NATURAL RESOURCES DEFENSE COUNCIL

September 27, 2011

Fethi Benjemaa
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Sacramento, CA 95814

Sent via email to: jemaa@water.ca.gov

RE: Comments on Quantifying Agricultural Water Use Efficiency

Dear Mr. Benjemaa:

NRDC strongly recommends that the Department's methodology for quantifying water use efficiency should include crop production and economic efficiency methodology, in addition to efficiency quantified by measurements of water use by crops. We appreciate the Department's investigation of these metrics, and we strongly encourage the Department to include such metrics in the final report. Given the value of California's scarce water resources, crop production and economic efficiency metrics provide very useful information for farmers, districts and policy makers in assessing economic sustainability, improvements to irrigation practices, crop choices, deficit irrigation, and broader socio-economic benefits and costs.

In particular, we encourage the Department to explore metrics based on "average productivity of applied water" as defined in the Department's September 16 discussion paper. This metric can be used to compare inter-year crop production on the same field/district, or to compare production between fields or districts. While crop production can be affected by factors other than water use (e.g., disease, pests, etc.), this metric is unaffected by crop prices and provides useful information, particularly when averaged over longer periods.

With respect to the quantification of water use efficiency, we encourage DWR to focus primarily at the field or district level, using the equations below. These are similar to the equations for consumptive use fraction proposed by the Department on Attachment D of the August 8, 2011 meeting materials, and this approach is also similar to the analysis provided in the comments by Summers Engineering:

$$\text{Field level agricultural water use efficiency} = \frac{\text{Crop evapotranspiration}^{1} - \text{effective precipitation}}{\text{Applied water (surface water diversions+ GW pumping)}^{2}}$$

[1] It may be more appropriate to use crop transpiration, instead of crop evapotranspiration, for these equations. In addition, water use for frost protection, salinity leaching and other uses not intended for plant uptake would not be included in this equation.

[2] At the field level, applied water would be measured by water at the farm gate, and would not include conveyance losses upstream of the farm gate.

$$\text{District level agricultural water use efficiency} = \frac{\text{Crop evapotranspiration - effective precipitation}}{\text{Applied water (surface water diversions + GW pumping)}^{3}}$$

We recognize that in addition to the fraction of water actually consumed by crops, there are other consumptive and nonconsumptive uses of water associated with agricultural production. However, we believe that these uses should not be included in the numerator in these equations, since it is not actually consumed by plants. This would include water used for salinity management, temperature management, straw decomposition, or similar uses. As the Department and ASC members seemed to recognize at the September meeting, there are no objective standards for measuring what level of water use for such purposes is efficient, and it cannot be the case that *whatever* water is used for these purposes is both essential and efficient. Equally important, this water is not consumed by crops and may not be necessary to producing these or other crops (for instance, DWR has acknowledged that mechanical removal methods may be available as an alternative to using water diversions for rice straw decomposition).

Some of these ancillary agricultural water uses can be beneficial, but it is important that the Department's report also recognize that there can be substantial non-beneficial uses and adverse impacts as well. In our view, these non-crop uses are appropriately part of a calculation of reasonable and beneficial uses, which is a separate and distinct question from water use efficiency. Thus, in some cases inefficient or marginally efficient agricultural water use can contribute to some positive benefits (e.g., groundwater recharge, wildlife habitat), in some cases it can result in environmental harms (e.g., surface and groundwater pollution, increased water diversions), and in some cases it results in economic inefficiencies (growers paying for water that is not used by them, but is used by other growers). These questions are properly part of an assessment of reasonable and beneficial uses, but not of agricultural water use efficiency *per se*.

Moreover, in order to accurately assess the amount of water going to these ancillary uses using a water balance approach, one must first assess the fraction of water actually taken up by the crops. Thus, while a broader analysis of water balances at the district level is a very worthwhile objective, assessing the fraction of water used by crops is a necessary prerequisite to such an analysis and is the appropriate basic measure of agricultural water use efficiency. In addition, the water balance approach is far more complex and difficult to assess, requiring far more quantitative measurements, as well as inviting subjective assessments of whether particular water uses beyond crop use are beneficial or harmful. In contrast, the far simpler methodology we have proposed above, building off of DWR's first methodology on Attachment D, focuses on crop evapotranspiration, effective precipitation, applied water, and conveyance losses.

Finally, measures of distribution uniformity or conveyance losses can be useful tools in helping farmers assess their own practices, but by themselves, they fail to accurately and effectively quantify agricultural water use efficiency. Distribution uniformity fails to capture the full measure of efficiency, without also measuring irrigation excess/deficit. Likewise, conveyance losses (diversions divided by farm gate deliveries) are an important part of the assessment of water use efficiency, but alone are not a sufficient measure of efficiency.

[3] Conveyance losses within the supplier's distribution network would be included at the District level, as would the offsetting effects of tailwater recapture and redelivery by the supplier's facilities.

Thank you for consideration of our views. We regret having to miss the coming meetings of the Subcommittee, but we will continue to follow the proceedings closely, and we would be happy to answer any questions staff may have with respect to these comments.

Sincerely,

Doug Obegi
Staff Attorney
Natural Resources Defense Council