

Attachment A: Agricultural Demand TAG Comments Received through September 26, 2017.

Comment Number	Comment Author	Organization	Section Reference	Comment	Response
1	Tom Trout	USDA	2.2	(Diversion vs. CU): I feel ag demand should be quantified in terms of CU. Basing demand on diversions introduces complications and assumptions. The benefit of a diversion basis is not clear to me. (see additional comments in Email).	Thank you for your comments on this issue, and as indicated, basing demand on diversions does complicate the analysis. The SWSI Team plans to move forward in representing the diversion demand in the Planning Scenarios because it reflects the true amount of water necessary to meet the crop demand and also allows for future analyses of projects that may impact efficiency.
2	Tom Trout	USDA	3.2.1	(Planning Diversion Demand): I don't understand the question.	We apologize for the misunderstanding; the question was intended to ask whether the Agricultural TAG participants felt it was appropriate to represent the Agricultural Demand as the demand at the crop level or as the diversion demand.
3	Tom Trout	USDA	3.2.1.2	Might be an interaction between urbanization, efficiency, and crop type. Areas likely to be urbanized (Front range, Grand Valley...) may have lower efficiency irrigation systems (surface irrigation) and different crops than areas expecting and investing in long-term ag production.	Your comment provides a good perspective in that urbanization may occur on lands with less sophisticated irrigation operations or areas that produce lower-value crops.
4	Tom Trout	USDA	3.2.1.2	(Groundwater): Yes, it's appropriate.	Thank you for your support of the Ground Water Acreage Sustainability factor
5	Tom Trout	USDA	3.2.4	(Emerging Technologies): I feel there should be discussion of the impacts of emerging technologies in the SWSI report. However, this is complicated by the fact that diversion rather than CU is the target quantity. Most emerging technologies will not substantially reduce CU, and, where CU is water supply limited, they will likely increase CU, and thus reduce basin supply. It is important to make this point that increased efficiency will not result in additional basin water supplies.	There has been significant discussion surrounding emerging technologies and adjustment to system efficiencies in the Planning Scenario demands. Our experience supports your point; improving efficiencies, particularly on water short systems, likely increases crop consumptive use as opposed to increasing streamflow or basin supplies. The Agricultural TAG is discussing options on how to most appropriately adjust system efficiency in the Planning Scenarios. The Agricultural Diversion Demand methodology will be revised accordingly.
6	Tom Trout	USDA	3.1.1	I look forward to the day when Colorado adopts current technologies in CU calculations (eg. based on P-M rather than B-C).	We agree with your comment; the State is making strides in improving the quality and availability of daily climate data for use with the ASCE Standardized PM method, including constructing new climate stations in agricultural areas.
7	Terry Scanga	UAWCD	2.2	The use of the term "Agricultural Demand" assumes that there exists an agricultural water right when actually there are irrigation water rights but not agricultural ones. My suggestion is to change the terminology from Agricultural Demand to "Irrigation Water Right Demand". Truly we are dealing with the demand for water to fill irrigation water rights. Today many irrigation water rights irrigate turf grass, hemp, ornamental plants, or marijuana—These are not traditional agricultural products but represent water demands for irrigation. Recently the State Engineer promulgated a policy to clarify irrigation water right uses.	Our approach recommends basing the agricultural diversion demand directly to currently irrigated acreage and crop types, and calculating the amount of water that needs to be pumped or diverted to meet the full crop demand. The approach does not contemplate developing a demand based on decreed irrigation water rights. We are still considering what the most appropriate terminology is for describing this approach (e.g. agricultural diversion demand vs. irrigation diversion demand).

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8	Terry Scanga	UAWCD	2.2	The demand requirements to meet compact compliance needs to be addressed as part of the overall demands upon the irrigation water supply and should be analyzed as an integral part of meeting in State irrigation needs.	As discussed in the Water Supply methodology, the Arkansas River Compact will be considered when accounting for water availability in the basin to meet new demands or existing demands under climate change scenarios.
9	Terry Scanga	UAWCD	2.2	The Agricultural (or irrigation) Diversion Demand should be calculated based upon the amount of consumptive use water under a given right of which the holder has a reasonable expectation to receive. In the Arkansas Basin, there are more water rights than there is water to fill these rights at any given time. With this realization, we need to ask the question of junior water rights: Should the holders of junior water rights have a reasonable expectation of a full water supply to meet the irrigation water requirements for their crop? I believe the answer is no. Therefore, it is incorrect for the demand methodology to assign a 100% irrigation water requirement to junior water right's irrigated acreage. In the Arkansas Basin, I suggest two separate analyses on each major tributary. For example, on the main stem of the Arkansas, one analysis for water rights with a priority from 1884 and senior and another for water rights with a priority junior to 1884. Each major tributary would have different dates that divide relatively senior rights from junior rights for the calculation of the irrigation water requirement. Without considering the above and reducing irrigated acreage (no reasonable expectation of full supply by junior water right holders) I am not comfortable with the new approach to calculating "Agricultural Demand" or "Agricultural Gap". Agricultural Diversion Demand should be adjusted and consider new irrigation practices and also constraints such as junior decrees and by major tributaries.	There was significant discussion at the Agricultural TAG as to how the existing shortages experienced by many irrigators should be reflected in the SWSI analysis and results. Among the discussion, TAG participants indicated that existing shortages (i.e. "gap") should be summarized so that Basin Roundtables and planners have access to this data as new projects were developed. Your recommended analysis would get to the heart of this issue, although budget and schedule constraints do not allow us to perform these additional analyses. The Water Supply Methodology document, which outlines the agricultural "gap" approach, will be revised to note these concerns and bracket the agricultural "gap" between senior and more junior water rights in the Arkansas River Basin.
10	Terry Scanga	UAWCD	3.2.1.2	I do not believe we should delve into urbanization of irrigated lands.	Direction from the TAG participants indicated the agricultural diversion demand should reflect the impact from potential urbanization.
11	Terry Scanga	UAWCD	3.2.1.4	Augmentation water of wells for irrigation in the Arkansas Basin is primarily derived from trans-mountain supplies. To the extent this satisfies (supplements) water supplies for irrigation, it should be reflected in the analysis along with any constraints on the use of ground water to meet irrigation demands for crop irrigation.	Your point will be discussed with the primary augmentation providers in the basin (refer to the Ground Water Acreage Sustainability Factor, Section 3.2.1.4) to accurately reflect the impact to augmentation supplies across the Planning Scenarios.
12	Terry Scanga	UAWCD	3.2.1	Irrigation application efficiencies should be included in the analysis. In the Arkansas Basin, the changes in irrigated acreage from pre-1975 to present should be analyzed with adjustments for changes of water rights from irrigation to M&I.	The Agricultural Diversion Demand Methodology currently reflects the use of conveyance and irrigation application efficiencies to calculate the diversion demand. The document will be revised however to reflect the use of system efficiency information from a current period to capture the changes to application methods over time. The methodology already discusses the use of current irrigated acreage, assigned with application methods and crop types, for the analysis and will therefore capture conversion of acreage for municipal purposes.
13	Jack Goble	LAVWCD	2.1.1	Will the acreage irrigated in the Southern High Plains Designated Basin in southeast Colorado be included in this analysis?	Yes, the analysis will represent the irrigated acreage in Water District 66.
14	Jack Goble	LAVWCD	2.2	Are delivery system losses (i.e. transit losses in the river) being considered in this analysis? For example, if the ag. gap is determined by subtracting the agricultural diversion demand from the supply (presumably measured at a river gage(s) that measures runoff, but upstream of the ag. diversion points), are transit losses being accounted for? If not, should they be considered as part of the agricultural diversion demand since these losses are required in order to deliver the "supply" to the diversion point.	Thank you for your comment; the SWSI Team understands the importance of transit losses, particularly in the Arkansas River basin, and ultimately the water allocation models developed through the ArkDSS effort will include these losses. The Agricultural Diversion Demand Methodology, however, does not currently contemplate reflecting transit losses for the SWSI Arkansas River analysis. This simplified approach was recommended due to the variability of transit losses experienced in each stream reach between gage and diversion locations and lack of current models in the basin that can account for "what-if" Planning Scenarios such as the SWSI Update effort.
15	Jack Goble	LAVWCD	3.2.1.4	Consider also reaching out to the other two well augmentation groups in the Lower Arkansas Valley, CWPDA and LAWMA.	Your recommendation is noted. The team will reach out to these entities for their recommendations if budget and schedule allows.

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16	Jack Goble	LAVWCD	3.2.4	In response to the question posed at the end of this section: Any water "saved" in the Arkansas River Basin through improved conveyance of application efficiencies is not an actual savings since that water was likely historically lost back to the river as return flows and is still owed to downstream users, including Kansas.	The Water Supply Methodology addresses the need to consider irrigation improvement rules in the Arkansas River with respect to "saved" water if emerging technologies are implemented in the Planning Scenarios.
17	Ken Curtis	DWCD	5	It appears that budget and schedule will be limiting factors and could cause problems if CWCB attempts to much extra work. This may be most pronounced in the Rio Grande & South Platte where Baseline CU must be developed for 2 of Colorado's largest and most complicated basins.	Developing Baseline consumptive use analyses in these basins will be challenging, particularly due to the prevalence of ground water pumping in the basins.
18	Ken Curtis	DWCD	General	I can't adequately assess the resource limitations, but I think CWCB should consider focusing their improvement efforts on several representative basins instead of all of them. Should resources prove insufficient, SWSI update may not yield desired outcomes.	A goal of the SWSI update is to leverage the investment the State has made in analysis tools where they exist (i.e. in most basins in the state). Utilizing these tools should represent an improvement where they are available and will fulfill the overall objectives of SWSI (even if some enhancements cannot be achieved due to resource limitations). It is anticipated that future versions of SWSI will include even more refinements and improvements.
19	Ken Curtis	DWCD	3.1	CWCB should consider piloting the proposed changes to agricultural demand in several representative basins, east and west slope, before using statewide. Also make sure sufficient time is spent on the South Platte & Rio Grande modeling to make it reasonably accurate and verified by local water professionals.	It is likely during the implementation of the methodology, some representative basins will be analyzed first, and the quality of the results will be evaluated before implementing the methodology in all basins.
20	Ken Curtis	DWCD	General	The approaches appear adequate, but each basin has local differences that may not be recognized without sufficient local review by water commissioners, Division Engineers & Basin Round Tables. I think the underlying data & estimating assumptions are potential weak points.	You are correct in your assumption; the models are only as good as the data used to create them. The CWCB continues to work with DWR staff, including Water Commissioners, and local water users to refine irrigated acreage, model operations, and calibrate the CDSS datasets. Additionally, the CWCB is hopeful that CDSS models and data will be improved as the basins use the information during their next Basin Implementation Plan efforts.
21	Ken Curtis	DWCD	1.1	I think IWR becomes a common bridge calculation between versions of SWSI. Depends heavily on accuracy of local data.	We agree with your comment; the Agricultural Diversion Demand contemplates calculating and reporting irrigation water requirement (IWR) for Current and Planning Scenario conditions.
22	Ken Curtis	DWCD	2.1.1	In SWSI 2010, it was hard to tell how qualitative assessments were applied to affect future irrigated acreages. This is handled better in update as represented by sections 3.2.	Thank you for your support of the current methodology.
23	Ken Curtis	DWCD	2.1.2	The WSLCU demonstrated historic actual limits to CCU that I believe demonstrated water short basins based on hydrological limitations & basin priority	The Agricultural Diversion Demand Methodology and Water Supply Methodology contemplate estimating water supply limited consumptive use (WSLCU) for the Current and Planning Scenario conditions in order to compare actual crop consumptive use across the scenarios.
24	Ken Curtis	DWCD	3.1.3	Both SWSI 2010 & the update use similar basis for non-irrigation agriculture demands. It seems that some of these uses are in the historical diversion records and may fall into system efficiency calculations. It also may not represent grazing on public lands precisely as discrete decreed diversion points may not exist. If not accurately represented the CU looks similar to incidental loss attributable to vegetation. I recognize that these are relatively minor may not merit significant efforts to refine.	The methodology does not currently contemplate parsing out diversions to irrigation and stock, therefore there are a limited amount of diversions to stock that are likely applied to meet the crop demand. As you noted however, this is a small amount compared to the diversion and consumption of irrigated crops.
25	Ken Curtis	DWCD	3.1.3	Incidental loss was real, but hard to define across different basins so was set at 10% in SWSI 2010. In the new version it appears to fall out of the system efficiency calculations based on historic IWR & diversion records. This may be appropriate, but tough to confirm realistically. I hope CWCB can have local checks that verify appropriateness of model calculations to actual field practices.	As you note, the amount of water consumed "incidental" to irrigation is difficult to quantify. System efficiency calculations recommended in the methodology include these losses, as well as other losses due to ditch seepage and irrigation return flows, however incidental losses will not be quantified or summarized explicitly in the analysis.

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26	Ken Curtis	DWCD	2.2	The updated IWR will be good comparison to SWSI 2010. Some of the value of SWSI continual updates is long term trend identification and analysis, policy course correction based on observations and demonstrable effectiveness of models for public buy in.	Thank you for your support of the current methodology.
27	Ken Curtis	DWCD	2.2	To what purpose is CWCB changing to agriculture demand from 2010 calculations? Parity to treatment of M&I diversions, comparable calculation methodologies, seems appropriate, but may not be. Given the hydrologic limitations, large share of agricultural CU across Colorado (relative to total CU for CO), basin seniority & over appropriation the agricultural gap is not realistically expected to be met. Otherwise it would have been met in the past.	You are correct regarding comparable calculation methodologies - diversion demand is needed to use the CDSS's water allocation models. We agree, that agricultural community currently "lives with" a water supply gap. The SWSI Update will assess how the existing gap may change under various planning scenarios.
28	Ken Curtis	DWCD	2.2	Setting agricultural demand to be used in scenario planning seems to be of limited value. Show bad to worse may not assist in decision making.	Understanding the full amount of water that needs to be pumped or diverted to meet the crop demand and where this demand is located is critical in planning for future projects. Each basin can then analyze a suite of projects or solutions that may meet a portion of that demand during the next Basin Implementation Plan update.
29	Ken Curtis	DWCD	2.2	Using future scenarios to evaluate agricultural projects likewise seems of limited value. Any specific proposed project can demonstrate agricultural benefits as appropriate. I would not expect to basin wide large scale improvements to the agricultural demand gap. Trend changes such as urbanization & climate change can be applied to existing data without identifying an insurmountable agricultural demand gap. So I do not see the benefits in future scenario planning relative to currently limited agricultural diversions.	The SWSI Update strives to provide technical data to support the Planning Scenario narratives as presented in the Colorado Water Plan. As you note, there are many ways to create potential future demands and conduct scenario planning, however previous policy decisions by the CWCB and IBCC have guided the approach taken in this effort.
30	Ken Curtis	DWCD	2.2	I would recommend verifying all CDSS agricultural acreages by local water commissioners and/or other local basin water groups.	Your comment is noted on CDSS irrigated acreage, which serves as the foundation of the CDSS modeling datasets and the SWSI analysis. The CWCB continues to work with DWR staff, including Water Commissioners, and local water users to refine irrigated acreage, model operations, and calibrate the CDSS datasets. Additionally, the CWCB is hopeful that CDSS models and data will be improved as the basins use the information during their next Basin Implementation Plan efforts.
31	Ken Curtis	DWCD	2.2	Does the additional effort and new modeling improve model accuracy given the existing data precision, other uncertainties & assumptions?	The CDSS modeling platform is appropriate for planning purposes, particularly to analyze "what-if" situations as presented in the Planning Scenarios at a basin-wide scale. Although assumptions are necessary in any modeling effort, the approaches outlined in the SWSI Update methodologies are designed to reduce the number of assumptions and uncertainties in the models.
32	Ken Curtis	DWCD	3.1.1	It seems like much work is needed for baseline CU in South Platte & Rio Grande Basins. Will future scenarios with unmet agriculture demand tell us how much agriculture land may be lost? The gap cannot realistically be closed.	Developing Baseline consumptive use analyses in these basins will be challenging, however necessary for the modeling effort. The agricultural gap results from a Planning Scenario may reflect that specific areas of irrigated acreage are at risk of experiencing significant reductions in irrigation supplies, which could be interpreted as the acreage may be taken out of production in the future. The SWSI Update effort will provide technical data on future potential demands and gaps; it will be up to the Basin Roundtables to draw conclusions and develop solutions based on the technical data.

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33	Ken Curtis	DWCD	3.1.1	How is soil storage calculated? Is this realistic? It would appear to have large uncertainties, especially in parts of the South Platte, yet irrelevant to other basins like the SW.	Both the consumptive use (StateCU) and surface water allocation (StateMod) models have the capability to simulate storage of soil moisture. Soil moisture capacity is based on the rooting depth of the crop, area of irrigated acreage, and available water content of the prevalent soil type. Please refer to the model documentation on the CDSS website for the specific calculations.
34	Ken Curtis	DWCD	3.1.1	Have input data sets been checked by local sources, e.g. water commissioners?	Yes, Water Commissioners are routinely contacted regarding diversion records, water rights, and irrigated acreage information in the model and local water providers are contacted regarding typical operations and demands.
35	Ken Curtis	DWCD	3.1.1	South Platte & Rio Grande will require much work to develop Baseline CU and be complicated by groundwater data uncertainty.	Developing Baseline consumptive use analyses in these basins will be challenging, however necessary for the modeling effort.
36	Ken Curtis	DWCD	3.2.1	I think recognition of existing agricultural demand constraints is appropriate. The unmet agricultural demand gaps will not realistically be closed. Unless we expect a significant improvement, it seems like the agricultural demand might be a fictitious or have no utility.	There was significant discussion at the Agricultural TAG as to how the existing shortages experienced by many irrigators should be reflected in the SWSI analysis and results. Among the discussion, TAG participants indicated that existing shortages (i.e. "gap") should be summarized separately from any new gaps so that Basin Roundtables and planners have access to this data as new projects were developed.
37	Ken Curtis	DWCD	3.2.1.2	Urbanization, no comment, minimally relevant to SW Basin.	Thank you for your review of the Urbanization approach.
38	Ken Curtis	DWCD	3.2.1.4	This is basin specific and is appropriate as it is real and would give false/misleading scenarios if ignored. CWCB approach seems appropriate.	Thank you for your review of the Ground Water Acreage Sustainability approach.
39	Ken Curtis	DWCD	3.2.4	It is unclear how the emerging technologies will be applied? Be cautious. Could give unrealistic outputs and CWCB probably needs to ground verify before applying on basin wide scales. Wait for future iteration for full roll out and get local BRT review and agreement.	The TAG is considering options to implement Emerging Technologies in the SWSI Update, ranging from example projects to explicitly modeling adjustments to crop demand and system efficiency in one or two scenarios. The Agricultural Diversion Demand Methodology will be updated accordingly.
40	Ken Curtis	DWCD	5	Budget will probably preclude some of the stated efforts.	Thank you for your review of the budget and schedule.
41	Mark Sponsler	Co Corn Grwrs	1	Agricultural TAG question: I believe the SWSI Update methodology is an improvement over the 2010 approach and will result in more reliable gap estimates.	Thank you for your support of the methodology
42	Mark Sponsler	Co Corn Grwrs	2.1.1	The 2050 acreage estimates, item 5: I'm not understanding why "Biofuels production" would be listed as a factor. Ultimate end-use of a particular crop is determined by the final purchaser of the commodity, not by the crop producer. Various demands and therefore price paid for a commodity are highly variable in nature. Commodity brokers and farmers respond to the prices offered by various demand sectors which determines ultimate crop use.	The impact of "Biofuel production" on future agricultural demands was considered during the SWSI 2010 effort; it is not contemplated as a factor for adjusting the agricultural diversion demand in the SWSI Update effort.

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43	Mark Sponsler	Co Corn Grwrs	2.1.1	The 2050 acreage estimates, item 5: Regarding "Farm programs" listed as a factor. I'll offer just a few perspective comments. Farm Programs have long been tailored to attempt a marginal "safety net" approach for those who risk livelihoods to produce food/energy critical to national security and well-being. Programs in recent decades have also provided marginal incentive for reduced production both mid and long term in order to help manage over-supply challenges, while also supporting a "cheap food" policy. The specific programs developed over the long term are unpredictable. More importantly, the anticipated demand by 2050 for food and energy is so strong as to support the expectation that all arable lands would/could have a role in meeting the population's needs, and the associated demand would logically provide the market incentive to maximize productive capability. It would be my belief that any Farm Program option(s) in place at that time would/could still likely serve a valuable "safety net" role in face of the natural/environmental challenges to production that are out of a producer's realm of control, but are not likely to be a factor going forward in limiting productive capacity or the need for production.	The impact of "Farm programs" on future agricultural demands is not contemplated as a factor for adjusting the agricultural diversion demand in the SWSI Update effort.
44	Mark Sponsler	Co Corn Grwrs	2.1.1	I'm concerned about the 70% assumption regarding portion of M&I gap estimated to be met from Ag to Muni transfers? Seems intuitively to be a generous/strong assumption. And if it turns out to miss on the high side, would have effect of leaving Ag Gap correspondingly underestimated.	SWSI 2010 focused primarily on municipal demands and gaps, and presented the option of meeting a portion of those municipal gaps using Agricultural to Municipal transfers. The SWSI Update is focusing on the agricultural and municipal demands and gaps under the five Planning Scenarios, and will not present recommendations to meet those gaps. Instead future updates to the Basin Plans will focus on solutions for meeting identified gaps.
45	Mark Sponsler	Co Corn Grwrs	2.2	Agricultural TAG question: I am comfortable with the revised approach, and believe it can help lead to much more realistic gap estimates.	Thank you for your support of the Agricultural Diversion Demand methodology
46	Mark Sponsler	Co Corn Grwrs	3.2.1	Agricultural TAG question: I think it entirely appropriate to reflect the full agricultural diversion demand in the planning scenarios. (Ag diversions into storage during non-irrigation season are likely to come under increased competitive pressure and should not be left out of the calculations. Nor should we assume that current irrigation season weeks/months will stay the same as climate and demand factors could possibly change)	Thank you for your support of the Agricultural Diversion Demand methodology
47	Mark Sponsler	Co Corn Grwrs	3.2.1.2	Agricultural TAG question: The approach taken seems reasonable. I do not have familiarity with other models.	Thank you for your review of the Urbanization approach.
48	Mark Sponsler	Co Corn Grwrs	3.2.1.4	Agricultural TAG question: I believe it appropriate to reflect estimated reductions in groundwater availability.	Thank you for your review of the Ground Water Acreage Sustainability approach.
49	Mark Sponsler	Co Corn Grwrs	3.2.4	Agricultural TAG question: System delivery estimates of increased efficiency do not appear to me to be predictable broadly. In addition, it may be reasonable to estimate that where efficiencies are gained for particular systems, there may be corresponding losses resulting to other systems from the same action (due to the interconnectivity of water supply/use pathways)	The TAG is considering options to implement Emerging Technologies in the SWSI Update, ranging from example projects to explicitly modeling adjustments to crop demand and system efficiency. The Agricultural Diversion Demand Methodology will be updated accordingly.