California Drought Update

For August 4, 2016
by Patrick Ruckert

http://www.californiadroughtupdate.org
https://www.facebook.com/CaliforniaDroughtUpdate
patruckert@hotmail.com

A Note To Readers

The major thrust of this week's report is the Delta Tunnel project, otherwise known as the *California WaterFix,* and at least some of the conflicting issues and background involved.

Over the two years I have been writing this weekly report I have deliberately avoided discussing the Delta Tunnels Project. Why? Because, as Governor Brown and the state Water Resources Board have always said, the building of the tunnels will not increase by one drop the water supply of the state, but just make "more efficient the distribution of the water that now exists."

My intent, in these weekly reports, is to the contrary, not to advocate a redistributionist scheme of any kind, but to call attention to the human solution to the existing problem that for two decades, thus far, California has not had enough water to meet all the needs of its citizens. Since 1992, the water contractors receiving water from the State Water Project and the Central Valley Project have not received their full allocation in most years. It is important to add here that those contractors must continue to pay for that water whether they receive it or not.

By a human solution, I mean one that unleashes the real creative power that we as humans possess, and have unleashed time and time again-- to look at a crisis, develop a solution and to put that solution together. Even better, is to foresee the needs of the future and solve the crisis before its impact can take hold. That is what William Mulholland did in building the Los Angeles Aqueduct and initiating the

Colorado River Aqueduct. That is what President Franklin Roosevelt did in building the Central Valley Project; likewise Governor Pat Brown's building of the State Water Project.

The past five years of the worst drought in the state's history has underlined the reality that the economic, cultural and political paradigm of the past decades is a failure. That paradigm must change, and unless it does there is no solution to the state's water crisis. A crisis, whether it is this California one, or the more general disintegration of the real economy of the nation, provides the kind of "break-point" required to engage the citizens in a real discussion of the needed policy. It is an opportunity to end the "issues" approach to government, which does noting but divide a people who must be united for a policy that, as the Preamble of the U.S. Constitution states, "provides for the general welfare," for ourselves and our posterity.

Unlike the first two or three years of this drought, where people in the cities of the state would ask, "what drought?," its reality is now up front and center for everyone to experience. Now is not the time to limit ourselves to fighting over non-solutions like the tunnel project or the Delta Smelt. Now is the time for a complete overhaul of the system.

I have posted this link before, but it is what we must enlist the American people to fight for, so here it is again:

The United States Joins the New Silk Road:
A Hamiltonian Vision for an Economic Renaissance

https://larouchepac.com/20151229/us-joins-new-silk-road

We must build the future—we must build tens of thousands of miles of high-speed rail corridors; nuclear power development leading into the era of fusion; the construction of hundreds of new Renaissance cities across the country; controlling rainfall based on insights gained from the Galaxy; space exploration and research; and so on. And all of this must be done in tight coordination with the BRICS and allied nations, led by China and Russia, who are already engaged in such a process of building a New Silk Road, and turning it into the World Land-Bridge.

Now, back to the tunnels. Whether intended by the social engineers or not, the tunnel project has virtually everyone fighting everyone; a condition that guarantees not only will the water crisis not be solved, but unleashes the same process that we see in the Presidential election right now: Two unqualified, and to put it bluntly, disgusting candidates, both of whom are disliked and not trusted by 60% of the American people; two candidates who have no policy for uniting the country to build the future required by ourselves and the generations to come.

The question for you to answer is, will you continue to accept this dead-end present, or will you join me in fighting for the policy proposal presented in the link above? Your answer will determine the future of the nation. For example, this statement from LaRouche PAC on August 3, "Obama Launches Yet Another Criminal War on Libya," presents both the dangers we face and the general policy solutions required. The entire statement is here: https://larouchepac.com/20160803/obama-launches-yet-another-criminal-war-libya

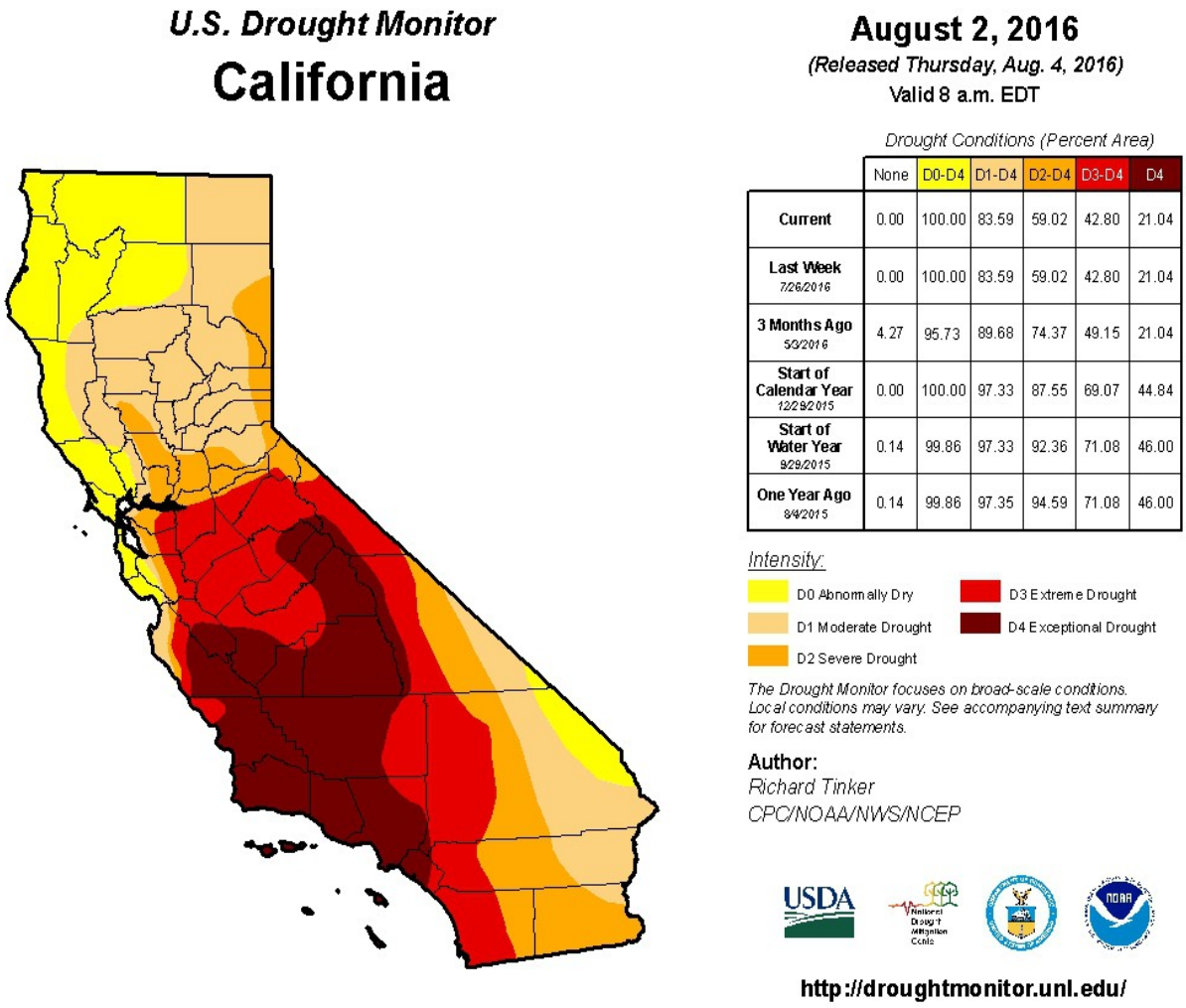
As for the rest of this week's report, we have, related to the Delta tunnels, the court decision that seriously threatens to cut off even more water from being sent south of the Delta.

In addition, I include some extended excerpts from an interview with the head of the Metropolitan Water District of Southern California to provide both some background to his thinking about the California water management system itself, and the tunnel project. He also makes some interesting

remarks about desalination.

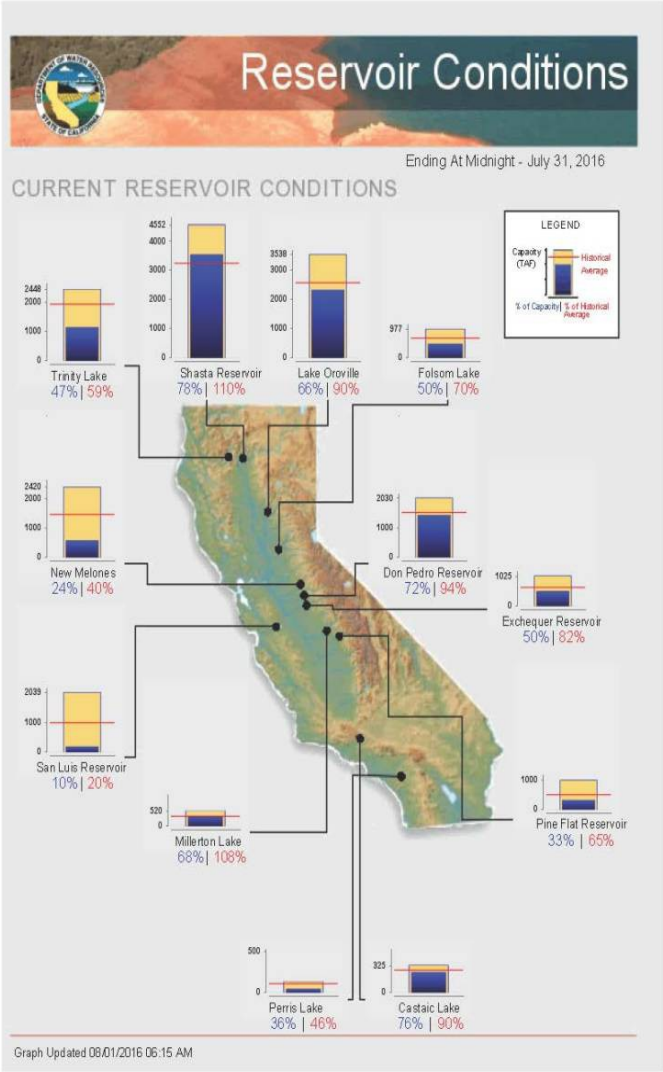
Finally, we have some reports on desalination and the Colorado River.

First, This Week's Drought Monitor and Reservoir Graph



Again, no change in the intensity of the drought in the state. Perhaps the people who put this together have gone to sleep.

As is normal in the month of August, the reservoir levels are falling as water is being drawn down and distributed to farms and cities-- at least some farms, mainly north of the Delta. The San Luis Reservoir is now at 10 percent of capacity, the lowest level in more than 25 years.



The Delta Tunnels, and More

Whether the $16 billion dollar, decade-long project ever gets built, one fact is clear: It will not add one drop of additional water to the California water management system. As the governor says, it will only make the system more efficient and give greater flexibility in operating the system.

The project is to be paid for by those water agencies that will receive the water that is sent south via the tunnels. The major recipients of the water would be the Westlands Water District and the Metropolitan Water District of Southern California.

A couple of wrenches have been thrown into the works this past week that threatens the entire project. First, a decision is to be made whether to further restrict water sent south from the Delta by the National Marine Fisheries Service and U.S. Fish and Wildlife Service. If that comes about then the major recipients will withdraw their commitment to fund the tunnels, and that is the end of the story. Second is a court ruling that threatens the renewal of existing water delivery contracts.

Not quite the end of the story, because the intensifying crisis of California's water supply will not go away, and unless a dramatic shift in the policies of the nation occur soon, that crisis will become

critical. Last week I reported on the first of the juggling acts required to ensure that the San Luis Reservoir pumps did not shut down. There will be more such emergencies, and within a couple more years they will become unmanageable.

The following reports flesh out the picture.

The Monkey Wrench

Here is the story on the National Marine Fisheries Service and U.S. Fish and Wildlife Service re-examination of the amounts of water to be allowed to go south. The August 3 article is from the *Sacramento Bee* by Dale Kasler. Some excerpts:

Feds to take new look at Delta, endangered fish species

http://www.sacbee.com/news/state/california/water-and-drought/delta/article93498337.html

Scientists from two federal agencies are about to overhaul the rules governing the Sacramento-San Joaquin Delta, potentially increasing protections for endangered fish populations and limiting the amount of water pumped to Southern California and the San Joaquin Valley.

The National Marine Fisheries Service and U.S. Fish and Wildlife Service will re-examine the nearly decade-old environmental regulations covering the Delta water pumps – rules that some experts say have been rendered nearly obsolete by drought and the devastation to endangered species. The old rules will remain in effect during the review, which could take two years or longer.

Even so, the fisheries agencies' work could affect deliberations over Gov. Jerry Brown's proposal to overhaul the Delta's existing plumbing system by building a pair of giant tunnels beneath the heart of the estuary.

The examination has been widely anticipated and, in some circles, dreaded. In light of five years of drought and the drastic population decline of the Delta smelt and other fish, many water experts believe the agencies will wind up significantly tightening the environmental restrictions on the massive pumping stations near Tracy. That could mean less water shipped via the Delta to customers of the State Water Project and the federal government's Central Valley Project.

Some experts believe the examination of the current system could complicate the tunnels plan. That's because the new biological opinions could result in less water being shipped south on a regular basis. If that happens, many south-of-Delta water agencies might resist paying for their share of the $15.5 billion tunnels project, saying it's pointless to spend the money if water deliveries are going to decline anyway.

A Court Ruling That Demands Less Water Be Sent South

Coming at it from another angel, a federal appeals court ruled last week that even signing contracts to renew existing water deliveries must be abrogated by environmental requirements. Here is the August 1 article in the *Sacramento Bee* by Dale Kester-- excerpts:

California fishermen win key ruling over Delta water supply

http://www.sacbee.com/news/state/california/water-and-drought/delta/article93080562.html

A group of commercial fishermen won a potentially significant court ruling in the seemingly endless battle over California's water supply and the volumes of water pumped south through the Sacramento-

San Joaquin Delta.

A federal appeals court last week ruled that the U.S. Bureau of Reclamation, which delivers water from the Delta via the federal Central Valley Project, violated federal environmental law by renewing a series of two-year delivery contracts for south-of-Delta agricultural customers. The court said the bureau should have given "full and meaningful consideration" to the idea of reducing the amount of water available for delivery in the contracts.

The ruling by the U.S. 9th Circuit Court of Appeals won't void any of the supply contracts, said Stephan Volker, an Oakland lawyer representing the fishermen. But it could force the Bureau of Reclamation eventually to reduce the amount of Central Valley Project water pumped through the Delta to farmers and leave more water in the estuary to help endangered fish species.

The decision comes as Gov. Jerry Brown's controversial plan to build twin tunnels beneath the Delta, in an effort to repair its battered plumbing system, enters a crucial phase. The State Water Resources Control Board is in the early stages of months of hearings on the $15.5 billion proposal, known as California WaterFix.

Regardless of court decisions or the fate of Brown's proposal, many observers say big changes are coming to the Delta. Pumping operations are likely to be throttled back in the coming years, even in wet years, to satisfy increasingly stringent environmental restrictions.

An immediate reaction to this ruling came from *Families Protecting the Valley* on August 2:

So Let's Get This Straight!

So let's get this straight, the Federal 9th Circuit Court of Appeals in San Francisco has ruled that the farms, cities and landowners who put their land up as collateral to build the dams, who are still paying for the dams, that enable the storage of water that can be released during peak summer demand times have No Right to delivery of any water?

That was not the only angry reaction. *Californiaagtoday.com*, on August 3 expanded on the theme that the farmers are being thrown to the wolves. Here are some excerpts:

5 Percenters and Endangered Fish May Both Lose http://californiaagtoday.com/the-5-percenters-may-not-receive-all-water/

By Patrick Cavanaugh, Farm News Director

Will the 5 Percenters—the Federal water users in California who were restricted by a 95% water allocation reduction this year—actually receive the promised 5% allocation?

***Ryan Jacobsen**, executive director and CEO of the **Fresno County Farm Bureau**, said, "arguably it's turned out to be much worse. Right now, for the initial 5% allocation to even be questionable right now is just absolutely insane. It all boils down to the amount of water being held up in **Lake Shasta** for fish purposes, which has put a major stranglehold on what's happening down here at this point," noted Jacobsen.*

Jacobsen reiterated, "Back when the precipitation was falling [last winter], water was available at some extraordinarily high levels; yet, we never saw the increase in pumping that we would have expected under the normal conditions. "Of course, we've seen less pumping this year for the farmers and the cities south of the Delta," noted Jacobsen. "During the times of the rainfall this year, it was essentially excuse, after excuse, after excuse. Some newer excuses pertained to why the pumps were not operating or operating at a very reduced capacity," explained Jacobsen.

*"The situation has been frustrating for a couple of years, but the anger continues to build because right now, this is not a 'Mother Natur*e' issue. It is completely a man-made regulatory drought that is, again, just incompetency at its best."

Even Background Articles Warn That Less Water Will Be Delivered

The *Sacramento Bee* article of August 2 on this week's state hearings on the tunnel also warns that less water may be delivered, with or without the tunnels. Some excerpts:

Remedy, or boondoggle? Hearings launch on Delta tunnels proposal
http://www.sacbee.com/news/state/california/water-and-drought/delta/article91922802.html

By Dale Kasler

Known as California WaterFix, the tunnels project effectively went on trial as a key state agency began months of formal hearings on details of the $15.5 billion proposal.

Peltier complained about the possibility that water deliveries from the Delta could decrease, even if the tunnels get built, because of the likelihood of tighter environmental restrictions in the coming years.

California WaterFix "must work not only for the environment but for those who are paying the cost," Peltier said. Others in agriculture have voiced similar concerns.

The project costs would be borne by the south-of-Delta water agencies, not state taxpayers.

Background

There is nothing but conflict when it comes to the tunnels, as this article from the *San Francisco Chronicle* highlights, while providing more in-depth background. This is from July 26, and written by Kurtis Alexander. Some excerpts follow.

Dissent brews over governor's $16 billion water project
http://www.sfchronicle.com/bayarea/article/Dissent-brews-over-governor-s-16-billion-water-8414743.php?t=e30c3da3d000af33be&cmpid=twitter-premium

The proposal by the state Department of Water Resources and the U.S. Bureau of Reclamation — championed by Brown — calls for a pair of 40-foot-wide tunnels to carry Sacramento River water 35 miles beneath the delta to the outskirts of Tracy. Pulled by gravity, the freshwater would enter the massive state and federal canal systems and flow south to cities and farms.

Currently, water is pumped directly from the delta into the canals of the State Water Project and Central Valley Project. This has altered circulation in the delta's wetlands and wreaked havoc on migrating smelt and salmon populations.

State and federal authorities are often forced to halt pumping from the delta because of the problems, limiting water deliveries. This past winter, for example, the agencies estimate that 486,000 acre-feet of water, enough for 3.6 million people for a year, went undelivered.

Changing the location where the water is drawn, which requires approval from the State Water Resources Control Board, is the government's answer to the quandary.

"We're not asking to take more water," said Nancy Vogel, a spokeswoman for the Department of Water Resources. "We're only asking to change the point where we divert it."

Opponents of the tunnels worry that water draws near Hood will reduce the amount of freshwater running into the delta, where a balance between river water and salty inflows from San Francisco Bay is crucial. Both fish and farmers would suffer from poor water quality or too little water.

"The more they take off the Sacramento, that's less going through the delta," said grower Bob Ferguson, 67, who relies on delta water to irrigate asparagus, corn, wheat, safflower and alfalfa. "It's something that we're very, very concerned with and watching very carefully."

While state and federal authorities vow to ensure sufficient water for the fragile delta ecosystem and remain bound to take no more than their water rights allow, the critics are wary. Many water agencies north of the delta are uniting against the tunnels because they're concerned that their rights to the Sacramento River may be undermined.

Approval of the new water draws, which won't come up for a vote until at least next year, is a major step to clearing the way for the three intake plants near Hood.

The state water board isn't the only hurdle to the plan. Dubbed California WaterFix, the project must survive additional reviews by local, state and federal agencies and satisfy the U.S. Endangered Species Act.

Money is also a big issue. The Metropolitan Water District of Southern California, one of the biggest supporters of the tunnels, is expected to provide funding, along with other water agencies served by the project, including some in the Bay Area. However, the benefit to backers is becoming increasingly murky.

Restrictions on state and federal water draws may tighten as the delta's environmental problems are studied and as statewide water supplies dwindle amid drought and climate change. While proponents of the tunnels expect more water to become available with the project, that's no certainty. Reliability is a clear advantage, but a bump in supplies is not.

Interview with Jeffrey Kightlinger

Maven's Notebook on July 31 published the full interview with Jeffrey Kightlinger, the General Manager of the Metropolitan Water District of Southern California, the agency that provides water to more than 19 million people. While I have my differences with Kightlinger, especially his tendency to go along with the lie about "man-caused global warming," this interview provides useful background to the thinking of Metropolitan on the tunnel and much more. He makes clear that if water deliveries from the Delta are to be reduced from present levels, Metropolitan will drop out, killing the project. His comments on desalination demonstrate, as I have written previously, that new technologies like artificial ionization to produce precipitation where it is needed, must be pursued as part as a science-driver approach to economic policy. Excerpts from the interview follow:
https://mavensnotebook.com/2016/07/31/a-conversation-about-water-with-jeffrey-kightlinger/

"A conversation about water" with Jeffrey Kightlinger

Metropolitan General Manager answers questions about the California Water Fix and other issues at a recent Sacramento Bee forum

"Why do you need water in Southern California?" asked Mr. Morain. "You've got the ocean; why can't

you do desal plants. Why is there not enough storage and ground water in Southern California in your view?"

"*There's a simple truth that the coast areas, where people do like to live in California, simply don't have enough water,*" responded Kightlinger. "*San Francisco essentially imports all of its water from the Sierras. Santa Barbara has to import water. The East Bay, Oakland – they all import water. The coast is not where fresh water is; it's where salt water is. The same is true with Southern California. We have good ground water basins in Southern California, we have some local rainfall, but the most it can do is about half our demand. So if you're going to have a growing and vital economy in Southern California, you're going to have to have some element of imported water.*"

"*The technology is there to do ocean desalination, but I don't think people sometimes get the scales and volumes of water*," Mr. Kightlinger continued. "*Southern California just completed in Carlsbad in Sand Diego County, the largest desalination plant in the West Coast. And it will do about 50,000 acre feet of water a year. On average, Metropolitan can get from the State Water Project, back when it was functioning better than it is today, about 1.5 million acre feet of water. Let's say Southern California will no longer get import any water from Northern California, and we're going to switch all to ocean desal. The comparable would be to build the largest desal plant that ever built in the world, every four miles between Los Angeles and San Diego. You would have to basically industrialize the whole coast. It took ten years to get the Carlsbad permits done for 50,000 acre feet. We'd need thirty of those done. So it isn't physically or fiscally feasible or practical to say we're going to roll up one system all over to another technology. They all have to be built and they all have to complement each other.*"

"Restore the Delta put out a press release basically denouncing this event and suggested various questions," said Mr. Morain. "So I wanted to read some of these questions. The first one was, 'Why does MWD continue to tell MWD board members that the Delta Tunnels will provide the more water when it is clear that climate change will lead to less snow pack in the Sierra and reduce flows to the tunnels?'"

"*That isn't actually what we tell our board*," replied Mr. Kightlinger. "*We don't tell our board that building something like the tunnels gets more water. It makes the existing State Water Project system function better. You're basically modernizing and upgrading existing infrastructure for the purpose of reliability for making sure it is reliable. People forget the State Water Project is 1960 engineering. It was stare of the art 50 years ago. It is not state of the art today. We need to modernize the system and make it better. That is what the tunnels are intended to do. And we think it's a sound investment in reliability not in more water. If you look at what San Francisco did, the City of San Francisco just spent $4 billion on base of three million rate payers to go completely rebuild their Hetch Hetchy system. It doesn't provide one drop of new water, and they essentially tripled their water rates in parts of the city. Why? Because they need reliability. And that's what investments do*."

Another audience member asks why the tunnels were selected to go under the Delta.

"*The challenge of this whole Delta issue has been known for some time,*" said Mr. Kightlinger. "*In 1930, there was a state water plan that was adopted by the California State Legislature that basically called for systems to move water from the Sierra to the Central Valley and open up that area for agriculture. They proposed the Delta bypass because they knew moving water through the Delta was not going to be a good idea. In 1960, when the state adopted the state water project, again it called for a Delta bypass. San Francisco, the East Bay, they all built Delta bypasses*."

"*The reason is it's completely at sea level; it's a completely flat area*," Mr. Kightlinger continued. "*It's a mixing estuary; it's not a good place to pump. So the plan has always been to build a Delta bypass but it kept getting put over for expenses or not. The last time we actually took a statewide vote on the Peripheral Canal was in 1982; that was again a Delta bypass. The thinking now is we've gotten very good at tunneling. We weren't good at tunneling 50 years ago or even 30 years ago. So the thinking*

today is a Delta bypass but this time tunnels. It has less of a footprint, it does bypass the Delta but it would be done by tunnels so it would be a lot less visible; completely out of sight and out of mind once it's built. It would be much more effective by gravity flow to be able to move water. So it's a good engineering solution. The real question is what are the political aspects of it and obviously that's controversial."

"*One of the questions that keeps being raised by those in the north who are suspicious of this project is, it's going to be paid for by your rate payers in MWD but there is a thought that most of the water benefits will be going to Westlands or the Valley Farmers*," asked an audience member. "*That the farmers are getting the biggest benefit of this and water is going to grow almonds in Westlands that would ship to China or something, and there's not really a lot of water that's going to go to those folks in LA and Orange county and so forth, will be paying most of the costs. What's your answer to that charge?*"

"*The question basically was, it's my agency that represents the large population, are we basically going to be subsidizing the agricultural agencies and paying their share – they'll get the lion's share of the benefits and my agency people will get the lion's share of the cost*," said Mr. Kightlinger. "*One thing that I think a lot of people don't understand. The amount of water Metropolitan takes out of the Delta is equivalent to four percent of all the water that goes into the Delta, four percent. And for that, we're supplying the drinking water for one half of the state's population. So it's a pretty remarkable, efficient operation we're trying to run and maintain and people in Southern California have done a good job in conserving and minting a flat water use as our population has grown*."

"The current plan on the table, though, is that we're going to pay bucket for bucket. So Southern California uses 25 percent of the water that moves through the tunnel, Southern California will pay 25 percent of the cost," he continued. "*The water is going to follow the money, the money is going to follow the water. Westlands gets 25 percent of the water, they would be on the hook for 25 percent of the cost. Now, there's a lot of debate in the farming community for whether they can afford that or not. They'll have to make that decision. But that is the plan that there isn't intended to be an Urban to Ag subsidy to make this happen.*"

"If the farmers in Westlands and Kern County don't pony up their share, would MWD do it on its own?," asked Mr. Morain.

"*I don't' believe so*," said Mr. Kightlinger. "*What we've done here is the state of California, working with the Federal government, has come up with a California Delta plan – not a Metropolitan Delta plan. It's a California-wide plan that benefits about 23, 24 million Californians, which we were at 19 million, but there is another four or five million out there that we don't represent. And would provide water to about four million acres of farmland going down to Central Valley that we have nothing to do with. That is the plan that's on the table. And if those people for the four million acres and the other four or five million people choose not to opt in and do it, I don't see any chance that the Metropolitan Board would say, well, we'll fix this for all of California; it's not politically feasible*."

Desalination

The following article makes two points: First, desalination is indispensable now and in the future, providing water to more than 300 million people now. Second, nuclear power is the preferable power source for the process. This is from *environmentalleader.com* on July 26. Some excerpts follow.
https://www.environmentalleader.com/2016/07/26/desalination-is-helping-san-diego-avert-drought-is-the-technology-useful-elsewhere/

Desalination is Helping San Diego Avert Drought. Is the Technology Useful Elsewhere?By: Ken Silverstein

But the Carlsbad Desalination Plant is necessary to guard against droughts and the influx of new citizens who will increase the demand for fresh water. That's why the Sandia National Laboratory has written a roadmap that would use desalination to increase the nation's drinking water supply.

"By 2020, desalination and water purification technologies will contribute significantly to ensuring a safe, sustainable, affordable, and adequate water supply for the United States," the federal lab says.

Applicable elsewhere in the world? The International Desalination Association says that 300 million people around the globe get their water using such technology. But if concerns exist over using fossil fuels to purify the seawater, what about using nuclear energy?

The Atomic Energy Agency says that nuclear energy is the most feasible method. It points out that the technology of coupling nuclear energy and desalination plants already has taken hold in Japan and Kazakhstan, where commercial facilities have been operating since the 1970s.

India is among countries seeking to expand the base of national and international experience through a demonstration plant it is building. Altogether, the agency is working with 20 nations to advance nuclear science and desalination.

It is estimated that a 300-megawatt nuclear plant would be required to drive a desalination facility with a capacity of 1 million cubic meters of potable water a day. That's enough water to support a population of between 3 or 4 million people. That same population would require between 4,000 and 6,000 megawatts of installed capacity to meet its electricity needs.

An interesting article from *newsdeeply.com* reports on a Monterey Bay proposed desalination plant, that by placing the intake pipe in deep water environmental objects can be overcome and the energy required to run it will be reduced by 40 percent. The article is from July 27, and written by Matt Weiser. Some excerpts:

Deep Water Desalination Proposed in Monterey Bay
https://www.newsdeeply.com/water/articles/2016/07/27/deep-water-desalination-proposed-in-monterey-bay

Backers of a new Monterey Bay desalination project think they have found a fix for the environmental problems posed by most seawater intakes: Instead of drawing seawater from the beach, they plan to draw from the one of the world's deepest marine canyons.

The Deep Water Desal project is proposed at Moss Landing, exactly midway along the curving shore of Monterey Bay. As such, it may be ideally positioned to serve the chronic water shortages affecting the region. Cities from Santa Cruz to Monterey are plagued with long-time water problems, including overdrafted groundwater, diminishing surface water and a lack of storage reservoirs. The region also has no access to the State Water Project, a key source of imported water for many Californian communities.

Moss Landing also sits at the head of Monterey Canyon, the deepest submarine canyon on the west coast of North America. It plunges 1,600 feet deep (488 meters) just two miles (3.2km) from Moss Landing, and eventually reaches more than 10,000 feet deep – twice as deep as the Grand Canyon.

Deep Water Desal proposes to draw seawater from an intake constructed at the edge of this abyss, about 1,000 feet offshore at a depth of 130 feet.

The goal is to produce 25,000 acre-feet (30m cubic meters) of freshwater per year, enough to serve

50,000 average homes.

In another unusual move, the developers also propose to build the desalination plant in tandem with a large data storage facility. Besides water, Adamson said, the Monterey Bay region also has a need for data storage and faster internet speeds. The cold seawater would first meet the cooling needs of the data storage facility before being routed to the desalination plant.

This solves a problem at the desalination plant as well. Cold water is not ideal for desalination because it is more dense and, thus, requires more electricity to force through the micropores of the reverse-osmosis filters, Adamson said.

The data center would warm up the seawater before it reaches the desalination facility.

In total, Adamson said, the electricity required to operate the project will be reduced by an estimated 40 percent compared to a conventional desalination project. This will help contain the price of the freshwater it produces, and also reduce the project's greenhouse gas emissions.

The Colorado River

Two articles provide background on the crucial role of the Colorado River for the water supply of five states and Mexico. The first is from the Bureau of Reclamation and the second article focuses on the upstream states. The complex of water management infrastructure of the Colorado River system is both a delicate and amazingly efficient one. I have excerpted both items.

Here is the August 2 release by the Bureau of Reclamation:

Colorado River More Important Than Ever *http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=55987*

SALT LAKE CITY – Ongoing attention to the Colorado River emphasizes its crucial role as the "lifeblood" that sustains millions of Americans across dozens of cities and countless farms in the American West. For the seven states that comprise the Colorado River Basin—Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming—the Colorado River has stimulated growth and opportunity for generations. Today it is as important as ever for leaders, residents and visitors to this beautiful and dynamic region of the country.

The second is from *circleofblue.org*, by Brett Walton, published on August 2. I suggest those interested click on the link, as excerpting it requires too much to get across the content.

Colorado River's Tale of Two Basins *http://www.circleofblue.org/2016/world/colorado-rivers-tale-two-basins/*

In Colorado, rivers flow not only down mountain slopes but beneath them, across them, and through them.

Nearly four dozen canals, tunnels, and ditches in the state move water out of natural drainages and into neighboring basins. Some snake across high passes. Others pierce bedrock.