The Future of Agriculture
In the
Central Valley of California[1]

I am extremely honored to present the lecture this year in memory of Anne's career-long dedication to water law and policy.

Anne and I are of the same generation of the water community and share certain foundational roots. We both worked in Jerry Brown 1.0; she as staff to the Governor's Water Rights Commission and I as the Undersecretary of California Department of Food & Agriculture and later a member of the California Water Commission.

[1] Presented by Daniel M. Dooley, Principal, New Current Water & Land, and Of Counsel at Bolen Fransen and Sawyers LLP, to the Anne J. Schneider Lecture, April 29, 2015 at the Crocker Museum in Sacramento, California

Consequently, when the Steering Committee inquired of my willingness to make this presentation, I eagerly accepted.

Please recognize that the thoughts I express this afternoon draw equally upon my experiences in government, farming, practicing water law, and serving the University of California.

Some of my expressions are simply philosophy at no extra charge (a line stolen from one of my early mentors, Stan Barnes).

None of these thoughts are intended to be indicative of the views of my current clients or partners. They may agree in whole or part, but candidly, I decided asking for forgiveness after the fact was a more prudent direction than asking for permission beforehand. If I

approach some of you for employment in the coming weeks you will know my decision was in error.

In order to understand the granularity of this talk it is important to understand who I am. I am a policy wonk. I was raised on and managed the family farming enterprise in Kings and Tulare Counties. The son of a first cousin still operates the business. I represented well in excess of a million acre-feet of average annual deliveries as a lawyer. I oversaw the work of the California Institute for Water Resources and many cooperative extension specialist and advisors working on water related issues while at the University of California. It is against this eclectic background that the forthcoming remarks were fashioned.

My principal thesis is that we will witness substantial restructuring of agriculture in the Central Valley (the San Joaquin in particular) between now and 2050. The restructuring will have corresponding impacts on the rest of the State as well.

There are and will be many drivers of this change, including, but not limited to, climate change, less reliable surface and groundwater supplies, groundwater management activities, and continued efforts to effectively balance allocations of water for agricultural, urban and environmental purposes.

Some of the change will be fueled by the outdated political and administrative infrastructures that continue to demonstrate difficulty finding reasonable and feasible solutions to some our most vexing water

and environmental problems. Conditions may well force changes to some of these outdated policy and regulatory constructs.

I will briefly look backwards at some reasons we are in our current circumstances in order to provide context for my forecasts. I will identify some of the overindulgence and recent policy changes that will drive the restructuring. I will conclude with my predictions about the changes that will occur in Central Valley agriculture.

Along the way, I will identify some of the policy and market changes that could, and hopefully will, soften the blow of the inevitable transition facing agriculture.

So what has happened in the last 25 years?

There is a growing recognition that climate change is altering the hydrologic assumptions upon which our water supply infrastructure was developed and has been operated. Climate models predict a continuation of significant change in California climate. Warmer temperatures have occurred and are expected to continue.

The models forecast, and recent experience validates, that a trend towards greater frequency of extreme events will continue. We are seeing new terms developed to describe these events. For example, an emerging area of research revolves around forecasting the occurrence of "atmospheric rivers", which as I understand it is a term to describe short-term, highly concentrated precipitation events.

Climate trends have had and will continue to place extreme pressures on water conservation and conveyance infrastructure in all parts of California and the Central Valley in particular. They will force us to operate our various water projects differently and to consider new and innovative investments.

To the climate change doubters, I suggest the things that need to be done to adapt to changing climate have independent value and will improve water management and farm productivity regardless of forecasted climate change.

Many environmental requirements have ramped up and increased in intensity during the last couple of decades or more. They have addressed protection of

terrestrial and aquatic species and the maintenance of water quality.

Clean Water Act requirements have increased (Delta requirements, Irrigated Lands to name a couple); various biological opinions have imposed additional obligations on water uses, particularly those reliant upon Delta exports; the Central Valley Project Improvement Act dedicated 800,000 acre feet of supply to environment uses; and the San Joaquin River settlement restored flows to the river and required the dedication of water to do so.

Recent revelations about groundwater quality pose additional obligations down the line, particularly for areas of concentrated dairies in the San Joaquin Valley.

There has been a transition in cropping patterns ramping up in earnest in the 1990s that has had the effect of "hardening" water demand in agriculture.

In 1993, fruits and nuts constituted $5.7B of a $19.9B California agricultural economy. In 2013, fruits and nuts were $20.8B of a $44B California agricultural economy. These statistics demonstrate the growing significance of fruits and nuts to the overall California agricultural economy.

By contrast, field crops constituted $2.8B of the California agricultural economy in 1993 and grew to only $3.3B in 2013. Proportionally, field crops became far less important to California over that same period.

In 1980, our own farming operation was primarily cotton, alfalfa and forage crops. Today it is walnuts,

pistachios, canning tomatoes and custom farming for neighboring dairies. We still grow forage crops, but as a much smaller proportion of our overall operation.

Even our neighboring dairies have diversified their operations by planting almonds and pistachios.

Counties in the Southern San Joaquin Valley continue to be agricultural powerhouses even in light of less reliable surface supplies and declining groundwater tables. Fresno, Tulare and Kern counties have remained in the top five California agricultural counties throughout the period 1993 through 2013.

In more recent years, Kings, Merced, Stanislaus and San Joaquin counties have found their way into the top 10 agricultural counties in California.

While no Sacramento Valley County is or has recently been a top 10 county, the region is by no means an insignificant contributor to California's vaunted status as an unparalleled agricultural engine.

This success is counter-intuitive to the public narrative we hear constantly about the existence of a regulatory drought. For those of you who do not drive up and down the San Joaquin Valley, you have been spared the constant visual reminders that claim politicians are responsible for all or most of the regions problems.

It is true that in some areas of the Southern San Joaquin Valley fewer acres are being farmed than in 1993. It is also an undisputed fact that the value of agricultural production in those areas has risen

dramatically as a result of the shift in cropping patterns noted above. This trend will continue.

The standing of these Valley counties also speaks to the tremendous resilience and adaptability of Central Valley agriculture.

Population growth in the 8 county San Joaquin Valley has grown from nearly 2.5M 1993 to just under 4.0M in 2010. This same region is expected to have a population of 6.7M people by 2050. Continued pressures on resource allocations will be fueled by such population growth.

There is another important factor to consider. Milk and cream (dairy) values have gone from $2.6B in 1993 to $7.6B in 2013.

Much, if not all, of the growth of dairies has occurred in the Tulare Lake basin of the San Joaquin Valley. Large new dairies have been constructed, many on more marginal lands and in some cases on lands that had never been farmed. Regulatory requirements have necessitated greater acreages per animal unit for the purposes of better nutrient management.

Now these lands are growing 2 to 3 forage crops a year in order to manage nutrients and to supply feed for the dairies. Most of these large new dairies rely upon groundwater and average between 5 and 6 acre-feet of water per acre every year. This development is an additional stressor on the continued sustainable use of groundwater resources in the region.

Another factor affecting the future of agriculture in the San Joaquin Valley must be discussed – groundwater management. The Department of Water Resources estimates that the average annual overdraft in the Tulare Lake basin is between 1MAF and 2MAF per year. Over the long-term this is not sustainable. The overdraft is a factor of many of the stresses noted above.

It is evident that there are many growing demands on water that historically supplied a more commodity-based agricultural economy in the San Joaquin Valley and to a lesser but not insignificant extent in the Sacramento Valley.

All of these factors (climate change, hardening of agricultural demand, increasing demands for

environmental purposes and the fastest population growth of any region in the state) have, and will continue to, influence the nature of Central Valley agriculture.

These factors combined with the Sustainable Groundwater Management Act of 2014 assure that conditions must change.

Without management, groundwater basins will come into balance through a very messy and chaotic process. Without management, impacts will be disparate and inequities rampant.

Under SGMA, local areas are required to manage the process to sustainably use groundwater or see the State step in to do so. This is another huge impetuous

for locally initiated change, which will hopefully bring more order and equity in achieving sustainability.

The few public water transactions and the many private transactions with which I am familiar indicate that the market value of water is on a steep upward trend.

Economists have for years argued that the market should determine the value of water. Instead the price for most water is determined almost exclusively by the cost of the infrastructure to deliver it to the customer, not by the value of the water itself.

Spot market prices have risen to levels never before thought possible. Many of these prices have been paid by farmers and reflect an ever-increasing

ability of farmers to pay more for incremental water supplies.

This is reflective of the fact that farmers increasingly see water as an asset rather than an input. This change in how water is viewed will also alter how water is managed.

So what changes will occur over the next 3 decades or so? Well my list is long and is not likely to be well received in some communities. Nonetheless here it is:

- As surface and groundwater supplies are brought into balance, there will be approximately a 15%-20% contraction in agricultural water use in the 5 county (Madera, Fresno, Kings, Tulare, and Kern) southern San Joaquin Valley.

- A substantial part of this contraction in use will be achieved by implementation of SGMA at the local level or related and corresponding groundwater adjudications. There has been a profound and rapid change in attitudes about the need to more sustainably use groundwater, particularly in areas of decreasingly reliable surface supplies;
- The use of surface and groundwater resources will be far more integrated across the entire Central Valley, permitted by more flexible regulatory and administrative infrastructures.
- This will require consideration of policy changes that incentivize more efficient water

use in order to market conserved water to others with unmet demand;

- As a result, water use Valley-wide, regionally, in sub basins and watersheds, within water agencies and on farm will become increasingly more efficient. Increasing scarcity and much higher values for water will foster this trend.
- As water values rise, incentives to more efficiently use water in the Sacramento Valley will rise with the prospects of marketing conserved water.
- Those in the San Joaquin Valley growing field crops will likely recognize that their water has far greater value than the crops grown with it

or the large investment necessary to convert to higher value crops;

- Water markets will be far more prevalent, open and transparent. SGMA will fuel groundwater markets in sustainably managed sub basins.
- Assuming Delta conveyance issues are stabilized, there will likely be more transfers from the Sacramento Valley causing fallowing or groundwater pumping depending upon circumstances. This will result in some, albeit more modest than in the San Joaquin Valley, restructuring of Sacramento Valley Agriculture;

- Agriculture will continue to evolve. Fewer acres of crops will be grown and the shift to higher value fruits, nuts and vegetables will accelerate.
- Crops likely to be grown less are field crops, in particular forage crops supporting animal agriculture.
- It is likely that there will be a contraction in the dairy industry driven both by scarce expensive water and water quality issues.
- In the Sacramento Valley, farmers will be making annual decisions based upon the comparative value of using their water to grow crops versus selling some of their water;

- The effect on local economies will likely be minimal because of the shift to fewer commodity-based crops to crops with more value added potential. This will foster more processing and shipping opportunities.

It will be critical that policy leaders resist the temptation to tell farmers what to grow. California farmers are the best in the world at adjusting to market trends and need little help choosing crops to grow.

There are many, many details embedded in the results of this "Tarot Card" forecast of the future. One of many is how are all of the necessary investments required to manage this transition are going to be funded.

There will never again be enough public capital to do all of the projects necessary to adapt to changing climate conditions, provide facilities to more effectively facilitate transfers and to fully integrated the management of surface and groundwater.

It is time to invite private capital to the table and engage in an honest conversation about what is necessary to attract private equity. It seems to me to be a critical component of a long-term effort to provide the necessary sustainability of water supplies that provide a vibrant agriculture and state economy.

Thank you for the opportunity. I look forward to your questions.