New Mexico. The Lower Basin incorporates Arizona, California and Nevada. The Basin states work within the "Law of the River" to address their water supply issues, with the Lower Basin managed by a federal Watermaster (the Secretary of the Interior through Reclamation), separate from the Upper Basin, where that responsibility falls on the Upper Colorado River Commission. Additionally, every Basin state has its own unique water rights system based on the prior appropriation doctrine.

Reclamation obviously has a critical role to play throughout the Basin, and it will continue to play that role well, in a manner that will not preempt the states' roles.

The Family Farm Alliance over the past year has helped organize a group of Basin agricultural water users from the headwaters to the Mexican border to come together to present key principles and expectations that are critical to sustainable and durable operation of the Colorado River (River) into the future. These parties include Central Arizona Project agricultural interests, Colorado River District, Dolores Water Conservancy District, Imperial Irrigation District, Little Snake River Conservancy District, Palo Verde Irrigation District, Welton-Mohawk Irrigation & Drainage District, Yuma County Agriculture Water Coalition, and Yuma County Water Users Association, among others.

We believe this group can play a major role as the seven Colorado River Basin States and Basin stakeholders engage to replace the 2007 Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead. These 20-year Interim Guidelines are set to expire at the end of 2026.

The challenges and associated solutions facing the River are complex and nuanced. However, the unified message of Basin agriculture is simple: Agricultural production in the Basin is an irreplaceable national resource that is vital to U.S. food security, the ecosystem, and overall drought resilience. It must be protected by ensuring water remains on-farm.

Last March, the Family Farm Alliance board of directors adopted a policy document that articulates these key principles. This is essentially a summary of a policy update to a Colorado River white paper developed by the Family Farm Alliance in 2015. Later in the year, many of the organizations listed above also took formal action in support of these principles. These agricultural water purveyors believe that Colorado River Compact decision-makers must update the new operating guidelines to incorporate the following principles:

1. Recognize that Western irrigated agriculture is a strategic and irreplaceable national resource.
2. Provide certainty to all users and interests with Compact equitable apportionment decisions made from a foundation of common sense and fairness.
3. Address critical data gaps to facilitate the trust needed to make fair operational and legal decisions related to the next set of Interim Guidelines.
4. Manage Lake Mead to provide the Lower Basin's share of the Colorado River Compact water to Lower Basin users. Manage Lake Powell to meet both the Colorado Compact obligations to the Lower Basin and protect the Upper Colorado River Compact entitlement of the four Upper Basin states.
5. Expand water supply augmentation opportunities as options for meeting growing water demands, at a time when River supplies appear to be diminishing.
6. Emphasize that future urban growth cannot be encouraged without locking in sustainable and diverse water supplies.
7. Recognize and address the impacts of drought and Colorado River management on Federal hydropower, its customers and related programs, and the resiliency of the power grid.
8. Include substantive measures to minimize and mitigate any anticipated negative economic, environmental and cultural impacts to rural communities due to reduced irrigated agriculture and more efficient irrigation practices.

These expectations will require visionary leadership and a firm commitment to a balanced, workable policy. Collaborative opportunities do exist, and if we are prepared to seize them, conflict will be reduced and certainty for all water uses increased.

The myriad of diverse Colorado River Basin interests can and will successfully work through future droughts and water shortages in a collaborative and effective way. The future of millions of people in urban areas, millions of acres of farms and ranches and the food and fiber they produce, and the many rural communities that dot the landscape in the Basin rest on this belief.

Solutions can be found that do not pit urban and agricultural users against each other. Once those solutions are identified, these competing users can resolve any differences and develop collaborative solutions to the Basin's complex water problems.

ALFALFA PRODUCTION AS A WATER MANAGEMENT TOOL

Alfalfa production forms the foundation of rural agriculture in many Western rural communities. Alfalfa is not only a food source for livestock, it also has important environmental and soil health attributes. The attributes of alfalfa are further detailed in "Alfalfa 101 – The Importance of Alfalfa

Production in the American West”, a 2022 white paper co-authored by the Family Farm Alliance and the California Farm Water Coalition.

Alfalfa fields use between 30 inches (2.5 acre-feet) and 80 inches (6.7 acre-feet) of water per year depending upon climate, soil type and topography. The wide range of alfalfa’s reported consumptive use of water is due in part to the number of cuttings (harvest operations) that a single field of alfalfa can generate in a year. In many parts of the West, alfalfa producers are lucky to generate six cuttings per year. In the Intermountain West, only three to four cuttings are made per year due to the cooler weather and shorter growing season. However, in the agricultural areas of California’s Imperial Valley and around Yuma, Arizona - where the weather permits year-round agricultural production - farmers can get 9-10 cuttings per year.

The tremendous yield in these areas as compared to national alfalfa yield is reflected in Table 1.

TABLE 1: Alfalfa Hay Yield for Colorado River Basin States

	<u>Average Alfalfa Hay Yield (Tons / Acre)</u>						
	2016	2017	2018	2019	2020	2021	2022
ARIZONA	8.6	8.4	8.3	8.3	8.5	8.3	8.2
CALIFORNIA	7	6.8	6.9	7.1	7.2	7.4	7.1
NEVADA	4.4	4.3	4.7	4.9	4.4	5.1	4.9
Lower CO River Basin*	6.9	6.7	6.9	7.0	7.0	7.2	7.0
COLORADO	3.5	3.7	3.4	3.7	3.4	4	2.9
NEW MEXICO	4.6	5	4.7	4.9	5.3	5	5.3
UTAH	4.2	4.2	3.7	4.3	3.8	3.7	4
WYOMING	2.7	2.8	2.7	2.7	3.1	2.8	3.2
Upper CO River Basin*	3.6	3.7	3.4	3.6	3.5	3.7	3.4
Colorado River Basin*	4.9	4.8	4.6	4.8	4.6	4.9	4.7
National Average	3.4	3.3	3.2	3.3	3.3	3.2	3.2
	<u>% of National Average</u>						
Lower CO River	202%	205%	216%	212%	215%	222%	222%
Upper CO River	104%	113%	106%	111%	108%	114%	109%

*- Calculated from Production/Acreage NASS Data

In 2022, Arizona’s and California’s average per acre yield on alfalfa hay & haylage was 8.2 tons/acre and 7.1 tons per acre, respectively, compared to the national average of 3.2 tons/acre, which is extremely consistent with the national tonnage per acre median for the preceding 13-year time frame.

Importantly, alfalfa has a variety of roles to play in a water-uncertain future due to its high flexibility during times of both insufficient and excess water. Eliminating its production doesn't have to be one of them.

Putnam et al. explain this in detail in a paper that was included in the proceedings of the 2021 Western Alfalfa & Forage Symposium, parts of which are reiterated here.

Alfalfa has several important biological features that make it an important component to consider as farmers adjust to a water uncertain future. Its deep roots can tap into residual moisture. Those roots can survive summer dry-downs and regrow when re-watered. Farmers in California's San Joaquin Valley have implemented summer dry-down as a practice to temporarily free up water supplies for other crops in the region. By temporarily ceasing to irrigate alfalfa, that water can be used by other farmers when it is needed most during water short years.

Because it is harvested in several cuttings, alfalfa can provide partial economic yields when irrigation ceases. Alfalfa fields can also be flooded in winter to recharge aquifers.

Buildup of soil salinity is an unwanted consequence of drought. Contrary to some published accounts, alfalfa is actually highly tolerant of salinity. This would enable alfalfa to be grown utilizing degraded water, such as treated municipal wastewater, drainage water, and the like, which provides another avenue to extend water supplies.

Alfalfa has proved to be highly flexible and resilient in surviving droughts while sustaining productivity, even when as little as half the water requirement is applied. Deficit irrigation is the application of water below full crop evapotranspiration requirements during stress-tolerant growth stages. The practice has been shown to conserve water while maintaining yield in several crops grown in the Colorado River Basin, including alfalfa (Cohen *et al.* 2013). It is one of the most cost-effective and most easily applied methods available, yet remains counter-intuitive to many, including some farmers. Perhaps the critics of alfalfa farming would consider assisting with developing policy that educates both decision makers and farmers and incentivizes the practice, which could reduce future water demand.

Under highly variable water supplies, alfalfa cropping systems offer tremendous flexibility due to its ability to be deficit irrigated and recover from droughts to yield normally. Alfalfa should be considered an important element of future irrigated cropping systems designed for highly variable water supplies in the Colorado River and elsewhere in the West.

CONCLUSION

Finding solutions to complex problems, like the Colorado River's dwindling supplies, requires working together, not divisive attacks. Following productive farmland should be a last resort when it comes to America's food supply.

The problem is, there isn't enough water in the Colorado River to meet its current demands, thanks to the ongoing drought in the Western United States and uncontrolled growth of urban areas. The situation is bad enough that Reclamation is seeking 2 million to 4 million acre-feet of water

reductions and additional conservation by users in the river's seven basin states. That is a significant amount and will put a strain on everyone, but we can make it less painful by working together.

Growers across the West are stepping up, at their own expense, to provide solutions for the viability of their basins and the communities those basins serve. In many cases, that means senior water rights holders are voluntarily making water supplies available to junior water users, preventing cuts otherwise required. There are other collaborative efforts underway to fund on-farm conservation projects that are helping reduce demand. Urban, agricultural, and environmental water users would all benefit from such efforts in the short and long term.

What is not helping is the relentless finger-pointing by non-agricultural water agencies and critics of agriculture, saying that farmers aren't doing enough. Critics of irrigated agriculture continue to shame farmers for growing crops, such as alfalfa, saying they should fallow their fields or switch to crops that use less water, which fixes nothing.

Farmers only grow crops that other people buy. Current vegetable and value-added farm products are subject to the same supply and demand of American manufacturers. Planting a crop simply because it uses less water ends up being a complete loss for the farmer and society if nobody is willing to buy it.

The Western agricultural system was built on local supply of feed and food. Shifting alfalfa production to other states adds additional food miles, greenhouse gas emissions from transportation, and ultimately higher costs and/or emptier shelves at the grocery store. Locally grown food for humans, dairy and animal proteins results in lower costs to producers and consumers.

Worse is the impact on communities that depend on agriculture for their economic well-being. California's Imperial Valley has no suitable groundwater or alternative water supply other than the Colorado River. With the largest irrigated district in the United States, it is an agricultural region that doesn't have an economic base that can absorb additional unemployment, business closures, and the loss of tax revenue that come with fallowing. Agricultural regions, such as the central valleys of California and Arizona, are facing a future of dwindling and unsustainable groundwater supplies as they look to replace potential shortages from sources like the Colorado River. Entire communities are at risk of closing, bankrupting their populations.

IID General Manager Enrique Martinez said it best in a recent interview with the *Desert Sun*: "You've got to . . . keep listening to the farmers, because ultimately, you don't want to get to the point of creating a food crisis to solve a water crisis."

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