SPDSS Consumptive Use Technical Peer Review Committee Meeting, March 31, 2008

Meeting Minutes

Meeting Attendees (according to sign in sheet)**:**

Last Name	First Name	Organization
Ackerman	Ron	Equity in the South Platte
Alaa	Aly	Intera
Altenhofen	Jon	Northern Colorado Water Conservancy District
Alvarado	Ray	Colorado Water Conservation Board
Ault	Dan	Deere & Ault Consultants
Bennett	Ray	Colorado Division of Water Resources
Brengosz	Mary Kay	Sprunk Water Engineering
Decker	Jim	Former well user
Eisel	Leo	Brown and Caldwell
Ferrell	Claudia	Equity in the South Platte
Ford	Barbara	HRS Water Consultants
Frank	Joe	Lower South Platte Water Conservancy District
Graeme	Aggett	Riverside Technology Inc.
Gullapalli	Lavanya	Brown and Caldwell
Halepaska	John	Halepaska
Hein	Michael	DWR
Kammerzell	Gene	Equity in the South Platte
Kaufman	Lance	Orphan Wells Of Wiggins
Kroeker	Bruce	TZA Water Engineers
Longenbaugh	Bob	Retired Engineer
Martindale	Dee	Equity in the South Platte
Martindale	John	Equity in the South Platte
McBride	Tom	Adams County Extension. Colorado State University
Miller	Calvin	Colorado State University
Mitisek	Mark	Leonard Rice Engineers
Moore	Andy	Colorado Water Conservation Board
Palizzi	Deborah	Equity in the South Platte
Phelps	Dorothy	Equity in the South Platte
Simpson	Hal	H.D. Simpson Consulting/CDM
Sobeiski	Kara	Leonard Rice Engineers
Stadjuhar	Laurel	Bishop-Brogden Associates
Thompson	Gary	WW Wheeler
Wilson	Erin	Leonard Rice Engineers
Winter	Bob	Weld County Farm Bureau
Yu	Chunming	Colorado Division of Water Resources

Meeting Minutes

The following table summarizes the questions asked and responses provided during the meeting and via follow up email, as well additional responses from the SPDSS team providing more information or resources. An acronyms list is provided following this table.

ID	Comment or Question, Answer, and Additional Response	
1	**Q**	Did you do comparison of rural and urban NOAA stations?
	A	Turned out that almost half of stations weren't in urban areas, so did not have to do a lot of analysis for comparison or adjustment.
	Additional Response	We began an investigation, specifically comparing temperature and estimates of PCU at the NOAA station and the NCWCD station in Sterling. We also reviewed climate variation seen by Dr. Smith between lysimeter sites and the NOAA station in Gunnison. We obtained specific site information, including climate station photographs, for the key NOAA climate station selected for the SPDSS study. Because nearly half of the stations were in a rural environment, a decision was made to use NOAA stations without adjustment for the basin-wide analysis.
2	**Q**	Re: images for 2001
	A	State chose 2001 because it was a good year for imagery based on number of cloud-free days
3	**Q**	What scale/resolution is the imagery used?
	A	Landsat is 30 meters; good for this application because it's reasonably low cost and good for regional level - there are sub-meter coverages, but more costly.
	Additional Response	Just recently USGS has made all Landsat data available for free. One potential issue is that they are using a different algorithm to process data - we are looking into the ramifications of this for irrigated lands mapping work
4	**Q**	In the first run through were there any patterns identified that were wrong that were corrected by ground-truthing?
	A	A lot of QC happens before the comparison; yes, early spring wet soil was getting misclassified as corn; with this work it is important to ground-truth this.
5	**Q**	Is there plan to replace information from Landsat if those satellites go down?
	A	NASA has a plan, but not until 2011+; working with state for other options; there are number of options because thermal sensor not needed for this work; MODIS could fill in, at lower cost, but would not be able to get to the resolution
6	**Q**	If satellite misses big rainfall, will I be charged for irrigating if it looks like I irrigated based on your coverage?
	A	Temporal limitations are every 16 days - if cloudy, then miss that day; sequence of imagery through the season is appropriate for this level of assessment. The purpose of the irrigated acreage assessment is not to measure ET, but to just say whether land was irrigated and by what crop type
7	**Q**	Are we missing out with looking at 2005 data?
	A	5 year cycle was selected because of costs, there are limitations
8	**Q**	What about 2005 when there were cutbacks in acreage because of well cutbacks, etc.? Isn't this resulting in limited crop irrigation?
	A	The original acreage was determined based on 2001 and not 2005

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9	**Q**	What about subsurface irrigation and drip irrigation? How would this process work for that?
	A	Would still be hard to achieve with higher resolution data with an optical approach like this. Note that this work consisted of hundreds of hours of time with users to verify maps - have 90% accuracy (typically 70-75%) because multi-temporal approach enhances classification accuracy.
	Additional Response	With future updates, we can do more ground-truthing to identify areas of drip irrigation.
10	**Q**	Did you identify areas that get water from two different ditches?
	A	Yes, the interviews with the water users identified areas that tied multiple water sources to a parcel.
11	**Q**	In interviews - did you attempt to differentiate between conjunctive GW use and surface use?
	A	Yes - and this is something that interviews help a lot with because not info you can get from coverages
12	**Q**	Could you touch on how we were using well data/water rights to help with ground water supply?
	A	Existence of wells implies that there is water to supply to well; also if no wells when thought there was groundwater
	Additional Response	Wells were matched to parcels spatially and water rights were used to assign wells over time
13	**Q**	How do you discriminate between types of corn in your analysis - specifically sweet corn versus corn silage?
	A	Spectral resolution is not fine enough to discriminate between types of corn - this is a known limitation. We rely on ground-truthing and input from water users to distinguish.
14	**Q**	Change in irrigation methods changes timing on return flows - so are Colorado farmers going to be locked in to irrigation method?
	A	In Washington state, using farm efficiency for entire state irrigated lands - it shows that SPDSS is far more advanced; these are good points but cannot resolve without much more money
	Additional Response	Irrigation method is defined for individual fields in each acreage assessment year (1956, 1976, 1987, 2001. 2005), therefore the analysis shows method changes over time.
15	**Q**	Will coverages pick up differences in soil type and water used?
	A	There are indexes that could help further differentiate between soil characteristics - again, much greater cost for this. RTi's effort was to identify whether lands are irrigated; soil types and how they affect irrigation CU are addressed in the consumptive use model through efficiency calculations.
16	**Q**	Big movement to drip for crop health, so this should be taken into account - does not affect CU, but does impact timing, so should be considered in model. How does this account for drip?
	A	It currently doesn't. Would require more ground-truthing. Good thing about SPDSS is that it changes all the time - so maybe would be time to do another irrigated acreage
	Additional Response	Knowing that this occurs will allow us to ask the right questions during ground-truthing of future acreage assessments
17	**Q**	Concern that farmers are not locked into crops so that there is flexibility if technology and consumer demand changes.
	A	This is planning tool, so this is not locking anyone into anything; will change as get feedback from users group; CU is estimated for planning purposes

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18	**Q**	How do we maintain this data for others to use - map or digitize? What scale? Available for engineers to use?
	A	You can get it from CDSS Map Viewer and you can query on line. You can get the memos on-line. Yes, available now for use.
19	**Comment**	Good point that this is regional, but know that people will apply to parcels, so warning to add a lot of caveats to tools that they are regional, and cautions with how to apply on a smaller scale
20	**Q**	Example of hail in 1986 or 87 - need appropriate data for crop loss
	A	EW - Would acreage have been identified as irrigated in ag stats survey? JM - Depends on time of year; but would be a good data point to see crop loss - happened in 86,87 where Weld got wiped out RA - so what would you have said in the 87 survey? JM - Haven't had that kind of devastation and wasn't here in 87 EW - if you put any water in that year - would probably be considered irrigated - but with surface water, would see records, but not as easy to know historically with groundwater. Currently with pumping records, this would be reflected.
21	**Q**	Didn't you include GW sprinkler?
	A	Yes
	Additional Response	Both water source(s) and irrigation method are assigned to each irrigated parcel.
22	**Q**	Where did you take in consideration the rains/water bearings for weather?
	A	Effective precipitation is considered to reduce the amount of water crops need from irrigation sources.
23	**Q**	We have a mutual ditch company, and as of 4/1 we will start to divert; no neighbors will divert; but if you look at diversion records, will look like there are several thousand (?) acres that will look like they are being diverted but will not actually be used for irrigation
	A	This is basin-wide analysis, but is detailed enough to be ditch-wide analysis. It is not detailed enough for parcel or farm level. Some of the diverted water will be shown as consumed, and rest will be quantified as return flows. It is a starting point for consultant to take this and make it more detailed.
24	**Q**	Water diversion in the spring will be just spilled back to the river. The tree farms will be taking water, but the corn farmers will not. So if you are only using diversion records, does this overestimate the actual supply that is getting to the river?
	A	No, crop demand will determine whether diversions are used or returned to the river
	Additional Response	The model will see that there is a CU demand for the tree farm acreage, but not a CU demand for the corn acreage, therefore there will be more return flows

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25	**Q**	How do you account/deal with reservoirs? Did you talk to operators?
	A	We relied on end-of-month contents in HydroBase to estimate on-ditch reservoir releases and we talked to reservoir operators.
	Additional Response	Ditch system memoranda, detailing information about the larger "key" reservoirs in the basin, are available on the CDSS WEB site. Information includes operational criteria.
26	**Q**	How do you handle augmentation water diverted at the headgate? How do you account for this?
	A	It's measured back through augmentation stations and the diversion records are coded according to use. This will be further refined during the surface water modeling effort.
27	**Q**	GASP records - are inaccurate (overestimating)
	A	The SPDSS team has decided that historical power records are not very good for application. Jack Oder recommends not using the GASP pumping records.
28	**Q**	Recommends that we look at the pumping data from the Bureau of Reclamation work on Narrows. Compare their aggregate pumping data to ours.
	A	Could be good as cross-check, but their estimates are not the same as our estimates. It's not that useful because it's not available for individual wells.
29	**Q**	Did you take time of year into account when calculating conveyance losses?
	A	No, conveyance efficiency is not variable; we use one value for the entire season.
30	**Q**	Irrigation efficiencies: who developed the 60/80 standard?
	A	This is the standard used in most change cases.
31	**Q**	The 60% for flood should be cut in half - it's too high.
	A	60% for flood and 80% for sprinkler are maximum efficiencies. If you apply more, actual efficiencies in the model will be lower.
32	**Q**	Can you vary ground water application efficiency?
	A	If pumping records are available, ground water application efficiency will vary. If not, maximum application efficiency will be used to estimate pumping values.
33	**Q**	Can you incorporate subsurface drip into this?
	A	Yes, efficiencies associated with drip irrigation can be integrated in future.
34	**Q**	The 60% efficiency is very high
	A	These are maximum efficiencies, can vary with actual water use.
35	**Q**	You can calculate efficiency based on the length of field and other parameters? There are software programs that calculate this (SurMod).
	A	We could look into this.
	Additional Response	The SPDSS team reviewed this comment and determined that the basin-wide level of analysis does not warrant this detail.

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36	**Q**	You should use soil types to determine efficiency, not the South Platte "standard". The NRCS Furrow Design Handbook outlines parameters.
	A	We understand that soil types affect application efficiency.
	Additional Response	The SPDSS team reviewed this comment and determined that the basin-wide level of analysis does not warrant determining maximum application efficiency in more detail.
37	**Q**	Why do you call these "maximum"?
	A	This is the maximum you can achieve. The actual application may be much lower.
38	**Q**	Are you using weighted average for whole ditch, not by parcel?
	A	Yes, this is ditch-wide, and not at the parcel/share level. Ditch-wide average is suitable for this level of planning tool.
39	**Q**	How do you take into account the different losses between ditch water and well water?
	A	Ditch deliveries include a conveyance loss and an application loss, well pumping only includes an application loss.
40	**Q**	Does this include difference in evaporative losses between irrigation systems?
	A	Yes, the maximum application efficiencies account for the difference in evaporation losses.
41	**Q**	Do farms get credit if they are not that efficient?
	A	Yes, in model the return flow to river is estimated in efficiency calculations - model will maintain mass balance.
42	**Q**	Are we getting credit for the return flows?
	A	Yes, we are crediting this in a physical manner in that we're tracking water and not losing water, but not crediting administratively. Also Aurora is getting credit for their transbasin import return flows.
43	**Q**	How do you determine the allocation of the deep percolation to groundwater over the 1000x1000 ft groundwater grid?
	A	Non-consumed water is distributed over the irrigated acreage then spatially distributed to ground water cells.
44	**Q**	Did you take into account how many shares farms own when distributing diversion based on acreage?
	A	No, we allocated water based on acreage under each ditch because we had no data on share ownership
45	**Q**	Did you ever take a common sense approach and actually go look at a farm to see how it's really done?
	A	These are planning level studies. You and your consultants can take these tools and not have to start from ground zero, you can refine these.
46	**Q**	This is going to punish us - You have to do everything completely accurately - Will we be able to pump our wells this year?
	A	The basic data is and will bring of lots of benefit to farmers in the S. Platte. The models get lots of attention, but the data are the really important part. The models will be improved over time, but a high percentage of the money for SPDSS has been put into the data. We hear often that the data is saving people lots of money. The data is what will be valuable over time.
47	**Q**	Planning has to be accurate - example of using snowpack at 115% but it's a fluke year
	A	CCWCD has augmentation plan tools that will determine how much water can be used with increased snowpack - those are administrative tools, but these are planning level tools.

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48	**Q**	Where are these data stored? Will they be available to engineers?
	A	Yes, the data and analyses are available.
	Additional Response	Raw data, such as diversions and climate data, are available in HydroBase through the CDSS web site http://cdss.state.co.us/. GIS coverages of irrigated acreage, memoranda describing irrigation systems and estimates made for the consumptive use modeling are available on the web site as well. The StateCU data input files for the basin-wide consumptive use analysis will be available on the web site this spring.
49	**Q**	How could you call something deficit irrigation? I.e., how can you determine deficit irrigation when you have no pumping records?
	A	We currently estimate pumping to meet the full CU.
50	**Q**	You use many estimates.
	A	This is a basin-wide study; it can't do every farm and take all of the little differences into account. This is moving the data situation forward. We are getting lots more data. The data situation will move forward with new innovations like drip irrigation. This is a long term situation and you will see further improvement in the data.
51	**Q**	Can we convert the data model to an administrative tool in the future?
	A	This process has cut out lots of the costs that you would normally have to pay your engineer. Not the intention of CWCB to do a statewide augmentation plan.
52	**Comment**	Have more data now to start the water court process. Cuts out a lot of cost for farmer because of existing database.
53	**Q**	Why not include winter precipitation because if it decreases IWR by 4% and pumping by 6% , it's important
	A	It's not usually considered in change cases, so we initially did not include. We wanted to perform a sensitivity analysis to determine the impacts and help decide if we should include.
	Additional Response	The SPDSS Team has reviewed this recommendation and we will be considering winter precipitation in the historical consumptive use analysis.
54	**Q**	Why not include winter precipitation if it is based on the best science?
	A	We did not include it in order to be consistent with change cases.
	Additional Response	The SPDSS Team has reviewed this recommendation and we will be considering winter precipitation in the historical consumptive use analysis.
55	**Q**	Winter precipitation is being considered in change cases. It should be added in, because it's simple to add in. It would be more accurate.
	A	Yes, it could be added in. It will likely affect junior ditches.
	Additional Response	The SPDSS Team has reviewed this recommendation and we will be considering winter precipitation in the historical consumptive use analysis.

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56	**Q**	Is the preference to be consistent with local process or with best science?
	A	Referenced slide with development guidelines - being consistent one goal.
	Additional Response	The 38% effective winter precipitation was based on a study performed by B.W. Greb title Snowfall and its Potential Management in the Semiarid Central Great Plains. The study was based on field work in Akron, Colorado. Bob Longenbaugh also suggested reviewing CSU Winter Time Storage at Rocky Ford.
57	**Q**	There is no panel of independent experts to review this?
	A	Dr. Rick Allen from the University of Idaho has reviewed our crop coefficients and gave feedback.
58	**Comment**	We have peer review, the question is, are they independent? We will be putting out a paper on this. There are unresolved questions, for instance if we pay for it, is it independent?
59	**Q**	Do you have a suggestion on how to do independent review? Either paid or unpaid?
	A	No
60	**Q**	Were there enhancements made to diversion records in HydroBase?
	A	Yes, we reviewed records for diversions and coordinated with SEO personnel to correct identified errors.
61	**Q**	Why use pumping records from before 1956 when they were made more accurate in 1965 when rules were passed, and again in the 1970s?
	A	In general, we do not have pumping records for any time period. We are using well permits to help identify lands irrigated or supplemented with ground water.

Acronyms List

Acronym	Definition
AFY	acre-feet per year
CCWCD	Central Colorado Water Conservation District
CDSS	Colorado Decision Support System
Central	Central Colorado Water Conservation District
CU	consumptive use
CWCB	Colorado Water Conservation Board
DWR	Division of Water Resources
ET	evapotranspiration
GW	ground water
IWR	irrigation water requirement
LRE	Leonard Rice Engineers
MAF	million acre-feet
NASA	National Aeronautics and Space Administration
NASS	National Agriculture Statistics Service
NCWCD	Northern Colorado Water Conservation District
NNT	not nontributary
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NT	nontributary
PCU	potential consumptive use
PRC	Peer Review Committee
QC	quality control
SPDSS	South Platte Decision Support System
SW	surface water
USGS	U.S. Geological Survey