Public Comment
Agricultural Expert Panel Draft Report
Deadline: 8/7/14 by 12:00 noon

State Water Resources Control Board
ILRP Expert Panel

July 10, 2014

re: public comment on the draft report

Dear Panel and Board Members:

Please accept the comments below for inclusion with public comments to the Agricultural Expert Panel Draft Report to the State Water Resources Control Board.

Items in bold italics reference sections of the Draft Report.

Programmatic Recommendations from the Agricultural Expert Panel

3. Grouping of individual fields: Item "Z" in the section entitled ***Key Points of the Panel Related to the Specific Questions Posed by the State Water Board Staff***, dealing with reporting units, suggests an additional aggregation criterion of similar soils compared to this entry. Neither the criteria suggested in "Z" nor the criteria in this section are sufficient. Fields differ as well in climatic parameters as they do in soils. This is especially true of valleys, such as the Salinas and Llagas Valleys, that open to cool water bodies. These and similar valleys have steep climatic gradients, and the concept of "general geographic area" is correspondingly weaker. A given proportion of error in irrigation scheduling results in greater leaching in even slightly warmer areas as Et_{crop} increases.

Soil map units very commonly contain unidentified inclusions of other soils up to about fifteen per cent. It is to be expected that some fields identified as being composed of similar soils will in fact include dissimilar soils. Inclusions can be expected to differ in hydraulic conductivity from the mapped soil unit. It is also to be expected that many fields span more than one soil and their inclusions.

Soil hydraulic conductivity is the most highly variable of all the soil parameters. Please reference Nielsen and Biggar, "Spatial Variability of the Leaching Characteristics of a Field Soil" in either Hilgardia or Water Resources Research, and Nielsen and Vieira in the Soil Science Society of America Journal. Even within soils regarded as relatively uniform in texture, as the authors cited above demonstrate, soil hydraulic conductivity varies widely over fairly short distances.

Growers generally irrigate to the driest area of a field. Doing so makes

financial sense insofar as a field receives the same investment in seeds, fertilizer, pesticides and labor in all its subunits, carries the same share of capital investment, and is expected to generate similar revenues. The argument for irrigating in such a manner, however, is nearly irrelevant when the constraint is to minimize leaching of nitrate, for irrigating to the driest area of a field implies all other areas are irrigated to some extent excessively. Under such a constraint, the individual field may be too large an area to be encompassed by a single irrigation program. Drainage also is exacerbated in vegetable crops by the high (less negative) potentials at which soil water is maintained.

The intensity of spatial variation of soil hydraulic conductivity suggests the individual field is a more justifiable unit for reporting than is an aggregation of fields of some unspecified similarity. Indeed, no similarity in the major governing parameter of the spatial distribution of hydraulic conductivity can be said to exist. Similar to hydraulic conductivity variations, spatial variation of infiltration rates is high.

It may be argued that if all is chaos in infiltration and hydraulic conductivity, then aggregating fields for reporting purposes is justified. However, the influence of areas of high hydraulic conductivity in governing irrigation frequencies and amounts and the variation in the proportions of these areas in fields mean any similarity in irrigation characteristics between fields is purely random, and that the limiting aggregation criteria beyond which a field would not be included would not be possible to specify in a non-arbitrary fashion. Additionally, the basic unit of irrigation programming is the individual field.

3.1 Essential Background Concepts

4 b: The cited change to drip irrigation may be of limited significance for nitrate leaching. Et_{crop} remains unchanged as do crop N requirements. Even with greater N uptake efficiency with drip irrigation, localized high water content of soil directly below emitters coupled with the disproportionate increase in hydraulic conductivity with increasing water content and with the accelerated transport of anions relative to cations create sufficient opportunity for leaching fertilizer whenever irrigation exceeds crops' water requirements. Referencing comments above, irrigation in excess of water requirements in most areas of a field is systemic.

4 c: Inference from fertilizer sales is dubious. Organic methods of fertilization are capable of adding plenty of nitrate to the soil solution, there

to be leached. Consider the additions of N resulting from plowing out a field of alfalfa.

3.2 Key Points and Recommendations by Panel

3.2.1.i: "Signal attenuation" suggests a reduction of the amplitude of the signal. Total load from a given pulse might not differ even though the signal is attenuated.

3.2.1.iii: The Panel should not recognize that the Regional and State Water Boards have limited resources. The problems being discussed here are as political in nature as they are technical. It is up to the Boards to make their case for an increase in resources to the Legislature.

The concepts of risk discussed in 3.2.1 are unnecessarily limited in their scope. All N applied in excess of plant requirements ends up somewhere, to a significant extent partitioned between aquifers, water bodies and the atmosphere. Reduced forms of N in the atmosphere are outside the scope of the Water Boards, yet these Boards share in the Governor's global warming initiative.

3.2.2.iii: The example of Dr. Hartz' recommendation points out that a lot of information is known about the nutrient needs of crops in California; enough to set standards for fertilization of most crops, with some excess fertilizer permitted for insurance purposes. Several decades of grower education campaigns have taken place throughout the state, arguably resulting in this panel. I would like to suggest that growers need educational programs significantly less than they (and the state) need a standard with which they may comply. Growers will rise to the mark if an enforceable standard exists. This is, admittedly, a statement of faith. It is also the only program that has not yet been tried.

3.2.3.i: 3.2.3.iii.I. states "The only way to reduce nitrate deep percolation … is to reduce the volume of deep percolation water (irrigation or rainfall) ..." [ellipses mine]. The Panel should recognize that robust information exists or will shortly exist for verification of irrigation water application. All irrigation districts and some groundwater districts must report farm gate water deliveries to DWR. Et_{crop} may be estimated sufficiently well at fifteen meter square resolution from the multispectral imagery of Landsat 8. Farm gate deliveries minus Et_{crop} approximately equals excess irrigation (not considering leaching fractions) - to be partitioned between runoff, subsurface transport and deep percolation.

The discussion of the application of management practice plans in the box in ***3.2.2.i*** mentions that the data should include the distribution uniformity of existing irrigation systems. However, the Panel also notes in its key points that the distribution uniformity is not time invariant. (I would also note also that DU is generally determined by a single sample.) The Panel's position prioritizes uniformity of water application over uniformity of Et_{crop}. Evaluation of variability of Et_{crop} at fifteen meters square resolution and commonly at a frequency of two and one quarter weeks (Landsat 8) may be a better method compared to DU.

In sum, robust application of regulatory attention on irrigation is a reasonable initial step. Adequate tools exist in the forms of pesticide use reports, satellite multispectral imagery and farm gate water delivery reporting. Application of these tools would provide an encouraging context for more educational programs dealing with fertilization and management plans.

Respectfully submitted,

Bob Siegfried
Carmel, California