January 21, 2019

Attn: Francisco Guzman  cwpcom@water.ca.gov

Re: California Water Plan Update 2018 – Public Review Draft

My comments are referenced by Update Draft page number, in **bold**, and my general comments appear in black text. Quoted excerpts from the draft appear in **blue**. Specific proposed changes to text appear in **bold green**. Please consider the material on all linked pages to be incorporated into my comments by reference.

1-1 I suggest the following changes to the below text (in **bold green**):

“Setting the Context for California Water Plan Update 2018

The state **currently** relies on a complex network of **engineered** water storage and conveyance systems to control, capture, and store water when it is available in the wet winter and spring for use during the dry summer and fall. . . .”

1-3 Section, “California’s Diverse Water Supplies and Uses”

“Precipitation, specifically snowpack and snowmelt from the Sierra Nevada, is the primary source of water supply and natural groundwater recharge in California — though it varies from place to place, season to season, year to year. “

While that may be the primary source for much of the state’s engineered infrastructure, that certainly is not the primary source for **natural** groundwater recharge throughout most of the state and in many cases is not even true for water supply. I’m well aware that the above statement reflects DWR’s overarching approach to water management but that unfortunate attitude does a disservice to water management in regions far removed from Sierra Nevada watersheds al.k.a. Catchments.

At least some portion of the enormous expenditures required to build, operate and maintain engineered distribution of water from the Sierra Nevada throughout much of the state might be more prudently applied to strengthening reliance on local water supplies, especially given the outlook for Sierra Nevada snowpack due to climate change.

“The timing, quantity, and location of precipitation in California are largely misaligned with agricultural and urban water uses.”

This is exactly why I’ve proposed to DWR **enhancing natural groundwater recharge** – **leading to baseflow augmentation** – through ecological restoration of watershed/
catchment functions over vast areas of the state where those functions have been unwittingly degraded through historical land uses, as follows:

1.) in my 2009 comments on the Draft Water Plan 2010 then in progress, 2.) in my August 2016 input to DWR as you were just beginning to implement SGMA, and 3.) in my 2017 comments on the Draft Water Available for Replenishment (DWAFR) report. Note that those latter comments, submitted just prior to the deadline for DWAFR comments, were inexplicably routed to DWR’s “archives”, as I learned later from DWR’s point person on that, so they did not appear among the comments posted online. But when I spoke with DWR’s DWAFR point person later by phone, he indicated my input would still be considered. For convenience you may refer to the bulk of those excerpted comments in my 2018 blog post, “DWR, Great Job on WAFR! Now Add R2G”.

In all cases, DWR’s final products indicate that my earnest input has been completely ignored. So please forgive me for not submitting these comments sooner, as requested during your webinar, but I admittedly procrastinated and I’m feeling irritated as I write, knowing that this current effort is also likely to be ignored; knowing that I’m probably (again) wasting time on this that might be more profitably invested elsewhere.

Especially given the numerous urgencies associated with water in California, I don’t know specifically why DWR has consistently failed to even consider or be the least bit curious about this input, moreover ask me if you would like more information, but I suspect that it is because your agency is dominated by engineers who can’t see beyond mechanistic engineering a.k.a plumbing approaches to resolving our state’s water issues.

I know for a fact that not all engineering hydrologists are as blinded by a mechanistic, reductionist worldview as DWR’s seem to be but you DWR engineers need to wake up to the fact that there is more to hydrology than engineering. While y’all have been busy encouraging new dams [see my page Retention vs Detention Storage] and conveyance schemes, the field of ecohydrology emerged during the late 20th century and has only been expanding during the current millenium.

More on this later, now back to my comments on your draft update . . .

3-1  Goal 1 — Improve Integrated Watershed Management

Recommended Action 1.2 — Support the Role of Working Landscapes.

The Rainfall to Groundwater approach, initially articulated in my voluminous interdisciplinary doctoral dissertation, “Watershed Restoration for Baseflow Augmentation”, finalized 2011, emphasizes the role of the vast areas of our state’s rangelands now dominated by nonnative annual grasses. The “nonnative annual” descriptor highlights the fact that these represent anthropogenically degraded watersheds/ catchment.
To get a sense of just how vast these rangelands are and which drainages they cover, please refer to the satellite image, “Rangeland Opportunities for Rainfall to Groundwater”, midway down the page, California Case (among other locations on my site). Note that while the high-albedo (light-reflecting, light colored) nonnative annual grasslands stand out in that image, the need for restoration of watershed/catchment functions applies also to the native oak woodlands and savannas (a.k.a. “hardwood rangelands”) less obvious in that image, whose understories are now dominated by nonnative annual grasses, that, in many cases, impact natural oak regeneration.

To get a sense of how ecological restoration of native woody vegetation, especially oaks, can enhance infiltration and percolation functions on these lands, please see Plants in an Ecohydrology Context. Please also refer to Surface-Groundwater Systems in a Holistic Water Cycle.

Many of these nonnative rangelands lie downstream of existing surface storage reservoirs, hence their explicit importance to the potential enhancement of local natural groundwater recharge and the cold water baseflows needed by native, including anadromous fish populations like steelhead and salmon.

But annual and hardwood rangelands also lie upstream of many reservoirs. Restoration of catchment functions on reservoir watersheds promises to expand the effective capacity of those reservoirs through detention storage, as I pointed out in my second blog post last year, Expand existing reservoir capacity non-structurally.

It has long been clear to me that among the reasons the potential of these watershed uplands have long been overlooked are paradigmatic biases. I’ve articulated several of these in the Alternate Paradigms section of my website. Probably most applicable is Stream Networks vs Watersheds/ Catchments but related issues are Figure vs Ground and Reductionism vs Holism, as well as the long-standing historical bias toward removing vegetation for “water yield”, as articulated on Water Yield vs Baseflow Augmentation.

As for supporting the “working” aspects of these lands, please see the page, What’s in it for ranchers? in the Ecohydrological Economics section of my site, along with pages linked therein, Criollo Cattle? and Livestock Appellations for California?

3-1 Recommended Action 1.3 — Promote Flood Managed Aquifer Recharge.

DWR will provide technical, planning, and facilitation assistance for local and regional entities to evaluate and execute managed aquifer recharge opportunities.
I find it quite telling that DWR and academic colleagues have all quite enthusiastically jumped on the bandwagon of “Flood MAR” since enactment of SGMA, without really thinking it through from holistic or interdisciplinary perspectives.

For one thing, it emphasizes the historical bias toward surface waters, as articulated on Surface Water Diversions vs Baseflow Augmentation. For another, it emphasizes “sink” over “source”. Really, when many were focused on the Clean Water Act in the early 1990s the rallying cry regarding nonpoint source pollution was “Start at the Source”. Did that understanding simply vanish when we began getting serious about groundwater? Or is simply because water is compartmentalized between DWR and the Water Boards?

Perhaps y'all are so enamored because it requires more of your preferred (serial, not to mention costly) engineering to capture and divert those floodwaters to the proposed infiltration sites.

But, my understanding is that the proposed infiltration sites are all lowland agricultural lands, especially orchards. While someone has apparently recognized that woody roots can enhance infiltration and percolation, has anyone stopped to consider that during times of flooding, those lowland sites themselves will become saturated??? You can’t force more water into soil profiles that are already saturated.

My guess is that during the Flood MAR “listening session” hosted last week one or more orchard managers may have pointed out that typical orchard trees, among other crops, can only stand so much inundation before they become impacted by lack of oxygen in their root zones. So the thought of weeks (months?) of standing water on these lands does not seem economically viable.

Having been a bystander on new of these Flood MAR discussions, including watching the 2018 webinar, wherein other issues, like nitrate pollution, were brought up, my distinct takeaway is that, especially compared to my relatively simple Rainfall to Groundwater proposal for restoring degraded upland catchment functions, the proposed Flood MAR is like a Rube Goldberg contraption.

Another issue is the requisite Water Board permits to divert even flood flows for Flood MAR. The Rainfall to Groundwater approach circumvents that necessity entirely. Please see Who owns the rainfall? A legal frontier?

I realize that a major influence on such earnest efforts as Flood MAR is SGMA’s unfortunate to me, focus on groundwater basins, as though they are entities in themselves, disconnected from the watersheds/ catchments that actually feed them. While the WAFR appendix on methodology, specifically regarding water budgets, offered a small tidbit pertinent to the uplands that feed the basins, that tidbit did not explicitly indicate
infiltration and percolation on catchment uplands, so most GSAs are likely to miss that in developing their GSPs.

In fact I’ve seen and commented on one draft water budget model that had “stream gauge readings” as the sole input to “Watersheds”. In this particular region the watersheds/catchments are vast, the stream gauges are very few in number and lie downstream of many areas of existing groundwater extraction. So how can that possibly provide sound insight into the existing natural groundwater recharge? I had to ask, given this vast watershed/catchment, do the hydrological consultants actually believe all the groundwater arose from surface water sources???

Again, this is a paradigmatic issue. Based on my extensive review of the historical literature on my doctoral topic, my conclusion is that a paradigm shift toward reductionistic determinism spanned the mid-20th century, likely especially related to various ramifications of World War II. I summarized one example of early 20th century perspectives on watersheds/catchments in my third blog post, How Watersheds Relate to Groundwater.

A bit later but still early in that century, Oscar Meinzer led the first USGS investigations of groundwater, recognizing early on the existence of bedrock aquifers, how they enable artesian and other springs, and diagramming various ways that groundwater exists within bedrock (Meinzer 1923 a, b, 1927a and 1942) – long before plate tectonics made evident how seismic forces fracture bedrock. Echoes of those early diagrams are reflected in more recent USGS diagrams, such as one offered on Surface-Groundwater Systems in a Holistic Water Cycle. Meinzer demonstrated the importance of interdisciplinary investigations to water resources in “Plants as indicators of ground water” (Meinzer 1927b).

Meinzer’s observations were not refuted, but rather built upon to elucidate groundwater hydrology, but it would seem that the engineers at DWR, among others, have forgotten (most of) those early insights.

3.2 Recommended Action 2.1 — Improve Infrastructure and Promote Long-Term Management.

. . . Identify and evaluate opportunities to expand surface and groundwater storage capacity in the state. . . .

Goal 3 — Restore Critical Ecosystem Functions

California is one of the world’s great biodiversity hotspots. Anthropogenic influence — water management included — has historically impacted natural resources; and environmental protections for many species has impacts on water management.
Recommended Action 3.1 — Address Legacy Impacts

With respect to all of the above, one important legacy impact that should not be overlooked is the widespread decimation, diminution and narrowing of riparian zones. As I completed my doctoral dissertation I assumed, since the importance of the detention storage functions of healthy riparian zones a.k.a. “streambank storage” to baseflows had been articulated long ago, e.g., Kondolf and colleagues (1987), Ponce (1989), Ponce and Lindquist (1990a,b,c), that others would have recognized that in calls for expanding riparian zones.

Not long after my doctoral committee approved by dissertation I offered a poster at the CALFED 5th Biennial Science Conference in 2008. My poster, which was mostly ignored by that audience, included nascent versions of the annual rangeland restoration concept illustrations that now appear on the Rainfall to Groundwater page, What’s in it for ranchers?

Since the concept of baseflow augmentation by streambank storage had been documented nearly twenty years prior, I had figured that my concept of uplands restoration was the only new aspect and that streambank storage needed no further promotion. But upon scrutinizing the presentation and poster categories assembled for that conference, I discovered that riparian zones were considered only with respect to their functions as habitat or in water quality amelioration – nothing about water quantity whatsoever. Hence the holistic restoration concept graphics on the Rainfall to Groundwater Front Page

Fast-forward ten years and that error of omission still applies. A case in point is DWR’s draft and final Water Available For Replenishment (WAFR) report, wherein there is no consideration at all of how streambank storage contributes to groundwater sustainability.

My dissertation was inspired by analyses of a GIS database I developed around the turn of the millennium compiling the status and conservation issues of historical steelhead populations on streams and watersheds from Point Reyes southward through San Diego County. While baseflow augmentation is, or should be important for human water resources the initial impetus for my work was restoring/improving habitat for steelhead.

Holistic restoration of both catchment uplands and riparian zones can do much to support habitat functions required by anadromous fish – see What’s in it for steelhead & salmon? and other species – see What does Rainfall to Groundwater offer for vernal pools?
3.2 Recommended Action 3.2 — Facilitate Multi-Benefit Water Management Projects.

Pursue large-scale multi-benefit projects that efficiently address multiple public needs, such as the reduction of flood risk and the recovery of fish and wildlife populations.

Recommended Action 3.3 — Quantify Natural Capital.

The Rainfall to Groundwater approach is absolutely a win-win-win proposal. Please see all the pages in the Ecohydrological Economics section of my site, along with the pages linked therein.

I don't have the resources to quantify all this, but I certainly encourage any and all interested to have a go at it, furthermore to compare in a cost/benefit analysis with other proposed strategies, like Flood MAR.

Respectfully,

Verna Jigour, PhD.

Citations


http://ponce.sdsu.edu/baseflow_augmentation.html


http://ponce.sdsu.edu/aridlandsbaseflowaug391.html

http://ponce.sdsu.edu/watershedplanbaseflowaug313.html