



## **SAVE THE COLORADO**

**Date: October 7, 2015**

**To: U.S. Army Corps of Engineers**

**From: Save The Colorado**

**Re: The Demand Analysis in the Final Environmental Impact Statement for the Moffat Collection System Project is Fatally Flawed and Must Be Redone**

**Summary:** Save the Colorado (STC) submits the following comments on the Final Environmental Impact Statement (FEIS) for the proposed Moffat Collection System Project (Moffat Project) to the US Army Corps of Engineers (Corps). Save The Colorado did a high-level analysis of the data and modeling about the Army Corps projections for Denver Water's "water demand" in the FEIS. Save The Colorado finds the water demand data and modeling in the FEIS to be fatally flawed because:

1. The Corps and Denver Water inappropriately changed the "purposed and need" during the EIS process.
2. The Corps failed to conduct an independent review of Denver Water's water demand, and instead relied on a flawed study presented by a biased source, Harvey Economics, which has a conflict of interest due to its business relationship with Denver Water.
3. The Corps' water demand projections are fatally flawed and absolutely do not reflect Denver Water's water use data in the past, now, nor in the future.

Therefore, the water demand analysis in the FEIS must be redone and the Purpose and Need statement must be re-examined in order to comply with federal law.

## 1. The FEIS Inappropriately Relies on a Contrived Purpose and Need Statement

Denver Water originally proposed four needs for the Moffat Collection System Project:

- The Reliability Need
- The Vulnerability Need
- The Flexibility Need
- The Firm Yield Need

FEIS at 1-2.

These needs were adapted into a singular Purpose & Need statement for the FEIS<sup>1</sup>:

The purpose of the Moffat Collection System Project is to develop 18,000 acre-feet per year of new, firm yield to the Moffat Treatment Plant and raw water customers upstream of the Moffat Treatment Plant pursuant to the Board of Water Commissioners' commitment to its customers.

FEIS at 1-4.

This statement is justified by a distillation of Denver Water's original needs into two "major issues":

1. Timeliness: Water Supply Shortage in the Near-Term Timeframe (Prior to 2032)
2. Location: Need for Water to the Moffat Water Treatment Plant and Raw Water Customers

FEIS at 1-4.

During the NEPA process, and contrary to how the proposed project was presented to the public, Denver Water and the Corps have elevated the provision of new water supply (18,000 of new firm yield) from one component of the Moffat Project to the driving force behind the "need" for the project. There is no support for this shift in the record other than a change in priorities for Denver Water. *See, e.g., "Purpose and Need Statement for the Moffat Collection System Project," Denver Board of Water Commissioners, April 2004 (explaining and attempting to justify the 18,000 firm yield figure but not documenting the shift towards a primary focus on new water supply).*

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<sup>1</sup> Save the Colorado rejects as unacceptable the Corps' Purpose and Need statement presented in the FEIS. *See "Re: Moffat Collection System Project – Final Environmental Impact Statement," The Environment Group, Save the Colorado, and Save the Poudre, submitted to the Corps on June 9, 2014 (comments of the FEIS), and forthcoming comments from Save the Colorado.*

This is a significant evolution of the project and an approach that has a dramatic effect on the alternatives that are considered. The preliminary alternatives screening process documented in the FEIS was driven by the Purpose and Need statement as written, in particular with the “Purpose and Need” (“PN”), “Logistics – Practicality Issues” (“LP”) and “Environmental Consequences” (“EC”) screening criteria being based on the firm yield requirement. Any proposed alternative that would not provide at least 15,000 AF of new firm yield in a surface impoundment was immediately removed from consideration, regardless of the ability of that alternative to address the reliability, vulnerability, and flexibility needs of the project. FEIS at 2-4 – 2-7, 2-9.

As will be documented below, the demand projections that underlie the purported “need” for 18,000 AF of new firm yield are fatally flawed. Consequently, the Corps’ alternative screening process inappropriately constrains the range of alternative that should be given full consideration in the review of the Moffat Project. The Corps must correct its Purpose and Need statement by eliminating the firm yield need as the driving force behind what thus appears to be a pre-determined outcome, and re-evaluate the full range of alternatives.

## **2. The Corps Failed to Conduct an Independent Review of Denver Water’s Demand Projections**

After public review of the Draft EIS and prior to the issuance of the FEIS, the Corps requested updated water demand projections from Denver Water. FEIS at 1-14. These updated projections form the basis for the 18,000 AF firm yield “need” underlying the FEIS. FEIS at 1-14 – 1-18.

Apparently understanding that there was an obvious conflict of interest in having the project proponent be solely responsible for determining the need for a project such as Moffat, the FEIS states that the Corps “evaluated these more recent projections for suitability for the Final EIS.” FEIS at 1-14. The updated projections and the Corps’ consultant’s evaluation of the projections are documented in the FEIS at Appendix A-4 and A-5.

The Corps also retained the same consultants to evaluate the earlier versions of the demand projections and the underlying models (which are retained for the FEIS):

**An independent review of Denver Water’s demand forecast model was completed** for this EIS and concluded that the water demand projections produced from the 2002 IRP offer an acceptable basis for water supply planning purposes.

FEIS at 1-17 (emphasis added).

In a review of this process, however, STC has determined that the Corp's choice of consultant for the evaluation of Denver Water's updated projections and the evaluations of Denver Water's initial projections, itself raises serious concerns about the objectivity of the evaluation and the Corps' diligence in critically examining material from the project applicant.

The evaluation of the updated projections (FEIS Appendix A-5) as well as the earlier evaluations (FEIS Appendices A-1 and A-2) were authored by Harvey Economics, a consulting firm apparently retained by the Corps through contract to complete various work products incorporated into the FEIS. See FEIS Appendix A-1, A-2, and A-5. FEIS Appendix A-1, cites Ed Harvey specifically as the author. The documents are described as:

FEIS Appendix A-1 – "Re: Review of Denver Water's IRP," January 15, 2004:

The primary goal of this review is to determine the validity of the water demand forecasts produced through Denver Water's most recent IRP process as a basis for establishing a need to develop new firm yield supplies.

FEIS Appendix A-1 at 1.

FEIS Appendix A-2 – "Supplemental Evaluation of Denver Water Demand Projections," August 12, 2004:

This document describes the results of a supplemental evaluation of Denver Water's demand projections, following an initial evaluation that HE conducted in late 2003 and finalized in early 2004.

FEIS Appendix A-2 at 1.

FEIS Appendix A-5 – "Update of Denver Water Demand Projections," April 2, 2012:

Under the direction of Harvey Economics (HE), one of the third party contractors, the following steps were completed:

- 1) Review of the Purpose and Need section of Chapter 1 to determine what information required updating;
- 2) Request to Denver Water to update the water demand projections;
- 3) Review and validation of the Denver Water demand projection update; and

4) Incorporate updated water demand information into the final EIS.

FEIS Appendix A-5 at 1.

**Based upon HE's determination** that the updated economic demographic projections and the associated water demand projections are reasonable, **the results have been incorporated in the FEIS.**

FEIS Appendix A-5 at 6 (emphasis added).

Even a surficial review of the materials reveals obvious conflicts of interest from having Harvey Economics in general, and Ed Harvey in particular, evaluate Denver Water's projections:

- Ed Harvey founded Harvey Economics in 2003, and that prior to that date he was a Managing Director at BBC Research & Consulting (starting in 1989). Exhibit A.
- Denver Water's demand projections are based on forecasting models developed by BBC Research & Consulting completed in 2001. FEIS Appendix A-1 at 2.
- Denver Water and BBC Research & Consulting worked in close association in the development and implementation of the demand forecasting models. FEIS Appendix A-1 at 4.

Consequently, Harvey Economics evaluated models that were developed by the firm where Mr. Harvey was a Managing Director at the time that these models were developed. Given his purported expertise in these topics, it is a reasonable assumption—that the Corps fails to refute or even address—that Mr. Harvey was at least overseeing, if not directly involved with, the model development work that the Corps subsequently called upon him to evaluate.

If Harvey Economics merely reproduced standard calculations in its evaluation then concerns about objectivity might have been mitigated, but the nature of the evaluation extends far beyond a simple math check. Harvey Economics was relied on by the Corps, for example, to evaluate:

- If “the methodology used to develop those demand projections [was] **appropriate** for the purpose of formulating future water resource development strategies;”
- if “the data sources that drive the water demand forecasts [were] **appropriate** for the purpose of producing water demand projections;”
- If the underlying assumptions in the forecasts [were] **reasonable;**”

- If the demand projections **provide a sufficient basis** for determining future water development requirements.”

Appendix A-1 at 1 (emphasis added).

Clearly the tasks conducted for these evaluations required the subjective application of professional expertise. In fact, the evaluations centered on broad assertions without quantifiable and verifiable support and are uniformly supportive of Denver Water’s projections. *See, in general*, FEIS Appendix A-1, A-2, and A-5. Particularly troubling was Harvey Economics failure to critically evaluate the demand model itself. For this, Harvey Economics relied on a belief in the validity of the model’s assumptions rather than any review of its efficacy or any aspect of its actual function:

HE determined that a re-estimation or new configuration of the water demand models was not needed. The water demand models were originally estimated using 27 years of economic demographic, **data which is believed to be the sufficient historical period** for estimating regression coefficients. **HE concluded** that the structure of the 2002 water demand forecasting **models remained sound and appropriate** for projecting water demands in 2011.

FEIS Appendix A-5 at 2 (emphasis added).

Harvey Economic’s “belief” that the model is valid contrasts sharply with the reality of changing water use in the Denver area. The model was derived from data on water use running from 1973 through 1999, a data series that fails to capture the significant shift in water use rates that has occurred since the drought of the early 2000’s. *See* <http://www.denverwater.org/SupplyPlanning/WaterUse/Population/> (last viewed September 22, 2015 and attached here as Exhibit B, illustrating a marked downward trend in water use). This failure would have been evident in even a simple analysis of readily available multi-year average use data.

Even if Harvey Economics in general and Ed Harvey in particular were professionally qualified<sup>2</sup> to perform an evaluation of Denver Water’s demand projections, the apparent involvement of Mr. Harvey in the development and implementation of the underlying models clouded the ability of Harvey Economic and Ed Harvey to provide a reasonably independent evaluation. By employing Harvey Economics for this task, the Corps failed to provide an outside review and rather appears to have

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<sup>2</sup> STC does not stipulate to the adequacy of the qualifications of Harvey Economics and Ed Harvey to perform the work that they report in the described documents.

supplied those responsible for the demand projections another opportunity to justify their approach and results.

The Corps must retain a new and truly independent expert to evaluate Denver Water's demand projections before the Corps can rely on those projections in the FEIS. An independent analysis is needed, given factors including the significant environmental impacts of the proposed project and the level of public controversy regarding environmental and socio-economic impacts.

### **3. The Corps' Demand Projections Are Fatally Flawed**

Denver Water's demand projections were based on three demand sectors:

- Water provided by Denver Water directly to customers
- Fixed-amount contracts with other entities outside of the Combined Service Area
- The 1999 contract with Arvada

FEIS at 1-14, 1-15.

The demand under each of these sectors was projected independently. STC reviews each of these projections below.

#### The Demand Projection Modeling is Unrealistic and Likely Overstates Future Water Demand

##### *The Demand Projections are Inconsistent with Actual Patterns of Water Demand*

The consultant evaluating Denver Water's demand projections took an almost flippant view of the task:

In truth, there is little opportunity for testing the accuracy of demographic and economic forecasts. Such forecasts are inherently very uncertain.

FEIS Appendix A-1 at 4.

Freed from the burden of a rigorous analysis, the consultants' evaluation of the Denver Water's demand projection model defended it with a variety of lightly described (but not documented) statistical analysis

results. See FEIS Appendix A-1 at 5, 6. The consultant found, perhaps not surprisingly, that these statistics supported the model, even when the “R<sup>2</sup>” results (the proportion of variability in a data set that is accounted for by the model) reported were both high and relatively low. See FEIS Appendix A-1 at 5 (“The various models’ overall predictive capability predictions are also relatively strong. The single family model has an r2 of 0.65, the commercial model has an r2 of 0.99 and the institutional model has an r2 of 0.92.”)

The evaluation also cited “backcasting” – the use of the model to “project” demand during years for which we have historical data as a test of the models predictive ability. FEIS Appendix A-1 at 6. The majority of the years that were the subject of the backcasting analysis (1973 – 1991) were years for which data were incorporated into the model’s development.<sup>3</sup> Compare FEIS Appendix A-1 at 5 (“Denver Water was tasked with providing water use data for all of the water distributors within its service area from 1973 through 1999”) and FEIS Appendix A-1 at 6 (“That is, each was used to project historical water use each year from 1973 to the year 2000.”) Backcasting these years added nothing to the evaluation gained from the statistical analysis as it merely restates the previously cited error analysis. The few relevant years (1992 – 1999) were discussed in only broad summary so a reviewer is unable to understand what the model’s success in projection actually was. It is also not disclosed if the backcasting was performed using actual precipitation, a parameter necessary to adequately assess the model results.<sup>4</sup>

Fortunately, the consultant’s assertion that the accuracy of the model couldn’t be tested is incorrect. As the model projects forward from 2002, STC was able to perform its own backcasting analysis to independently determine the models results.

At the simplest level, the demand projections appear to produce results that are contrary to empirical evidence of demand over the last decade.

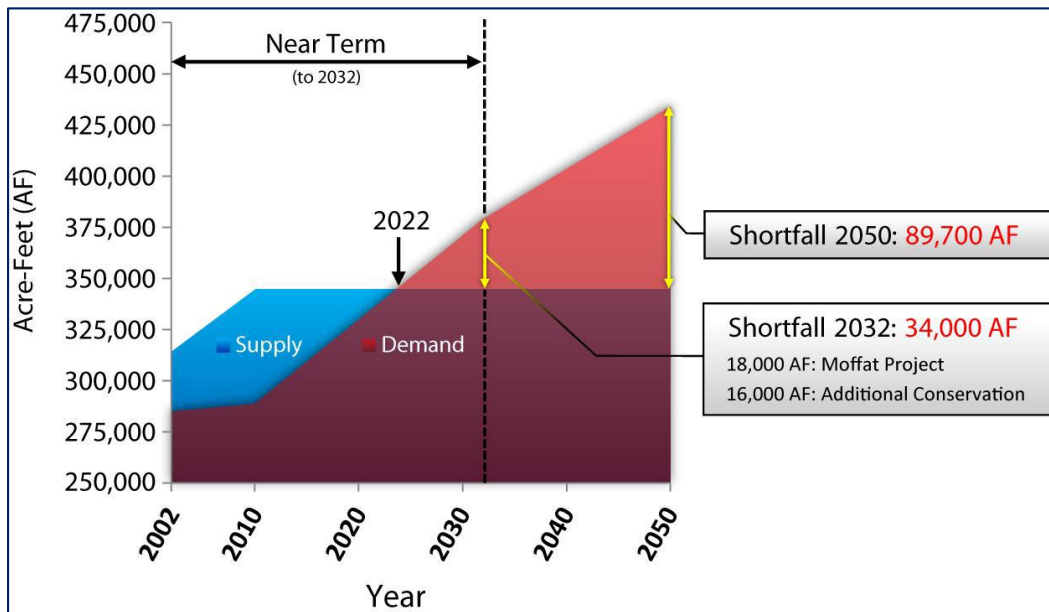
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<sup>3</sup> Although, Denver Water was tasked with providing water use data for the years 1973 – 1991, it is not clear from the FEIS and supporting documents which years’ data were actually incorporated into the model’s development. FEIS Appendix A-1 at 5 (“In fact, only 834 cells of water use information were identified for the single family model, and fewer observations were found for the commercial and institutional water use models.”) The inability to acquire all of the desired data is described as “less than ideal,” yet the consultant claims that the model’s development is “credible.” FEIS Appendix A-1 at 5. This justification is based on a successful regression analysis rather than an assertion that a representative range of data was acquired.

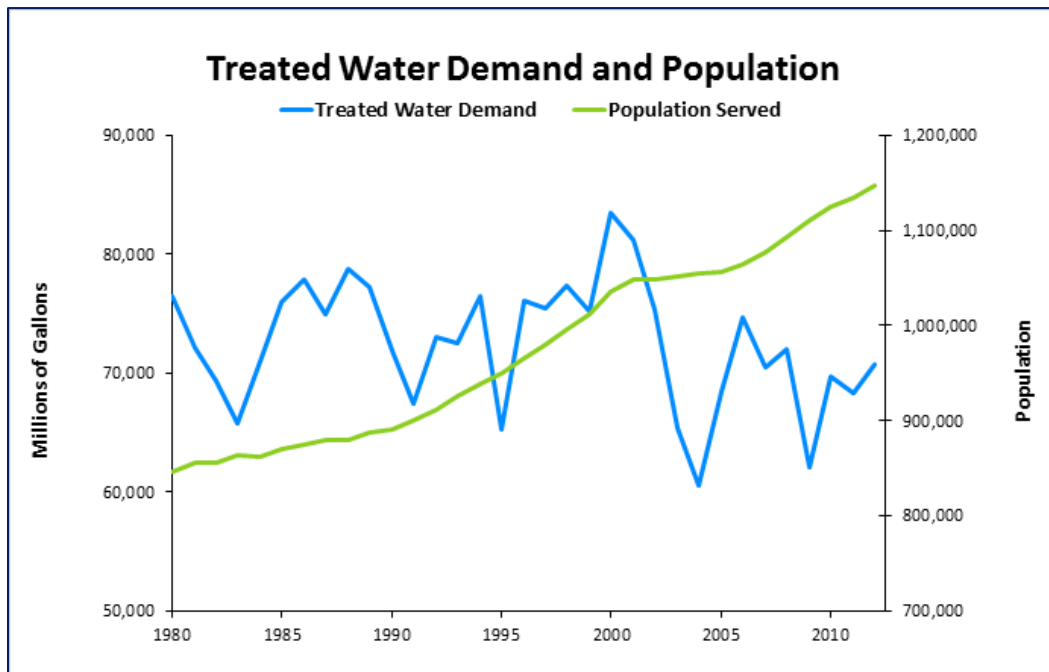
<sup>4</sup> As is evident on the graph of treated water demand from Denver Water attached below (and available at <http://www.denverwater.org/SupplyPlanning/WaterUse/Population/> as of September 22, 2015), actual demand in any given year is highly variable. The only independent variable in the model that might reasonably vary to such an extent each year is precipitation. See FEIS Appendix A-1 at 3 (listing model independent variables).



STC compared the demand projection for the period 2002 through 2014 as depicted in the FEIS (Figure 1-5) with actual demand data for the same period presented on Denver Water’s website:<sup>5</sup>



FEIS Figure 1-5 (Total Annual Denver Water System Demand Versus Supply).



<sup>5</sup> These graphs portray different units (acre-feet and gallons) but are comparable as they both portray linear rates.

Exhibit B.

To even the casual reviewer, it is obvious that the demand projection in Figure 1-5 shows a slight increase each year from 2002 to 2010, and then follows a higher growth rate upward. Contrarily, the actual demand figures, shown in “Treated Water Demand and Population” vary year to year but follow a distinctly downward trend line after approximately 2002. The lower actual demand since 2002 occurred despite steady population increases. Although this is a simple evaluation of the model’s efficacy, it clearly failed to accurately portray even the direction of the demand trend for this substantial period.

Importantly, it casts doubt on one of the fundamental assumptions employed by Denver Water and thus far accepted by the Corps in the FEIS: that “demand”, or actual use, can be expected to rise steadily with population increases. Actual data for the past ten years, since Denver Water began to take conservation at least somewhat seriously, disprove this assumption.

STC also performed a more sophisticated review of the model’s predicative ability, examining the results for the year 2010:<sup>6</sup>

<b>Modeled<sup>7</sup></b>	<b>Actual<sup>8</sup></b>	<b>Actual w/ 6% System Loss Amendment<sup>9</sup></b>	<b>Difference between Modeled &amp; Amended Actual</b>
289,200 AF	238,528 AF	252,840 AF	36,360 AF/12.6%

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<sup>6</sup> Although more samples would have been desirable, the modeling results available from the FEIS are only at very large time steps (2010, 2032, 2050) so only 2010 could be tested.

<sup>7</sup> FEIS 1-15, Table 1-1, “Total System Demand.”

<sup>8</sup> STC here uses the figures from the Denver Water 2014 Annual Report (attached here as Exhibit C), “Water Supply, Use, and Storage: 2005-2014,” at III-64. STC combined the figures for “Total Treated Water Delivered” and “Raw Water Deliveries” to derive an actual demand figure. Denver Water’s accounting methods are arguably complex so it was difficult to determine equivalent figures for a valid comparison. This method used was tested on data from 1997 and 2001, as presented in the Denver Water 2001 Annual Report (attached here as Exhibit D), in comparison with system demand figures cited in Denver Water’s Integrated Resource Plan (“water demand of 265,000 acre-feet annually” at 7, “[c]urrent demand on the Denver Water system is now 285,000 acre-feet” at 9; attached here as Exhibit E) and found to be reliably close (263,330 AF and 286,089 AF, respectively) when evaporative losses were added, so losses were approximated and added in the next column.

<sup>9</sup> Following FEIS Appendix A-4 at Attachment 3, a 6% unspecified “system loss” is added for comparison purposes. It is unknown if the model applies a “system loss” to the fixed contract deliveries (as STC does here) so it is possible that the loss in the actual use estimate is overstated. No details were found by STC on how the fixed contract amounts were projected year-to-year other than broad statements that they were increased to the maximum by 2032. Of further note, the FEIS cites a total of 249,000 AF of water use within the Denver Water CSA during 2010, including distribution losses. FEIS at 1-12. This figure is cited to a Denver Water publication on conservation, “Solutions” (attached to the FEIS as Appendix A-3), but STC was unable to locate that figure or any substantial reference to it in the referenced publication.

STC cautions that single-year portrayals of water demand are suspect as indicators of overall demand as there can be great variation year to year; this is evident in the “Total Water Demand and Population” graphic above. A competent projection of water use must incorporate a consideration of a range of probable values. Acknowledging that, however, it should also be noted that our analysis casts significant doubt on the reliability of the model.

2010 fell squarely in the mid-range for demand for the decade 2001-2010, and the model overstates demand at this level by 36,360 AF (12.6%) – twice the new firm yield sought by the Moffat Project. This undercuts the “Purpose and Need” presented by Corps as the premise for the project. The modeling and analysis behind Denver Water’s assertions are not reliable when evaluated by reference to actual data.

Over the entire thirty-year period portrayed on Denver Water’s “Treated Water Demand and Population” graphic, there does not appear to be any substantial correlation between population growth and water demand increase. In those thirty years, population has increased by roughly 300,000, while the long-term average water demand is approximately flat if not trending downward. This relationship—or lack thereof—directly contradicts the projections of the model which, for single-family residential use, is based on a linear relationship of a demand rate and the number of single family homes, and for commercial and institutional use is based heavily on employment figures.<sup>10</sup> FEIS Appendix A-1 at 3. The model’s linear relationship to projected population growth is clear from Denver Water’s results. *Compare* FEIS Appendix A-4 at Attachment 1 (projected population growth from 2000 to 2050 is 65%) and Attachment 3 (projected water demand growth from 2000 to 2050 is 62%). Despite the statistical analysis that the consultant uses to justify the validity of the model (Moffat FEIS Appendix A-1 at 5 – 6), the model results are completely inconsistent with over thirty years of actual water demand patterns.

The demand projection model relied on by the Corps for the demand projections and the “need” determination in the FEIS is fatally flawed. The Corps must re-examine future water demand using a

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<sup>10</sup> The Corps needs to consider whether models have even considered documented economic trends such as the emergence of internet and service-based sectors in the economy and possible displacement of the water-intensive industrial sector during the 21<sup>st</sup> century. Denver Water appears to blithely assume that average use statistics from over forty years ago would simply remain constant indefinitely. Assumptions about water use must be re-examined in light of today’s economy and lifestyle choices, such as employment patterns and dedication to past landscaping habits (e.g., intensive watering of Kentucky bluegrass yards).

defensible method that can be expected to produce rational demand projections. The Corps must also incorporate a competent consideration of the variable nature of water demand.

*Key Components of the Water Demand Projection Model are Improperly Implemented*

In addition to being fundamentally flawed, the water demand projection model used by the Corps to inform the FEIS was also hampered by poor execution of key components of the model. If Corps persists in using the current water demand model, the Corps must evaluate and correct the following components.

A key independent variable which informed all of three of the sub-models was precipitation during the growing season. FEIS Appendix A-1 at 3. For the projections, this variable was set to a constant, using an average irrigation value of 9.4 inches. FEIS Appendix A-4 at Attachment 1. STC tested the sensitivity of this variable by reproducing the model projection using a precipitation total of 0.01 inch for 2010. In other words, STC's analysis compared the actual water use projected by the model for an average precipitation year (9.4 inches of rainfall) to a year with effectively zero precipitation. The results do not seem logical.

STC's result from a model run projecting the three sub-models with this precipitation figure (0.01") was only 9% higher than Denver Water's calculation using the average precipitation (9.4"). *Compare* Moffat FEIS Appendix A-4 at Attachment 3 (2010 "Total" demand is 72,573,482 thousand gallons) and Exhibit F (STC's figure of 78,876,357 thousand gallons). Precipitation was the only independent variable in the model that is likely to vary significantly year-to-year. *See* FEIS Appendix A-1 at 3. It is apparent from the Denver Water graphic "Treated Water Demand and Population" that the model fails to capture the true impact of precipitation differences on water demand if such an extreme precipitation variation ("average" to none) generates only a 10% difference in water demand. If the Corps persists in using the current water demand model, the Corps must re-examine the role of precipitation in the water demand model and improve its implementation to more accurately capture its impact on water demand.

Cost was a significant independent variable in the residential sub-model. *See* FEIS Appendix A-1 at 3. Despite this essential role, the model does not appear to have incorporated tiered pricing or any other progressive pricing structure such as that currently utilized by Denver Water. *See, generally,* FEIS Appendix A-1 and A-4, and "Inside City 2015 Rates" (available at: <http://www.denverwater.org/>

BillingRates/RatesCharges/2015rates/insidecity/, last viewed September 29, 2015, and attached here as Exhibit G). The Corps developed a paradigm of unrestricted demand for its modeling (or utilized such a paradigm provided by Denver Water but not objectively evaluated) that fails to incorporate the realities of current water provision systems. FEIS at 1-17.

STC modeled a price increase of \$1 per 1,000 gallons for 2050, a much smaller increase than shown in Denver Water's current tiered structure for increasing usage. This increase, independent of any other changes, resulted in a demand reduction of over 13,000 AF. Exhibit H. If the Corps persists in using the current water demand model, it must redevelop the water demand model to more accurately incorporate tiered pricing structures and other consumption disincentives that are integral to water provision and hence separate from conservation techniques.

The figures for number of single family households and multifamily households used in the model are derived from Denver Regional Council of Government's (DRCOG) total number of households, rather than being sourced directly. FEIS Appendix A-4 at 1. The total number of households is split on a 60/40 scale (single family versus multi-family), rather than the 50/50 basis assumed in the original 2002 model data, on the basis of the unsupported statement that this ratio "reflects the current ratio of SF to MF units across the Metro area counties (Adams, Arapahoe, Denver and Jefferson)." FEIS Appendix A-4 at 1. Although it is given little notice in the FEIS, this split is critical to the water demand projections.

Each single family household has a linear demand increase on the residential sub-model; a change of 1% of the total households in 2050 attributed to single family units reduces demand by nearly 3,000 AF. See FEIS Appendix A-4 at Attachment 1 (1% of 2050 household total is 7,652) and Exhibit I (STC's modeling of changes in household unit distribution). If fifty percent of the total households are assigned to single family units in 2050 (an historically accurate split according to FEIS Appendix A-1 at 9), then demand at 2050 is reduced by nearly 30,000 AF. Exhibit I. If the Corps persists in using the current water demand model, it must reconsider the distribution of total households in the model between single family and multi-family units and must establish a rigorous defense for its choice of distribution.

Conservation spending, based on a three-year average, was an independent variable in the residential model. FEIS Appendix A-1 at 3. The FEIS states that the source data incorporated into the model comes from Denver Water; the FEIS does not state if the data include expenditures by other providers that use water provided by Denver Water or if they represent only Denver Water's expenditures. FEIS Appendix A-1 at 5. The modeling presented in FEIS used an "updated" figure for conservation spending,

\$1,149,949, reportedly the 2010 figure adjusted to a 1983 basis. FEIS Appendix A-4 at Attachment 2. This figure is, however, substantially less than the three-year average for 2008-2010 actual conservation spending—\$4,016,833 in a 1983 basis—as presented in the 2011 Denver Water Budget document. Denver Water 2011 Budget, attached here as Exhibit J, at 91; figures adjusted to 1983 basis individually using the Bureau of Labor Statistics CPI Inflation Calculator ([http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm), last viewed October 1, 2015). If the conservation spending as determined from the publicly available data is used in the model, 2050 demand is reduced by nearly 88,000 AF. Exhibit K (STC modeling of conservation spending change). As the raw data is not provided it is impossible for the reviewer to understand the origin of this discrepancy or to rationally accept the figure presented in the FEIS. The Corps must either document the conservation spending figure used or re-model demand using irrefutable data.

The model's method was also critically undermined by holding the conservation spending figure constant throughout the fifty-year span of the model, even though population increases by 65% and the number of households increase by 72% during that time. FEIS Appendix A-4 at Attachment 1. This flat-lined spending situation is justified as holding conservation spending constant (FEIS Appendix A-5 at 4) but actually fails to accurately capture a status quo and rather reflects an active decrease in conservation spending per capita and per household. If spending per capita is held constant, 2050 demand is reduced by nearly 23,000 AF.<sup>11</sup> Exhibit K (STC modeling of conservation spending change). If the Corps persists in using the current water demand model, the Corps must re-examine the assumption of holding conservation spending constant rather than holding conservation spending per capita or per household constant.

#### The Corps Fails to Provide Any Meaningful Projection of Actual Demand Under the Fixed Contracts

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<sup>11</sup> The unsupported assertion of Harvey Economics that there will be diminishing returns on investment in conservation in the future (the statement was written in 2004) needs to be rigorously evaluated against the results of conservation programs to date, the continued development of water efficiency technologies, and the emerging region-wide water consciousness. FEIS Appendix A-1 at 5 ("According to outside experts, the 'low hanging fruit' of conservation savings have already been achieved," with no documentation of those comments or the identities of the experts).

Approximately 24,000 AF<sup>12</sup> of the pending demand cited in the FEIS as “need” apparently derived from fixed contracts under which Denver Water is obligated to provide raw, recycled or treated water to other entities when requested. FEIS Appendix A-1 at 10. The Denver Water Integrated Resource Plan (Exhibit E) clearly states that the perceived shortage of water in the North System is a result of the potential demand from the fixed contract deliveries. Denver Water Integrated Resource Plan (Exhibit C) at 53.

The only disclosures about demand resulting from these contracts are: a second-hand and unsupported reference by the consultant that “these customers have indicated that they intend to take all of the water they are entitled to by 2030”; the consultant’s opinion that “[a]lthough the exact timing is dependent upon each entity’s own desires, it is reasonable to assume that these commitments will be fulfilled in their entirety by the year 2030”; and an opinion ascribed to a Denver Water official by the consultant that “[a]s of 2000, these customers were receiving approximately 43,000 acre-feet of water, and their calls for additional supplies under their contracts with Denver Water are accelerating more quickly than Denver anticipated.” FEIS Appendix A-1 at 11, Appendix A-2 at 8.

Questions requiring answers in the NEPA analysis that remain unanswered include: 1) who are these entities or customers, 2) how are they using water supplied by Denver Water, 3) what are the nature of the contracts, and 4) are alternatives available to meeting calls for increased supply from Denver Water?

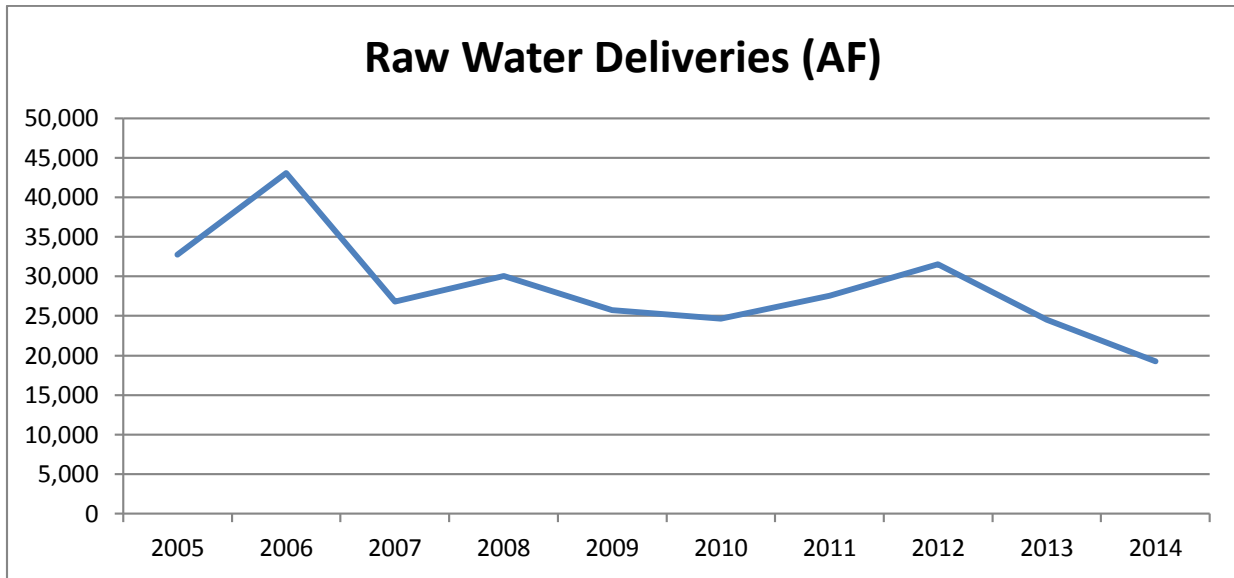
The FEIS does not explicitly describe how the fixed contract demand is incorporated into its demand modeling, leaving the reviewer to assume that it is fully incorporated in the 2032 figure. FEIS at 1-15 (Table 1-1). STC’s critique is based on this assumption.

The FEIS utterly fails to provide any type of quantitative support for the assertion that the contracted for water represents an actual need. Readily available data does not support any demonstration of immediate “need” for water by Denver Water to fulfill requests under these contracts. In fact, and contrary to the fear-mongering statement that “calls for additional supplies under their contracts with Denver Water are accelerating more quickly than Denver anticipated (FEIS Appendix A-2 at 8), raw water

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<sup>12</sup> “There are approximately 30 entities, including municipalities, water districts, industrial customers, golf courses and power plants, that have agreements with Denver Water to provide up to a certain supply of either treated or raw water each year. In the year 2000, the total water demand from these fixed and special commitments amounted to approximately 43,000 acre-feet. However, Denver Water is committed to providing slightly more than 67,000 acre-feet, suggesting that an additional 24,000 acre-feet of demand be incorporated in the Denver Water demand projections.” FEIS Appendix A-1 at 10.

demand has not increased over the last decade.<sup>13</sup> As with total demand, annual use varies but the trend is clearly for demand to be either flat or decreasing:



Data: Denver Water 2014 Annual Report (Exhibit C)

In light of this critical role deliveries under the fixed contracts play in the “need” for the Moffat Project, it is inexcusable that the Corps failed to take a hard look at actual demand. The Corps must undertake an independent analysis of the actual demand anticipated under these contracts within the project time frame, similar to—but more competent than—that conducted for Denver Water’s Combined Service Area, and consider how Denver Water might meet that demand without developing additional firm yield in the North System. The Corps should pay particular attention to the role of temporary demand and demand meeting techniques in light of the extremely variable nature of water use in the Denver Water system.

#### The Arvada Contract is Inappropriately Included in Water Demand Projections

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<sup>13</sup> Raw water delivery amount is not a perfect approximation for the amount of water that Denver Water provides under these contracts but provides a reasonable proxy for the general trend. In 2014, deliveries outside the Combined Service Area were split approximately 2/3 raw water and 1/3 treated water. Denver Water 2014 Annual Report (Exhibit C) at III-21 and III-22.



The FEIS incorporates 3,000 AF from the 1999 Arvada Contract into the projected demand beginning in 2032. FEIS at 1-15 (Table 1-1). As Denver Water is only obligated to provide this water if the firm yield from the Moffat Collection System is increased (FEIS at 1-19), it was improper for the Corps to incorporate this amount into the “need” for the project. This 3,000 AF of increased firm yield is a consequence of the project, not an underlying demand that creates a justification for the project. The Corps must re-conduct its demand projections and need analysis without considering the water proposed under the Arvada contract.

This 3,000 AF represents 1/6 or 16.67% of the 18,000 AF new firm yield “need” claimed by Denver Water – a significant percentage of the total. Subtracting the 3,000 AF might significantly increase the attractiveness of various alternatives to the current preferred alternative.

#### **4. Conclusion**

In order to comply with the National Environmental Policy Act, Clean Water Act, and Endangered Species Act, the Corps must redo the demand projections in the FEIS. STC’s review of the FEIS and comments presented here are not intended to be comprehensive, but STC’s comments make a clear case that the demand projections are fatally flawed and must be redone. These comments are supplementary to earlier submissions and do not replace previous comments unless specifically noted as doing. STC has confirmed with the Corps that the Corps will accept and consider all substantive comments on the FEIS submitted prior to the publication of the Record of Decision for the Moffat Project<sup>14</sup>. Consequently, these comments – raising major issues of great public interest -- are entitled to full review and response by the Corps


Save The Colorado stands ready and willing to meet with the Corps and Denver Water officials to discuss this crucial and glaring flaw in the current NEPA documents prepared in conjunction with the Moffat project.

Please acknowledge receipt of this letter.

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<sup>14</sup> [http://www.dailycamera.com/boulder-county-news/ci\\_25908721/army-corps-will-take-more-comment-gross-reservoir](http://www.dailycamera.com/boulder-county-news/ci_25908721/army-corps-will-take-more-comment-gross-reservoir)

Thank you,

A handwritten signature in black ink that reads "Gary Wockner". The signature is fluid and cursive, with the first name "Gary" being more prominent than the last name "Wockner".

--

Gary Wockner, PhD, Executive Director  
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The mission of Save The Colorado is to protect and restore the Colorado River and its tributaries from the source to the sea. Save The Colorado focuses on fighting irresponsible water projects, supporting alternatives to dams and diversions, fighting and adapting to climate change, supporting river and fish species restoration, and removing deadbeat dams. Save The Colorado has thousands of supporters throughout the Southwest U.S. from Denver to Los Angeles and beyond.