BEFORE THE COLORADO WATER CONSERVATION BOARD

STATE OF COLORADO

**Rebuttal Statement of Staff of Colorado Water Conservation Board**

IN THE MATTER OF STAFF'S RECOMMENDATIONS FOR AN INSTREAM FLOW APPROPRIATION ON THE SAN MIGUEL RIVER, WATER DIVISION 4

Pursuant to Rule 5n (2) of the Rules Concerning the Colorado Instream Flow and Natural Lake Level, 2 CCR 408-2 ("ISF Rules"), the Staff of the Colorado Water Conservation Board ("CWCB") hereby submits its Rebuttal Statement in support of Staff's recommendation for an instream flow ("ISF") appropriation on the subject reach of the San Miguel River.

## BACKGROUND:

The Board declared its intent to appropriate an ISF water right on this segment of the San Miguel River at its January 2011 meeting. On July 15, 2011, Staff submitted its Prehearing Statement in support of its recommendation for an ISF water right on the San Miguel River from the confluence with Calamity Draw downstream to the confluence with the Dolores River.

In its Prehearing Statement, Staff set forth evidence demonstrating that the ISF amounts claimed on the San Miguel River are based upon standard scientific methodology, including accurate R2Cross and PHABSIM (Physical Habitat Simulation) analyses; reflect the amount of water available for the appropriation; and are necessary to preserve the identified natural environment to a reasonable degree.

On July 29, 2011, the Hearing Officer held a pre-hearing conference for this contested proposed ISF appropriation for the purposes of establishing an agenda for the hearing before the CWCB scheduled for September 13, 2011 and resolving any procedural issues prior to the hearing. In accordance with the ISF Rules, the Hearing Officer established the following issues for hearing: (1) whether there is a natural environment that can be preserved to a reasonable degree if the CWCB's water right is granted; (2) whether a natural environment will be preserved to a reasonable degree by the water available for the appropriation; and (3) whether such environment can exist without material injury to water rights.

## ARGUMENTS

### 1. Natural Environment and Biological Flow Recommendation

In their prehearing statements, Opponents make multiple assertions regarding the existence of a natural environment and question the assumptions and validity of the quantification methodologies used to recommend the minimum flows necessary to preserve the natural environment to a reasonable degree. Opponents have identified the following specific concerns:

- Colorado Division of Wildlife, hereinafter Colorado Division of Parks and Wildlife (CPW), and Bureau of Land Management (BLM) appear to target "optimum" habitat conditions to "maximize" the natural environment in the subject reach.
- The BLM and CPW did not establish and verify that the reach of stream selected for study is representative of habitat conditions in the entire ISF reach.
- The biological justification in the PHABSIM analysis failed to consider multiple life stages, relative abundance of species or habitat requirements of the most sensitive species.
- The habitat curves developed by Anderson and Stewart are not suitable for application to the San Miguel River.
- BLM and CPW did not properly apply the depth and velocity criteria in the R2CROSS modeling.
- BLM and CPW identify efforts outside the proposed ISF reach to enhance flows and habitat for certain fish species.

The BLM and CPW, as the recommending agencies, have coordinated to provide sufficient biological evidence demonstrating the existence of a natural environment on the San Miguel River and to quantify the minimum amount of water necessary to preserve the natural environment to a reasonable degree. Further, Staff and the Board rely upon the biological expertise of the CPW as the basis for the Board's statutory determinations. As a result, Staff defers to CPW and BLM's rebuttal statement regarding the scientific basis for the existence of a natural environment and the biological flow recommendation. However, based upon its programmatic expertise with regard to policy and legal questions regarding what constitutes the "minimum amount necessary to preserve the natural environment to a reasonable degree," Staff submits the following rebuttal to Opponents' contention that the recommended flow amounts exceed the minimum necessary for reasonable preservation of the natural environment.

Over the history of the ISF Program, the CWCB has relied upon standard quantification methodologies (R2CROSS & PHABSIM) as utilized by CPW biologists to scientifically quantify minimum flows. Both methodologies result in flow recommendations that would protect **100 percent** of existing adult fish habitat (or the **optimum adult habitat**) when a fishery is used to indicate the presence of a natural environment. These quantification methodologies allow CPW to equate optimized habitat with a specific flow, which is the minimum flow needed to maintain the existing habitat, and thus the indicator fish. CPW and Staff are attempting to preserve the natural environment conditions that exist at the time of the Board's appropriation.

CPW's and Staff's association of the goal of achieving optimum fishery habitat with the minimum flow necessary for reasonable preservation can result in confusion (see Montrose County's prehearing statement, 9i on page 2; SWCD prehearing statement , page 3). Some Opponents imply that optimum habitat must mean optimum flows, which would be at odds with the minimum flow required for reasonable preservation. However, when CPW and Staff refer to the optimum habitat, they are talking about the biological definition of optimum, which means "the most favorable condition for the growth and reproduction of an organism" (http://www.merriam-webster.com/dictionary/optimum?show=0&t=1312488919, under existing average flow conditions. Optimum habitat does not mean optimum flows, which could include channel maintenance flows. While numerous biologists agree that such flows are necessary for any given fishery, the appropriation of such optimum flows is not being recommended here.

Another way to demonstrate the need for optimum fish habitat is by considering the potential consequences to the natural environment if one were to choose less than optimum habitat conditions for a given species. The logical construct set forth below illustrates this idea and how CPW biologists use modeling to arrive at the correct minimum flow.

- Modeling enables biologists to correlate the flow in a river to the physical habitat available to a given fish species.
- The objective of a CWCB ISF water right is preservation of the natural environment using the minimum amount of water.
- The existing fishery (indicator species) represents the broader natural environment that may include other biota, including the associated riparian areas.
- Preservation (*maintenance*) of that fishery requires protection of its existing habitat.
- Diminution of that habitat could produce harmful changes in the distribution, quantity or health of the fishery, whereas maintaining the most favorable existing habitat conditions (optimum habitat) will ensure that the fishery is "preserved" (to keep safe from injury, harm, and destruction; to protect; to maintain). To choose anything less than the optimum habitat is to risk diminution, which is not consistent with "reasonable preservation" of the natural environment.
- Consequently, the ISF is quantified to be the **minimum** flow to **preserve** that **existing optimum habitat**.
- CPW's recommendation is the modeled flow to achieve that objective.

Finally, correlating the activities of mankind with some reasonable preservation of the natural environment is a separate endeavor from the quantification of the minimum flow necessary. As demonstrated above, reasonable preservation only can be achieved when the goal is 100 % protection of existing habitat. Science defines the minimum, whereas policy establishes the manner and degree of correlation and defines "reasonable." In other words, to effectively correlate the needs of mankind with reasonable preservation, the Board may provide additional time for stakeholders to reasonably develop water rights that would be senior in priority to the proposed ISF water right. In addition, the Board's enabling statute itself provides for correlation by requiring the Board to recognize practices in existence at the time the Board appropriates an ISF water right. Correlation also takes the form of the Board looking at average or median hydrographs to assure that even with the appropriation of an ISF water right, adequate water remains available that Colorado's citizens can develop and use as the need arises. Staff has provided the basis for the Board's correlation in this case using all three of the above-described methods.

**2. Water Availability**

Opponents have raised numerous water availability arguments, many of which may result from a misunderstanding of how the Board, its Staff and CPW staff define and analyze water availability as it relates to an ISF water right and its purpose of preserving the natural environment to a reasonable degree. In addition, it appears that Opponents want to apply a water availability criterion more appropriate to firm yield analyses as used in water development projects. Opponents' attempts to discredit or cast doubt on staff methodology may be a direct consequence of this desire to rely upon common "firm yield" analyses. Differences in

approaches might be at the root of Opponents' claim that staff did not use correct scientific hydrologic methodologies or has made substantive errors.

Throughout the ISF Program's history, the Board has defined water availability for preservation of the natural environment as the *mean flow of a stream as determined at the downstream terminus of a proposed ISF reach*. If a proposed recommendation falls below the mean flow determined at this point, water was considered available for appropriation.

There are several reasons that the Board has based its ISF water availability determinations on mean flows. First, from a biological perspective, it is recognized that a self-sustaining fish population that is endemic to a given stream ecosystem adapts to some degree so as to survive over a range of seasonal and long-term flow conditions associated with the hydrologic variability of the ecosystem. It is further recognized that species do not exist indefinitely under any given extreme flow condition such as excessive high flow periods or periods of drought. Survival during wet or dry periods may occur through various adaptive mechanisms, such as downstream migration or temporary survival in pools during drought periods, or the use of tributary refugia habitat during high flow events. There is a multitude of evidence in the biological and ecological sciences indicating that if a species is subjected to such extreme conditions over a long period of time, there will likely be a negative effect on the population dynamics in terms of species health and/or numbers. In some cases, the end result will be extirpation of the species from the ecosystem. Therefore, mean flow conditions are chosen to represent ecosystem flow conditions that have occurred and in which a species has developed and flourished over time. This is not to say that temporary extreme conditions are not necessary. For example, there exists a substantial body of scientific literature that suggests regular periodic high flow events are necessary for channel/habitat maintenance purposes and without such flows, there could likewise be diminution of habitat and negative effects on species survival. (See rebuttal arguments by CPW).

In addition to the biological reasoning above, the Board adopted the mean flow criteria because it provides a natural balance between the needs of mankind and reasonable preservation of the natural environment, as required by the ISF statute. Mean flows, when compared with ISF recommendations based solely on biological fishery needs; provide room under the hydrograph for future storage and development. Furthermore, even though it is often suggested that the more familiar firm yield approach be employed, it is easy to see why the utilization of wet or dry year exceedances would be unreasonable from either the standpoint of water development or the preservation of an existing fishery. Wet year exceedances may provide optimum flow conditions for a fish species by providing necessary geomorphologic channel maintenance flows, but the application of such water availability criteria could preclude future water development. Likewise, dry year exceedances would result in diminution of habitat and possible extirpation of a species which would be unreasonable given the goal of preserving the natural environment, which means maintaining, protecting or safeguarding the indicator fish species, and thereby the natural environment.

Although the Board has chosen mean flow conditions to represent the availability of water, CWCB and CPW staff further refined these analyses to be more rigorous and to prevent the effects of rare extreme high flow events from skewing the results. Therefore, median monthly flows statistics (50 percent exceedances or the flow equaled or exceeded 50% of the time) have been used to better define water availability for ISF water rights. In recent years, Staff has continued to increase the rigor of its analyses by using the geometric mean statistic of daily values. The result is an even better approximation of mean conditions unaffected by rare high

flow events. Note that when the statistics are performed on a population of gage data, the geometric mean generally approximates median flows. In general, the geometric mean is a more rigorous descriptor of central tendency that reduces the effect upon computation of daily values of extreme flows that have a smaller role in the long-term formation and maintenance of channel morphology and physical habitat.

Following is a list of more specific arguments made by the Opponents either in their prehearing statements or through their experts. Staff's rebuttal includes the general arguments outlined above as well as specific detailed responses to each individual criticism of Staff's analyses.

1. The CWCB staff's hydrologic analysis used to develop and support the ISF recommendations includes unreasonable assumptions and methodologies (Arguments identified in the Deere and Ault report – Montrose County Prehearing Statement Exhibit 3; and Bikis Report – Farmers Water Development Company Prehearing Statement Exhibit 1)

   CWCB staff utilizes standard statistical hydrologic methodologies and applies appropriate assumptions when dealing with sets of stream gage data. Furthermore, Staff's analyses comply with, and are based upon, the US Geological Survey's *Techniques of Water Resources Investigations Series, Book 4: Hydrologic Analysis and Interpretation, Chapter A3: Statistical Methods in Water Resources* by D.R. Helsel and R. M. Hirsch. This technical reference provides the scientific background and guidance important to the systematic interpretation of hydrologic data. Some of the arguments posited by the Opponents regarding unreasonable assumptions and methodologies appear to be based upon an interpretation of water availability that is inappropriate for application to a water right used to preserve the natural environment, including the fish targeted for protection. Based upon their premise that a dry year exceedance should be applied to ISF water rights, Opponents argue that staff methodologies and assumptions are unreasonable.

   Additional specific arguments regarding methodology and assumptions are outlined in both the Deere and Ault reports and the Bikis report. Some of these specific arguments address CWCB's proration of the Uravan Gage data to the downstream terminus; correct calculation of drainage area ratios vs. use of precipitation volume ratios; and accounting to include influences from other tributaries and/or ground water. Owen Williams explains why these assumptions are incorrect, insufficient, or irrelevant as set forth in the attached rebuttal memos to the Bikis Report (Exhibit 1) and the Deere and Ault Report (Exhibit 2).

2. The available hydrology may be inflated by the development of a synthetic hydrology that overestimates water availability at the upper end of the reach. (Arguments by SWCD, Norwood and Lone Cone Ditch and Reservoir Company)

   In essence, this argument suggests that recommendations for ISFs should be quantified at the upper terminus of subject stream reaches. This approach would be impractical for an ISF right because of the nature of the right itself. Unlike virtually all other water rights, the ISF right has a linear or "area" character rather than being defined at a single point.

Were the quantification to be applied to the upper terminus, the Board would be faced with a quantification that would be perceived to be either insufficient to preserve the natural environment to a reasonable degree or to exceed the minimum amount necessary to accomplish that objective.

When quantification is done at the upper terminus, the area of the contributing basin, bank full width, channel cross-sectional area, width/depth ratio, energy slope, incident precipitation, and other factors all are likely to substantially differ from the values at the lower terminus. The dimensions at the upper terminus and their associated discharge values would lead a field technician to compute a hydrograph that differs substantially from one based upon the lower terminus and would be representative of a smaller stream. In addition, if that upper terminus were placed at a fairly high elevation, the timing of the peak and the distribution of annual discharge over time could deviate so significantly from the basin measured at lower elevations that assuring delivery in priority might become difficult or impossible. Other appropriators could be injured unnecessarily as the flow regime of a high elevation stream is mimicked at the lower terminus. Furthermore, farther downstream, the ISF amounts would likely be insufficient to reasonably protect the natural environment because of the larger stream environment needing protection at the lower terminus.

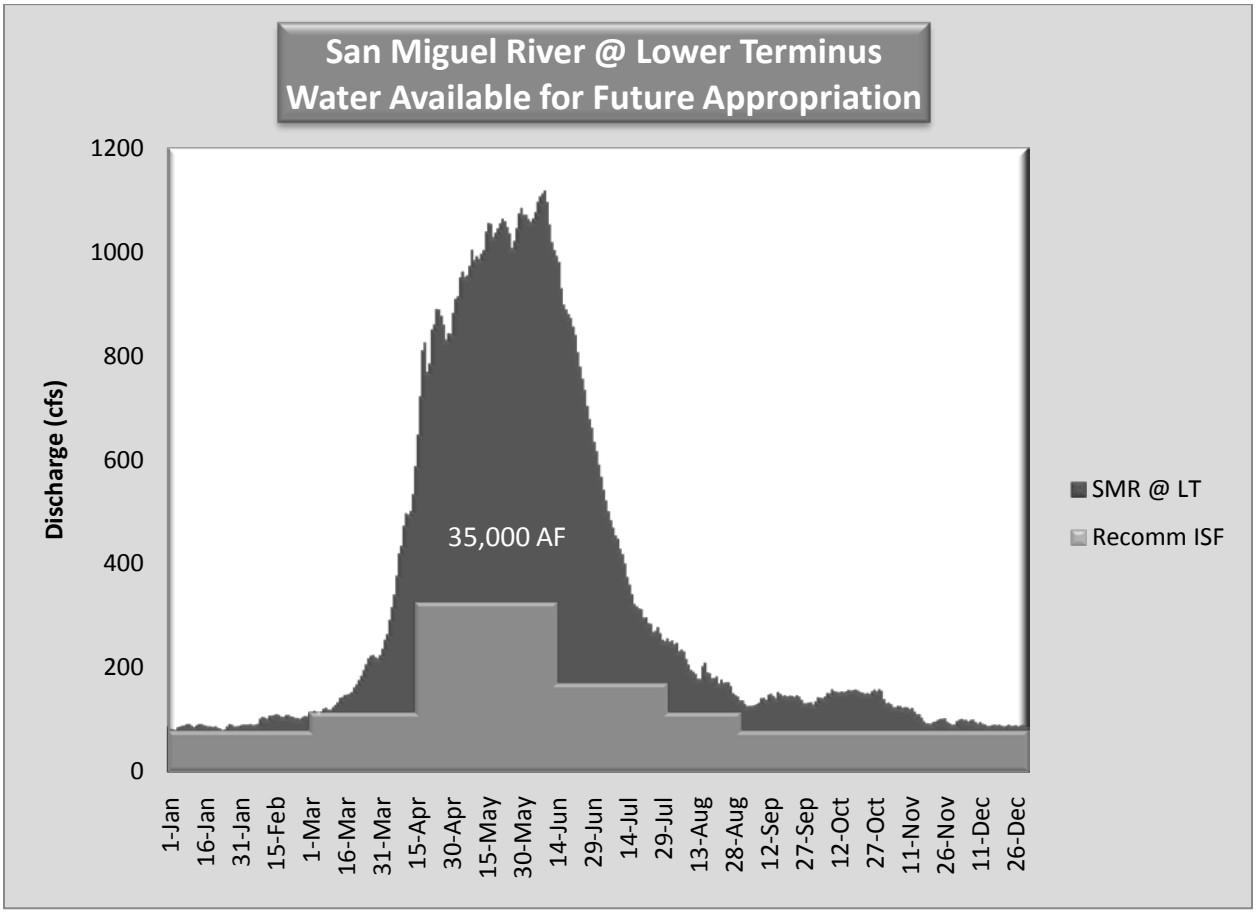
Quantification of the streamflow and ISF needs at the lower terminus, however, achieves the preservation objective more reasonably. The hydrograph of discharge at this location integrates the flows from upstream sub-basins that terminate at various elevations and aspects and sometimes derive from different sources. The historical impacts of existing upstream diversions, uses, exchanges, return flows, etc. have in large part also been integrated into the hydrograph at the lower terminus. Channel form and dimension have evolved over time to accommodate that hydrograph; so, too, have the fishery and its habitat.

One more attribute of quantification at the lower terminus involves the nature of water delivery. As described above, the hydrograph at the lower terminus integrates upstream diversions, return flow, etc. This integration includes the attributes of subsurface water transport. If there are any gaining or losing reaches, they are not segregated. Identification of such areas would require costly studies and the resulting characterization could be highly variable in time and space. As stated above, the hydrograph reflects an integration of all of the attributes influencing discharge, whatever the source of water. The same can be said of the resident fishery and its habitat. The Board has adopted this lower terminus quantification approach to determine the ISF amount most suitable for the preservation of the natural environment to a reasonable degree without claiming more water than necessary to achieve the preservation objective. This does not require a determination of the pathways water follows before arriving at the lower terminus.

Owen Williams further explains why this argument is incorrect, impractical and unnecessary as set forth in the attached rebuttal memo (Exhibit 3)

3. The proposed ISF will deprive the citizens of Montrose County the beneficial use of water available by law and compact (Arguments of Deere and Ault). This issue is addressed below and in the legal memo attached as Exhibit 4.

Staff has estimated that a significant amount of water (approximately 35,000 AF – represented as the dark shaded area in the hydrograph below) is still available for appropriation under the hydrograph of the geometric mean, which was used to determine water availability for this proposed ISF. However, much more water would likely be available for storage for future development if one were to look at the overall average hydrologic conditions as opposed to the geometric mean statistic. In Western Resource Advocates' prehearing statement, hydrologist Laura Bellanger calculated that 167,183 AF/Yr would be available under <u>average</u> conditions above the ISF recommendation. The proposed ISF will not deprive the citizens of Montrose County of the beneficial use of water available by law and compact because of the remaining water and because the ISF appropriation was delayed specifically to give the citizens of Montrose County and others time to develop beneficial uses of the water.




## LEGAL MEMORANDUM

Legal rebuttal arguments are included in the attached legal memorandum (Exhibit 4).

## EXHIBITS

The following list of exhibits supplements the list of exhibits provided in CWCB staff's prehearing statement.

1. August 12, 2011 memo from Owen Williams to Linda Bassi and Jeff Baessler entitled San Miguel River ISF, Bikis Water Consultants, LLC Report – Rebuttal Exhibit 1

2. July 31, 2011 memo from Owen Williams to Linda Bassi and Jeff Baessler entitled San Miguel River ISF, Deere and Ault Comments Water Availability - Rebuttal Exhibit 2

3. August 17, 2011 memo from Owen Williams to Linda Bassi and Jeff Baessler entitled San Miguel River ISF, Southwestern Water Conservation District – Rebuttal Exhibit 3

4. August 18, 2011 Legal Memorandum from Susan Schneider to the Colorado Water Conservation Board entitled Instream Flow Appropriation on the San Miguel River – Rebuttal Exhibit 4.

## ALLOCATION OF TIME

The Hearing Officer's order requires that the rebuttal statement include the time allocated to each party to present their case within the proponent group. The following table outlines this allocation of time. All proponents have agreed that if they do not utilize their full allocation of time, they will give the unused amount of time to the CWCB staff for rebuttal purposes. Since CPW provides expertise to the Board on the natural environment aspects of the required statutory findings, Staff may allocate a portion of its rebuttal time to CPW.

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| CWCB Staff | 1 hour |
| Recommending Entities (BLM & CPW) | 1 hour |
| Sheep Mountain Alliance, Western Resource Advocates, and Wilderness Society | 1 hour |

Respectfully submitted this 19th day of August, 2011

JOHN W. SUTHERS
Attorney General

*/s/ Susan J. Schneider*

SUSAN J. SCHNEIDER, 19961*
First Assistant Attorney General
Natural Resources and Environment Section
Attorneys for the Colorado Water Conservation Board

## CERTIFICATE OF SERVICE

I hereby certify that I have duly served the copies of the foregoing Rebuttal Statement of Staff of Colorado Water Conservation Board upon all parties herein by email or depositing copies of the same in the United States mail or via email, postage prepaid, at Denver, Colorado, this 19th day of August 2011, addressed as follows:

Casey Shpall
Hearing Officer
Colorado Attorney General's Office
1525 Sherman Street, 7th Floor
Denver, CO 80203
casey.shpall@state.co.us

Linda Bassi
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203
(303) 866-3441 ext. 3204
linda.bassi@state.co.us

Susan Schneider — Staff Attorney
Scott Steinbrecher — Staff Attorney
Natural Resources and Environment Section
Colorado Department of Law
1525 Sherman Street, 7th floor
Denver, CO 80203
(303) 866-5046
susan.schneider@state.co.us
scott.steinbrecher@state.co.us

Colorado Division of Wildlife
Mark Uppendahl
Colorado Division of Wildlife
6060 Broadway
Denver, Colorado 80216
(303) 291-7267
mark.uppendahl@state.co.us

Bureau of Land Management
Roy Smith
DOI, BLM, Colorado State Office
2850 Youngfield Street
Lakewood, CO 80215-7093
(303) 239-3940
roy_smith@co.blm.gov

Farmer's Water Development Company
David Alexander, President
Farmer's Water Development Company
PO Box 10
Norwood, CO 81423
(970) 327-4844
FarmersWDC@yahoo.com

Chris D. Cummins
FELT, MONSON & CULICHIA, LLC
319 N. Weber
Colorado Springs, Colorado 80903
(719) 471-1212
cdc@fmcwater.com

Board of County Commissioners of Montrose County
Charles B. White
Petros & White, LLC
1999 Broadway, Suite 3200
Denver, CO 80202
(303) 825-1980
cwhite@petros-white.com

Sheep Mountain Alliance
Jennifer Russell
Nathaniel Smith
Russell & Pieterse, LLC
PO Box 2673
Telluride, CO 81435
(970) 728-5006
jenny.russell@lawtelluride.com
nate.smith@lawtelluride.com

Southwestern Water Conservation District
John B. Spear
Janice C. Sheftel
Adam T. Reeves
Maynes, Bradford, Shipps & Sheftel, LLP
835 E. 2nd Avenue, No. 123
Durango, CO 81301
(970) 247-1755
bspear@mbssllp.com
jsheftel@mbssllp.com
areeves@mbssllp.com

Norwood Water Commission
Lone Cone Ditch & Reservoir Company
John B. Spear
Janice C. Sheftel
Adam T. Reeves
Maynes, Bradford, Shipps & Sheftel, LLP
835 E. 2nd Avenue, No. 123
Durango, CO 81301
(970) 247-1755
bspear@mbssllp.com
jsheftel@mbssllp.com
areeves@mbssllp.com

Western Resource Advocates
Robert Harris
Bart Miller
Western Resource Advocates
2260 Baseline Road, Suite 200
Boulder, CO 80302
(303) 444-1188
bmiller@westernresources.org
rharris@westernresources.org

The Wilderness Society
Robert Harris
Bart Miller
Western Resource Advocates
2260 Baseline Road, Suite 200
Boulder, CO 80302
(303) 444-1188
bmiller@westernresources.org
rharris@westernresources.org

San Miguel Water Conservancy District
Raymond Snyder, President
San Miguel Water Conservancy District
PO Box 126
Norwood, CO 81423

Robert W. Bray, Secretary
San Miguel Water Conservancy District
PO Box 65
Redvale, CO 81431

Board of County Commissioners of San Miguel County
Becky King

San Miguel County Attorney's Office
PO Box 791
Telluride, CO 81435
(970) 728-3879
beckyk@sanmiguelcounty.org

Colorado Environmental Coalition
San Juan Citizens Alliance
American Whitewater
Western Colorado Congress
Center for Native Ecosystems
Becky Long
Colorado Environmental Coalition
1536 Wynkoop Street # 5C
Denver, CO 80202
(303) 534-7066
becky@ourcolorado.org

/s/ *Holly Archer*

# STATE OF COLORADO

**Colorado Water Conservation Board**
**Department of Natural Resources**
1313 Sherman Street, Room 721
Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us



TO: Linda Bassi
Jeff Baessler

FROM: Owen Williams

DATE: August 12, 2011

SUBJECT: **San Miguel River ISF, Bikis Water Consultants, LLC Report – Rebuttal Exhibit 1**

As you requested, I have reviewed the Pre-Hearing Statement for Farmers Water Development Company (Farmers). In its **Statement of Factual and Legal Claims Asserted and Legal Basis of the FWDC** (Statement), Farmers asserted "…the minimum in stream flow ('MISF') quantities sought by the CWCB are excessive, at times well in excess of the physical flows which exist in the subject reach of the San Miguel River, evidencing that whatever natural environment exists within the San Miguel River can be preserved with lesser appropriations, if such MISF appropriations are necessary at all." Farmers also stated its intent to provide evidence that "…the methodologies, analysis and techniques utilized by the CWCB in determining the volumes and quantities of the MISF at issue here are inappropriate and result in over-appropriation of water, in excess of that amount required for the preservation of the natural environment to a reasonable degree, and resulting in injury to the vested water rights of others," and that "…material errors exist in the analysis and data relied upon by the CWCB in calculating the MISF amounts for the San Miguel River, and that independent analysis of water availability and the quantities necessary for the preservation of the natural environment provide far reduced flows than those recommended by the CWCB."

The remainder of the Farmers Statement addressed the exhibits to be introduced, witnesses to be called, alternative proposal (protective terms and conditions). Within the list of exhibits and as mentioned elsewhere in the Statement, a report by Bikis Water Consultants, LLC was to be used and relied upon to address the CWCB's determination of, inter alia, water availability. The report, cited in the Statement as ***Exhibit 1: November 2009 Evaluation of Technical Basis for Lower San Miguel River CWCB Instream Flow Recommendation – Analysis by Bikis Water Consultants, LLC***, provides the technical foundation for Farmers' challenge to the CWCB appropriation.

The above quotations taken from the Farmer Statement are sufficiently broad that they cover the same material as was addressed by Deere and Ault (D&A) (See Exhibit 2 of Montrose County Prehearing Statement), and are addressed in Staff's Rebuttal Exhibit 2.

Staff reviewed and prepared a rebuttal to the November 2009 Bikis report in 2009, which addresses those parts of the Bikis report that are related to water availability, and is set forth below.

## San Miguel River ISF Recommendation – CWCB Staff's Response to Bikis Water Consultants Report

In November 2009, Bikis Water Consultants (BWC) prepared a report entitled "Evaluation of Technical Basis for Lower San Miguel River CWCB Instream Flow Recommendations." The report, funding of which was attributed to certain water interests in the San Miguel Valley, evaluated the data and analyses forming the bases of the instream flow ("ISF") recommendation submitted to the CWCB staff by the Colorado Division of Wildlife ("CDOW") and the USDI Bureau of Land Management ("BLM") in February 2008. This evaluation identified a number of concerns surrounding the R2-Cross analysis performed by the CDOW and the BLM. In support of the stated concerns, BWC described work it had done using R2 Cross at a limited number of sites on the San Miguel River.

While little in BWC's report directly addressed the CWCB analysis, BWC's report did comment on: 1) the water availability analyses done by CDOW and BLM; 2) the role of groundwater contributions to river flow; 3) the inclusion of existing water rights in the CWCB analysis; and 4) impacts of the recommended ISF water right upon existing and future water rights . To its credit, BWC's report did recognize the fact that CWCB's water availability analysis was rigorous and included methods of the US Geological Survey[1].

The conclusions reached by BWC were necessarily different from those of the CWCB because the approaches used were fundamentally different. While some of BWC's concerns arise from a lack of information (e.g., the CWCB did not include existing water rights in its analysis), others result from differences in the approaches used. The following table examines a number of these differences:

| Issue | Bikis Report | CWCB Rebuttal |
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| What constitutes available water? | Any period of flow less than the ISF amount indicates unavailability. | •CWCB uses entire valid data set of a gage to describe the basin hydrology.<br>•Available water is the hydrograph computed from the flow record at the USGS gage station, adjusted for existing uses, that is equal to or greater than the recommended ISF amount.<br>•The occasional occurrence of flows less than the ISF amount is expected and accepted because of the resilience of natural environment and its inhabitants. |
| | Water availability planning is based on dry year conditions. | •Water availability to preserve the natural environment to a reasonable degree is based on a variable flow regime that includes wet and dry periods.<br>•The historical shortage of water for the natural environment highlights the importance of securing protections for fish in reaches containing important habitat at critical times of the year. |

[1] Techniques of Water-Resources Investigations of the United States Geological Survey Report (Book 4, Chapter A3)

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| Conflict among existing beneficial water uses | A junior water right for ISF will create conflict with existing beneficial water uses during periods of low flow. | •The junior ISF right can operate only when in priority and can have no impact on the operation of existing, senior water rights.<br>•The ISF recommendation is based on existing flow conditions and integrates the effects of upstream uses.<br>•As the most junior water right, the ISF right would not be able to call out existing senior water rights. |
| Conflict among future beneficial water uses | A junior water right for ISF will create conflict with future beneficial water uses during periods of low flow. | •In dry years, future water uses would be junior to the ISF as intended under Colorado law. As such, these uses and the ISF water right would operate in priority<br>•Conflicts with future beneficial uses during the irrigation season would arise among more senior water rights before the ISF water right would be in priority.<br>•Under Colorado water law, the right to use water depends upon actual beneficial use commenced at a point in time rather than as a future possibility that may or may not happen.<br>•The conditional water right is the means under Colorado water law whereby municipalities and others can secure water rights in anticipation of future growth while complying with the State's "first in time, first in right" water rights doctrine.<br>•Many conditional water rights have been established in the San Miguel River basin, many of which have been recently filed.<br>•If fully developed, these rights would more than satisfy currently anticipated needs. However, satisfying those rights would require more water than the basin typically produces. |
| | Changes in senior water rights in Telluride and other areas would be affected by the recommended ISF. | •Changes to existing water rights can and do occur to the extent that the change does not injure other water rights. This means senior rights holders can change the consumptive portion of their water right to the degree that (1) water users who depend upon the historical return flows are unharmed, and (2) no expansion of use of the water right results.<br>•Many changes to existing senior water rights would be constrained by other senior water rights before they would be affected by the ISF.<br>•Telluride's rights would enjoy the same protections and privileges as any other senior right, and like all other senior water rights, would have to protect the existing exercise of all junior water rights, including any decreed ISF water right. |
| Water accounting | Ground water contributions occur between Naturita and Uravan gages and should be "accounted for in the ISF". | •CWCB uses the gage record without regard to origin of the discharge as ground or surface water. Such a distinction would be difficult to establish and would likely change as a function of weather and climate.<br>•Because the natural environment and its inhabitants exist within a variable flow regime with both surface and ground water components, there is normally no need to distinguish |

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| | | between surface and ground water sources.<br>•The State of Colorado, for the purpose of efficient effective administration, has determined that all surface and ground water is tributary, with the exceptions of certain designated basins, which basins are subject to rules established within and in recognition of special site-specific circumstances. |
| | Because a portion of the flow derives from groundwater sources, the ISF should be diminished near the upper terminus to allow the accretion to make up the difference at the lower terminus. | • ISFs are computed and decreed for a reach, and thus require the full flow amount to the extent it is physically and legally available.<br>•If followed, this logic could also be used as a basis for claiming greater flow at the lower terminus so as to maintain the target ISF at the upper terminus. |
| Interstate Compact obligations | An ISF right would decrease the amount of water available for beneficial use within the state by delivering more to downstream states. | •No more water would be delivered out of state as a consequence of the ISF than is currently occurring because the ISF amount is based on current flow conditions.<br>•The lower terminus is located 29 ½ miles above the state line<br>•The recommended ISF amount still allows for additional appropriation for beneficial uses. |
| Possible future diversions | The water that would not be diverted as a consequence of the ISF equals a "lost diversion potential" of 8,667 A-F. | • The CWCB analysis indicates water would still be available for appropriation if the recommended ISF were established.<br>•Colorado law recognizes ISF water rights as a lawful beneficial use of water and does not qualify that use as different from that of any other decreed water right. |

In sum, little of the BWC report directly addresses the CWCB's water availability analysis. However, the attention that <u>is</u> paid to water availability relies upon an interpretation of the term that is inappropriate for application to a water right used to protect the natural environment, including the fish whose protection serves as the indicator of "protection of the natural environment to a reasonable degree". Stated in other words, the CWCB conducted its water availability analysis using its standard methodology and found that water is available for instream flow purposes to preserve the natural environment to a reasonable degree without injury to existing water rights.

Issues related to the R2 Cross analysis and other data related to the natural environment itself can best be addressed by the recommending entities themselves. Other issues raised by the BWC report relate to matters beyond the scope of this instream flow water rights recommendation and CWCB's assessment of its merits. These issues are not addressed here.

# Colorado Water Conservation Board
## Department of Natural Resources
1313 Sherman Street, Room 721
Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us




TO: Linda Bassi
Jeff Baessler

FROM: Owen Williams

DATE: July 31, 2011

SUBJECT: **San Miguel River ISF, Deere and Ault Comments Water Availability - Rebuttal Exhibit 2**

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As you requested, I have reviewed the June 14, and July 15, 2011 Memoranda from Deere and Ault Consultants, Inc (D&A) to Colorado Water Conservation Board regarding ***Review of FINAL San Miguel River ISF Executive Summary…*** and ***Impact of the Proposed San Miguel River Instream Flow Filing on Water Available Under the Colorado River Basin Compact,*** respectively. This rebuttal memo will show that the conclusions of D&A with respect to CWCB's hydrologic analysis of water availability for instream flow in the San Miguel River between Calamity Draw and the Dolores River in Water Division 4 are incorrect, insufficient, or irrelevant. My responses will address D&A's comments as they are sequentially presented in the text of their memoranda, starting with the June 14 memorandum.

**D&A's First Conclusion**

The first of D&A's four conclusions asserts that by "adjusting" the existing USGS San Miguel River gage at Uravan (USGS 09177000) to represent the flow regime at the "very most downstream location of the ISF reach, it is likely the CWCB created a synthetic gage that is less representative of the hydrologic conditions of the entire reach." D&A further asserts that the existing gage is the better record for describing water availability within the (entire) ISF reach. No basis for this assertion is offered within the text of conclusion #1; presumably, support for this conclusion can be found elsewhere in the memorandum. Please note that staff strongly disagrees with this assertion.

**CWCB Staff Response to D&A's First Conclusion**

When faced with a recommendation for an ISF, it is rare that its Lower Terminus (LT) is collocated with a USGS or other entity's stream gage. On those occasions when the LT is fortuitously collocated with a stream gage, hydrologic analyses and conclusions enjoy a decrease in complexity and an improvement in quality, assuming good data and a sufficiently long Period of Record (POR – the duration of data collection). In this circumstance, the determination of water availability should have the best chance of being accurate; as accurate as underlying data and its interpretation allow. Most ISF recommendations, however, do not conform to this LT – gage collocation ideal. In most cases, water availability must be estimated using methods and tools that address the physical realities of the proposed ISF reach as well as the gage and its location within the stream recommended for an ISF. The farther the LT is located from the gage

site, the more we must rely upon common hydrologic tools and methods to convey information from the gage record to the site of the LT and to the intervening channel. If, as is argued by D&A, the water availability analysis were limited to the gage location and no effort made to include the LT and the channel between the LT and the gage, the resultant water availability analysis would be incomplete.

The D&A memo also conveys the idea that the location of the gage (in the lower third of the ISF reach) is somehow sufficiently close to the LT as to ignore the lower, ungaged segment between the LT and the gage. If, in arguendo, the distance between the LT and the gage were "sufficiently small," perhaps then the D&A assertion might hold. However, outside of the trivial case where the points are coincident, I see no valid way to specify the distance between the LT and the gage such that the LT could be treated as if collocated with the gage. Any distance between the LT and gage identified as acceptable would be arbitrary and indefensible.

On its face, D&A's first conclusion might seem rational. However, the CWCB's water availability determination applies to the entirety of the recommended reach, not just to the portion upstream of the Uravan gage. The data from the Uravan gage can be used to represent the entirety of the recommended ISF reach if the data are "adjusted" to account for the effects of the increased basin size at the LT and of the hydrological effects of human activity within the intervening ("ungaged") reach. Even if this gage, or any other as a general principle, is located fairly close to the LT, CWCB Staff applies the same analytical approach as it uses when the distance between the LT and the gage is substantial. Further, CWCB Staff applies the same analytical approach when there is no gage data available on the stream of interest and the source of data must be a "representative basin." To the degree practicable, it is the objective of CWCB Staff to generate consistent analytical outcomes that are reasonably accurate and helpful to the CWCB in making its determinations. To do this, CWCB Staff has been working to establish a standard analysis protocol to be applied to all ISF recommendations, including those in which the available data might accommodate a "shortcut" to simplify analysis as could be the case, for example, if Staff ignored the portion of San Miguel River downstream of the Uravan Gage and upstream of the LT.

CWCB Staff rebuts D&A's conclusion that "[t]he existing Uravan Gage is the better record for describing water availability within the ISF reach" on the following bases: 1) Excluding a portion of the watershed from analysis could result in a failure to address influential properties important to the analytical outcome; 2) Excluding a portion of the watershed would be an arbitrary action casting doubt upon analytical outcomes and the analysis method; 3) Staff has no valid, tested and broadly applicable method to determine an acceptable length of stream that can be excluded from analysis; 4) Excluding portions of the watershed from analysis would be a deviation from the standard CWCB analysis protocol that Staff has been developing to generate consistent and reasonably accurate outcomes helpful to the Board in its determinations; and 5) Staff analysis could be viewed by the Board and parties to hearings as being incomplete if the entirety of a recommended stream reach and its watershed were not the subject of analysis.

**D&A's Second Conclusion**

In its second conclusion, D&A offers that it "…generally understands the methodology the CWCB suggests it used to develop the water availability at the LT..." and asserts "the results of the hydrological analysis developed by the CWCB appear to be in error." In making its assertion, D&A compared "CWCB's 'geometric mean' of the area-prorated adjusted data values from the San Miguel River at Uravan hydrograph" with the "mean daily discharge at the Uravan

gage." D&A found "decreases [in discharge] at the LT in … January through May and November through December." During the remainder of the year, D&A found increases in flow at the LT ranging from 9.6% in June to 48.6% in September.

D&A continues by giving its understanding of the CWCB methodology as CWCB establishing a "virgin gage" at the Uravan gage by eliminating "human uses" to produce a record "representative of only tributary runoff" and then moving this record to the "LT by adjusting it by the drainage area ratio of 1.0388 and reducing it by the pre-determined upstream human uses." D&A next makes the observation that, "…if this methodology was used, the resultant mean daily discharge at the LT would be approximately 3.88 percent higher " (due to the increased watershed area of the basin at the LT versus the smaller area at the gage) "…not 8.8 percent higher..." D&A therefore concluded the CWCB methodology is "flawed in that it assumes the drainage area that lies downstream of the Uravan Gage contributes to runoff, on a square mile basis, equal to the drainage area at the top of the San Miguel River basin, which the CWCB has previously stated contributes primarily to the flow within the basin as a result of snowmelt."

D&A next chose to check the CWCB's area ratio method of analysis by developing and using a "precipitation volume ratio" instead of the "drainage area ratio" used by CWCB. The "precipitation volume ratio" is computed by computing the mean annual volume of precipitation falling on each basin of interest and forming ratios from the results. This is typically done for each basin of interest by: 1) computing the area between two isohyets (lines of equal precipitation) within a delineated watershed; 2) computing the amount of precipitation incident to the area between isohyets (by multiplying this area by the average of the two isohyets); 3) doing this for the entire area of each watershed; and then 4) summing the results to produce the total amount of precipitation falling upon each watershed analyzed. The output from this computation can be described as total average annual precipitation units by watershed or as annual precipitation units per acre for each watershed. The ratio is produced by dividing the result for one watershed by that of the other.

To accomplish this D&A used the USGS's Web-based Geographic Information System application "StreamStats. As noted by D&A, in general StreamStats is used to estimate stream flow statistics on ungaged drainages by using empirical regression analysis. By referral to its database of precipitation data, compiled by NRCS, NWCC and Oregon State University, StreamStats can produce estimates of mean annual precipitation on delineated watersheds. StreamStats "automatically" delineates a watershed starting from a user-selected point on a stream of interest. Using this software D&A delineated the drainage basins tributary to the Uravan Gage and to the LT. StreamStats next "…determined the mean annual precipitation of the Uravan Gage Basin to be 21.97 inches and 21.75 inches for the LT basin." D&A then concluded the 0.22 inch difference between the two basins was supportive of its "…opinion that the drainage area below the Uravan Gage experiences lower precipitation than does the upper basin and therefore reduces overall mean basin precipitation. D&A's "precipitation volume ratio", when applied to the basin above the LT, , produced an expected increase in discharge at the LT of 2.84 percent instead of the 8.8 percent computed by CWCB. From this, D&A concluded the CWCB estimate of water availability was in error. D&A continues, "[t]he broad assumptions used by the CWCB to determine average monthly upstream irrigation consumption, return flows, etc. led to significant errors in the mass balance which resulted in the reduction of flow in some months, which D&A cannot explain or understand, and large, nearly 50 percent, increases in others." D&A concludes "[b]ecause of these apparent errors, it is D&A's opinion

that the CWCB should use the existing mean daily discharge record of the USGS San Miguel River at Uravan, CO gage as the basis of its availability analyses and ISF recommendations."

**CWCB Staff Response to D&A's Second Conclusion**

The "drainage area ratio" or "area ratio" is the numerical value that results from dividing the watershed area of the basin that drains to the LT, by the watershed area of the basin that drains to the USGS Gage. In this instance, the computation results in the value 1.0388 which means the watershed at the LT is 3.88 percent larger than the watershed at the USGS gage site. This value is used to "adjust" the hydrological record at the gage to produce a "new" hydrological record that represents discharge at the gage as if it had been located at the LT. All recorded values of discharge at the gage would, in this case, be increased by 3.88 percent as a consequence of the differences in watershed areas alone. D&A argues that the land increasing the gage watershed area (i.e., the area between the gage basin and the LT basin) is excessively increasing the computed water yield of the LT basin because that land area occurs at a lower and drier part of the basin. D&A therefore contends a discharge increase of 3.88 percent is more than the true yield of the additional area.

Living in Colorado, we all understand that different elevations result in differences in precipitation amounts, and resultant runoff. In the San Miguel watershed, the precipitation at upper elevations of the watershed, including the high country around Telluride, is greater than that at lower elevations as measured on a per acre or per square mile basis. The relationship of precipitation and runoff to elevation is well established, even axiomatic. However, D&A's assertion that the CWCB methodology is "flawed in that it assumes the drainage area that lies downstream of the Uravan Gage contributes to runoff, on a square mile basis, equal to the drainage area at the top of the San Miguel River basin…" is incorrect. The drainage area downstream of the Uravan Gage contributes to runoff, on a square mile basis, equal to the drainage area <u>of the entire basin</u> as measured at the gage which includes all of the basin not just the top of the basin. The gage itself does not measure discharge, on a per square mile or any other basis, for any area less than the whole basin above the gage. There is no basis in the data to assign all or any portion of the discharge to any particular area. While seasonal values of discharge may allow an attempt to seasonally segregate sources of discharge, the results would be inconclusive. While one may say that increases and decreases in flow at certain times of the year are likely due to particular causes in particular areas (e.g.,snowmelt, orographic uplift, etc), the gage still measures integrated flow delivered by the composite of all processes, elevations and sources including, among others, high elevation snowpack and basin ground water.

D&A's critique is weakened by the implied assumption that the area contributing runoff to the "ungaged area" portion of the river is dry because it occurs at the bottom of the basin. While this assumption often works, it does not in this particular case. In this case, the watershed area that drains to the part of the river between the LT and the gage has pretty much the same kind of elevation distribution as most of the watershed. An examination of the attached watershed map (Figure 1) shows a spread of elevation in the "ungaged" area that looks pretty much like that of roughly one half of the entire basin. While there <u>is</u> an area of high elevation and precipitation in the San Miguel basin, that area constitutes only a fraction of the basin. Much of the remainder of the basin has a range of elevations that tend to receive intermediate levels of precipitation and, based just on precipitation, would be expected to produce moderate amounts of runoff. Because much of the watershed area is in an intermediate range of elevation, a large portion of the basin contributes to runoff with similar per acre/square mile water yields. The attached basin map (Figure 2), with displayed isohyets, helps to demonstrate the precipitation (elevation) similarity

between the "ungaged" segment of the basin (that between the LT and the gage) and roughly ½ of the entire basin. Stated differently, the LT – Gage land area includes a spread of elevation, and hence precipitation, that is characteristic of much of the remainder of the watershed and is not particularly dry or otherwise different from the bulk of the basin.

D&A asserts the difference between the computed precipitation amounts of the two basins supports a conclusion that the watershed area between the LT and the gage experiences a sufficient deficiency in precipitation that the CWCB analysis inflates computed basin runoff. The weakness of this assertion becomes apparent by further examination of data and conclusions. The difference between D&A's computed values for mean annual precipitation, 0.22 inches, is 1% of the amount computed for either basin. D&A draws from these figures the conclusion that a 3.88% increase in basin size produces a decrease in mean annual precipitation of 1% because the additional basin area is composed of land much dryer than the rest of the basin resulting in a decrease in the per acre estimate of discharge. In light of the attached map of isohyets over the watershed, this effect on basin precipitation seems excessive. Even if not excessive, a value of 1% may not constitute a significant difference between the watersheds. Numerous opportunities exist for errors to occur in measuring basin areas, determining a precise precipitation-elevation relationship, generalizing the relationship to occur uniformly over individual basins, and measuring the areas between isohyets. The placement of isohyets was also subject to potential error as was the computation of the relationships that underpin the precipitation elevation relationship. Reliance upon a difference of 1% is not warranted in circumstances with the numerous opportunities for error as described above.

In forming its opinions, D&A relies upon small differences between its computations and those of CWCB. By choosing to use a Precipitation Volume Ratio instead of a Drainage Area Ratio, D&A concluded there was a 6% difference between the two analyses. However, a difference, in and of itself, says little. The USGS standard for defining a "good" streamflow measurement is +/-5% of the "true" value[1]. If all of the measurements that constitute the flow record at the San Miguel River at Uravan, CO gage were rated as "good," the "true" discharge at that point would be known only to within +/- 5%. These analyses were carried out using data that could have been in error by +/- 5%.from the beginning In their memorandum, D&A discussed their use of the USGS application StreamStats. This tool is useful for the analysis of discharge from ungaged basins. Its creator, the USGS, painstakingly and carefully developed regression equations that relate basin characteristics such as area, precipitation, mean elevation, percent of basin above 7500 feet in elevation, etc, to find the equations that best predicted the discharge measured in the field. Equations were developed for a suite of commonly used statistics and were grouped on the basis of regional best-fit relationships. Even with their careful work, the USGS still provides the user with cautions.

In its web application the USGS includes a section titled LIMITATIONS which begins with the following:

*The StreamStats Web application provides access to automated procedures and very large, complex data sets. These data sets are known to contain occasional errors. Users are advised to carefully check all results for accuracy and to exercise their own professional judgment in evaluating the appropriateness of the results for their application. Basin delineations, in particular, frequently have been found to be erroneous. The Web site provides*

[1] V.B. Sauer, R.W.Meyer, 1992, US Geological Survey, Open File Report 92-144, Determination of Error in Individual Discharge Measurements, p. 2

*tools and base maps useful for verifying the accuracy of the basin delineations and for correcting them, if necessary.*
*Estimates provided by StreamStats assume natural flow conditions at the site. If human activities such as dam regulation and water withdrawals substantially affect the timing, magnitude, or duration of flows at a selected site, the estimates provided by StreamStats should be adjusted by the user to account for those activities.*
*StreamStats can be used to obtain regression equation-based estimates of streamflow statistics under natural conditions for USGS data-collection stations that are affected by human activities. Users should not assume, however, that the differences between the data-based estimates for the stations and the regression equation-based estimates are equivalent to the effects of the human activities on streamflow at the stations because there are errors associated with both sets of estimates.*
*Extrapolation occurs when one or more of the basin characteristics needed to solve the applicable regression equations for an ungaged site are outside the ranges of basin characteristics for the sites used to develop the regression equations. When extrapolation occurs, StreamStats provides a warning in the output to indicate that the basin characteristics are out of range. StreamStats will provide extrapolated estimates for ungaged sites, as those estimates still are often the best estimates that can be obtained for the site; however, the errors associated with extrapolated estimates are unknown. As a result, StreamStats does not provide indicators of the errors for the estimates.* (emphases added)

From the discussion above, it is evident that even the USGS, the nation's water data collection agency and repository, recognizes the possibility, even the probability of errors in the collection and use of water data. With that the case, analysts must use discretion and professional judgment when interpreting the meaning of measured or computed data. Small differences in results must be taken with "a grain of salt" at least until such time as exhaustive efforts can be made, if warranted and feasible, to define the nature and magnitude of errors and their statistical characteristics.

As D&A completed their second conclusion, they referred to data in their **Table 1**. Examination of that data revealed the possibility of additional interpretations. The attached **CWCB Table 1** includes the data from D&A's table but also includes some alternative interpretations. Some of these interpretations may be viewed as trivial; they are included, however, to demonstrate how numbers presented with surety may be less a measure of actual difference than of differences in assumptions. For example, D&A compares CWCB discharge values at the LT to the measured values at the gage. That comparison computes the difference between the gaged discharge values in whole numbers, i.e., no decimal values, and the CWCB discharge values listed to two decimal places. When the CWCB values were rounded to whole numbers, the average difference in adjustment (D&A's term) between the two calculations differed by 1 percent.

Not all examples are that trivial. From cursory examination it appears that D&A's table compares the CWCB computed discharge at the LT to the recorded discharge at the gage. The table thus compares the discharge of the gaged basin record to the LT basin that is 1.0388 times the size of the gaged basin. Clearly, this kind of comparison is mixing apples and oranges. When the gaged record was multiplied by 1.0388 so as to represent the gaged discharge as it would occur in the larger basin, the average adjustment, as a percentage, was 4.7 percent. Assuming this computation is correct, the difference between it and D&A's adjustment of 2.84 percent is 1.86 percent, a difference that is less than the expected error in a "good" USGS streamflow measurement. Consequently, D&A's second conclusion is not supported by data insofar as D&A relies upon differences that may not be distinguishable from several forms of

expected error. D&A has not demonstrated that CWCB's analytical results differed from anything more than D&A's computations which themselves were not demonstrated to be more accurate, reliable, or appropriate.

**D&A's Third and Fourth Conclusions**

D&A's third conclusion states that CWCB's comparison of the recommended instream flows with the daily geometric means of the LT "…is not useful in and of itself. If the geometric mean happens to be similar to the median, the flow data provided is only indicative of the flow that would be available half the time, or 5 out of 10 years." D&A goes on to state the estimated flow presented in the form of percentage exceedance, as had been done in the earlier Draft version of the Executive Summary, would be of greater value.D&A's fourth conclusion is largely a restatement of the third conclusion with the addition of a summary statement that contends "[t]he hydrology presented in the CWCB's Final Executive Summary contains errors, as described above, and does not contain nor allow for a percent exceedence analysis, and furthermore creates a synthetic hydrologic regime that is less representative of the entire ISF reach than what is already established by the Uravan Gage record."

**CWCB Staff Response to D&A's Third and Fourth Conclusion**

Within its third and fourth conclusions, D&A contends CWCB's use of the geometric mean is not useful for the purpose at hand. D&A does not identify any reason for not using the geometric mean other than the fact that it only shows the flow that is in the stream 50% of the time (assuming its values are close to those of the median). While claiming this fact to be a limitation, D&A offers as its cure the inclusion of other exceedance values. Other exceedance values serve the same function as the geometric mean, which generally approximates the 50 percent exceedance value, so this cure just increases the number of exceedances displayed. The purpose for including other exceedance values is not made clear, but the purpose of the geometric mean or the median is clear insofar as it is the discharge that CPW (formerly the CDOW or Colorado Division of Wildlife) has determined will best serve to protect the fishery resource, and thus the environment to a reasonable degree, in balance with meeting the needs of man. A discussion of the kinds of flow CPW has determined best serves the needs of fish in balance with those of mankind can be found in the rebuttal statements of CPW, et al. The third and fourth conclusions have no merit because the purpose of the CWCB analysis was to determine if there was water available at the lower terminus of the recommended reach of the San Miguel River to satisfy the CPW recommended flow regime approximately half of the time.

D&A's conclusion that the Final Executive Summary does not "…allow for a percent exceedance analysis…" is also incorrect. While no other exceedance analyses were included in the Summary, the standard USGS percentile values are included in the full Excel workbook that constituted the full analysis. In that workbook, at the tab labeled *SM@Uravandvstat,* the USGS values for the 5, 10, 20, 25, 50, 75, 80, 90, and 95 percentiles of daily mean discharges for each day of the year were presented along with values for the mean, minimum and maximum daily mean discharges for each day of the year. Additional data for further analysis can be found at the USGS website shown at the tab labeled *SanMiguelatUravanSiteInfo* in the above-described workbook.

While preparing this rebuttal, I examined in detail the Excel worksheets whose output was contained in the Executive Summary. In doing so, I found an error that resulted from an unintentional use of one of Excel's automatic computation features. The error was small, had no

effect on results or conclusions, the error has been corrected, and the revised workbook placed on the CWCB website. The revised hydrograph for the Lower Terminus has not affected the conclusion that water is available for the proposed appropriation for instream flow purposes.

In sum, the conclusions of D&A with respect to CWCB's hydrologic analysis of water availability for instream flow in the San Miguel River between Calamity Draw and the Dolores River in Water Division 4 are incorrect, insufficient, or irrelevant. CWCB staff has demonstrated that water is available for instream flow in the location and in the amount claimed. Differences in the discharge amounts computed by D&A and CWCB are not significant in view of the normative values recognized by the USGS, the kinds and magnitudes of measurement and other errors encountered in natural systems such as rivers and streams, and the data, assumption, and precision differences found in the separate analysis approaches taken by both D&A and CWCB.

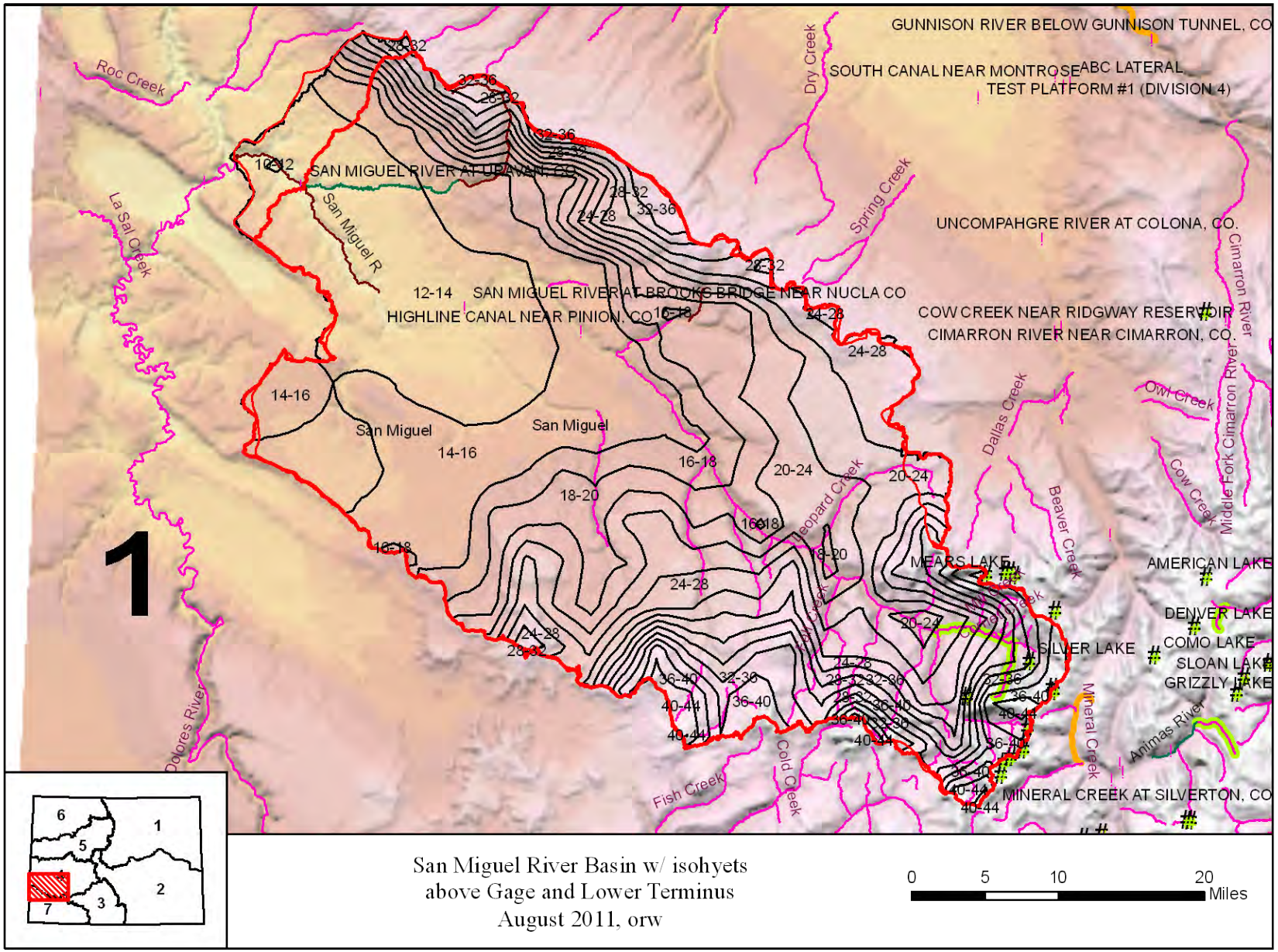


**Figure 1 - Isohyets San Miguel R. Basin**

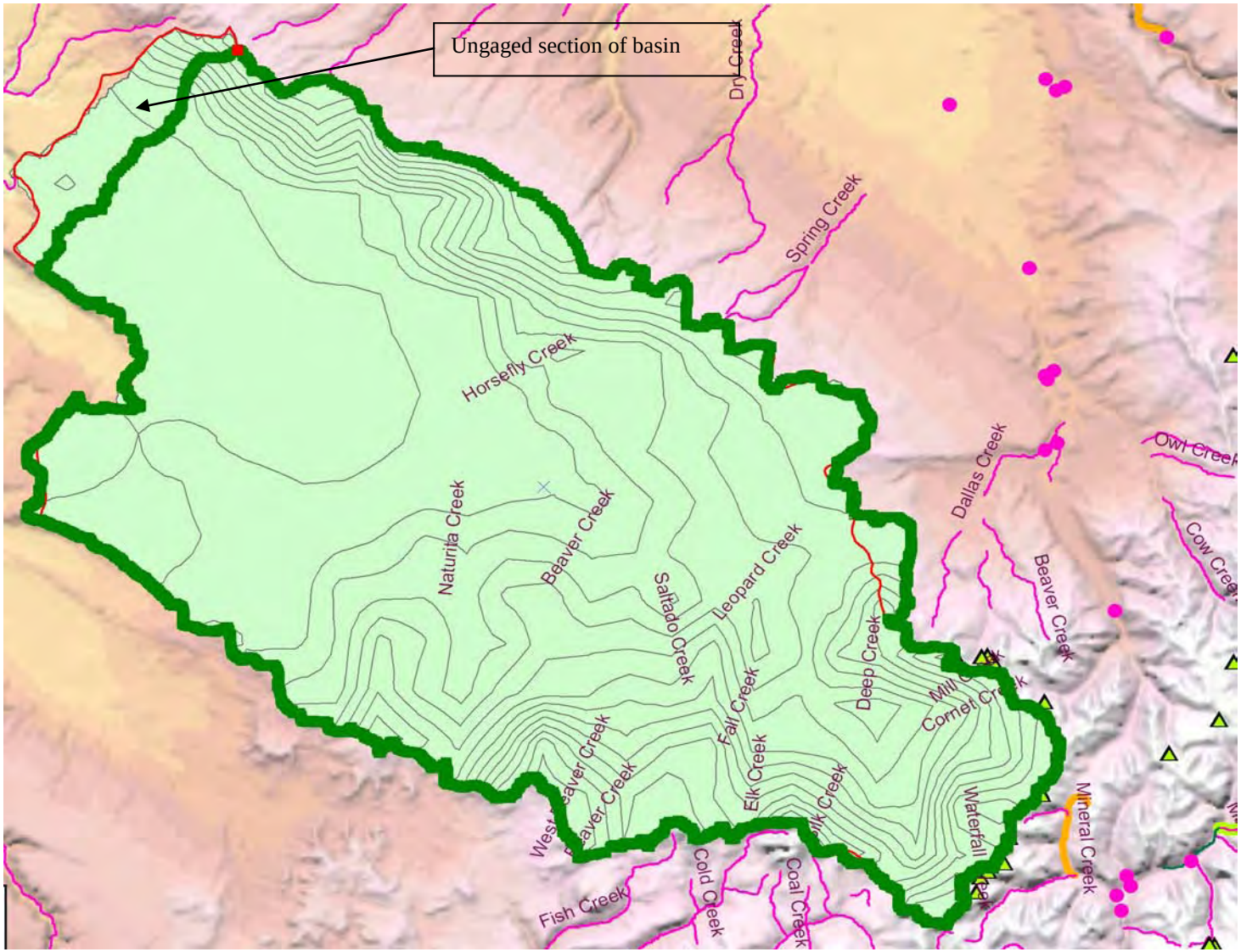


**Figure 2 – Precipitation Similarity**

CWCB Table 1 (Format Based on Deere and Ault Table 1)

| Monthly Yield (USGS Uravan x 1.0388) | Monthly Yield (CWCB) | Month | Mean Daily Discharge at USGS Uravan Gage x 1.0388 | CWCB Statistical Hydrology at Lower Terminus | CWCB's Average Daily Adjustment to Flow | Average Monthly Adjustment | Average Percent Change[1] | Maximum Daily Adjustment to Flow |
|---|---|---|---|---|---|---|---|---|
| (A-F) | (A-F) | | (cfs) | (cfs) | (cfs) | (ac-ft) | (%) | (cfs) |
| 5610.5 | 5391.1 | Jan | 91.2 | 87.7 | -3.6 | -219.5 | -3.9 | -1.88 |
| 6113.4 | 5680.1 | Feb | 110.1 | 102.3 | -7.8 | -433.3 | -6.9 | -2.45 |
| 12974.5 | 9691.2 | Mar | 211.0 | 157.6 | -53.4 | -3283.3 | -22.8 | -11.77 |
| 50012.8 | 39403.6 | Apr | 840.5 | 662.2 | -178.3 | -10609.2 | -20.5 | -41.04 |
| 71455.7 | 66727.9 | May | 1162.1 | 1085.2 | -76.9 | -4727.8 | -6.6 | 16.87 |
| 57457.1 | 60690.2 | Jun | 965.6 | 1019.9 | 54.3 | 3233.1 | 5.5 | 106.39 |
| 25194.9 | 28821.8 | Jul | 409.8 | 468.7 | 59.0 | 3626.9 | 15.9 | 78.67 |
| 11948.4 | 16373.6 | Aug | 194.3 | 266.3 | 72.0 | 4425.1 | 37.6 | 95.71 |
| 8052.2 | 11424.8 | Sep | 135.3 | 192.0 | 56.7 | 3372.6 | 43.0 | 73.94 |
| 9442.9 | 12021.8 | Oct | 153.6 | 195.5 | 41.9 | 2578.9 | 28.3 | 74.68 |
| 7267.1 | 6612.9 | Nov | 122.1 | 111.1 | -11.0 | -654.2 | -9.1 | -5.77 |
| 6026.8 | 5742.1 | Dec | 98.0 | 93.4 | -4.6 | -284.6 | -4.7 | -2.88 |
| 271556.5 | 268581.3 | Totals (a-f/y) | 271,556 | 268,581 | | -2975.2 | 4.7 | |

[1] Values taken from individual month tables

Table 2. Comparisons with D&A Table 1.

| Date | Mean Daily Discharge San Miguel River @ Uravan (cfs) | CWCB Adjusted Flow @ LT Gage (cfs) | Adjustment (cfs) | Percent Adjustment (%) | CWCB Values Rounded to whole Numbers as in Col G (cfs) | Adjustment (cfs) | Percent Adjustment (%) | Adj w/ CWCB as Denom (%) | Mean Daily Discharge San Miguel River @ Uravan x 1.0388 (cfs) | Adjustment (cfs) | Percent Adjustment (%) | ISF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Jan | 88 | 87.97 | -0.03 | 0.00% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.44 | -3.8% | 80 |
| 2-Jan | 82 | 82.24 | 0.24 | 0.30% | 82 | 0.00 | 0.0% | 0.0% | 85 | -2.94 | -3.5% | 80 |
| 3-Jan | 81 | 81.55 | 0.55 | 0.70% | 82 | 1.00 | 1.2% | 1.2% | 84 | -2.59 | -3.1% | 80 |
| 4-Jan | 82 | 80.7 | -1.3 | -1.60% | 81 | -1.00 | -1.2% | -1.2% | 85 | -4.48 | -5.3% | 80 |
| 5-Jan | 86 | 86.31 | 0.31 | 0.40% | 86 | 0.00 | 0.0% | 0.0% | 89 | -3.03 | -3.4% | 80 |
| 6-Jan | 87 | 87.5 | 0.5 | 0.60% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.88 | -3.2% | 80 |
| 7-Jan | 89 | 89.03 | 0.03 | 0.00% | 89 | 0.00 | 0.0% | 0.0% | 92 | -3.42 | -3.7% | 80 |
| 8-Jan | 90 | 89.91 | -0.09 | -0.10% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.58 | -3.8% | 80 |
| 9-Jan | 93 | 92.51 | -0.49 | -0.50% | 93 | 0.00 | 0.0% | 0.0% | 97 | -4.10 | -4.2% | 80 |
| 10-Jan | 92 | 91.98 | -0.02 | 0.00% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.59 | -3.8% | 80 |
| 11-Jan | 92 | 89.47 | -2.53 | -2.70% | 89 | -3.00 | -3.3% | -3.4% | 96 | -6.10 | -6.4% | 80 |
| 12-Jan | 91 | 86.78 | -4.22 | -4.60% | 87 | -4.00 | -4.4% | -4.6% | 95 | -7.75 | -8.2% | 80 |
| 13-Jan | 90 | 89.52 | -0.48 | -0.50% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.97 | -4.2% | 80 |
| 14-Jan | 94 | 92.44 | -1.56 | -1.70% | 92 | -2.00 | -2.1% | -2.2% | 98 | -5.21 | -5.3% | 80 |
| 15-Jan | 92 | 92.12 | 0.12 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.45 | -3.6% | 80 |
| 16-Jan | 89 | 90.57 | 1.57 | 1.80% | 91 | 2.00 | 2.2% | 2.2% | 92 | -1.88 | -2.0% | 80 |
| 17-Jan | 88 | 89.4 | 1.4 | 1.60% | 89 | 1.00 | 1.1% | 1.1% | 91 | -2.01 | -2.2% | 80 |
| 18-Jan | 88 | 87.85 | -0.15 | -0.20% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.56 | -3.9% | 80 |
| 19-Jan | 89 | 87.77 | -1.23 | -1.40% | 88 | -1.00 | -1.1% | -1.1% | 92 | -4.68 | -5.1% | 80 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-Jan | 88 | 86.99 | -1.01 | -1.10% | 87 | -1.00 | -1.1% | -1.1% | 91 | -4.42 | -4.8% | 80 |
| 21-Jan | 88 | 87.65 | -0.35 | -0.40% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.76 | -4.1% | 80 |
| 22-Jan | 85 | 85.54 | 0.54 | 0.60% | 86 | 1.00 | 1.2% | 1.2% | 88 | -2.76 | -3.1% | 80 |
| 23-Jan | 83 | 83.44 | 0.44 | 0.50% | 83 | 0.00 | 0.0% | 0.0% | 86 | -2.78 | -3.2% | 80 |
| 24-Jan | 81 | 80.21 | -0.79 | -1.00% | 80 | -1.00 | -1.2% | -1.2% | 84 | -3.93 | -4.7% | 80 |
| 25-Jan | 83 | 81.88 | -1.12 | -1.30% | 82 | -1.00 | -1.2% | -1.2% | 86 | -4.34 | -5.0% | 80 |
| 26-Jan | 88 | 87.75 | -0.25 | -0.30% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.66 | -4.0% | 80 |
| 27-Jan | 92 | 92.12 | 0.12 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.45 | -3.6% | 80 |
| 28-Jan | 91 | 91.22 | 0.22 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.31 | -3.5% | 80 |
| 29-Jan | 87 | 88.02 | 1.02 | 1.20% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.36 | -2.6% | 80 |
| 30-Jan | 87 | 88.23 | 1.23 | 1.40% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.15 | -2.4% | 80 |
| 31-Jan | 87 | 88.38 | 1.38 | 1.60% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.00 | -2.2% | 80 |
| 1-Feb | 89 | 90.35 | 1.35 | 1.50% | 90 | 1.00 | 1.1% | 1.1% | 92 | -2.10 | -2.3% | 80 |
| 2-Feb | 91 | 91.46 | 0.46 | 0.50% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.07 | -3.2% | 80 |
| 3-Feb | 92 | 91.17 | -0.83 | -0.90% | 91 | -1.00 | -1.1% | -1.1% | 96 | -4.40 | -4.6% | 80 |
| 4-Feb | 91 | 91.44 | 0.44 | 0.50% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.09 | -3.3% | 80 |
| 5-Feb | 93 | 92.01 | -0.99 | -1.10% | 92 | -1.00 | -1.1% | -1.1% | 97 | -4.60 | -4.8% | 80 |
| 6-Feb | 90 | 90.33 | 0.33 | 0.40% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.16 | -3.4% | 80 |
| 7-Feb | 91 | 91.14 | 0.14 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.39 | -3.6% | 80 |
| 8-Feb | 95 | 93.06 | -1.94 | -2.00% | 93 | -2.00 | -2.1% | -2.1% | 99 | -5.63 | -5.7% | 80 |
| 9-Feb | 110 | 102.61 | -7.39 | -6.70% | 103 | -7.00 | -6.4% | -6.8% | 114 | -11.66 | -10.2% | 80 |
| 10-Feb | 110 | 105.57 | -4.43 | -4.00% | 106 | -4.00 | -3.6% | -3.8% | 114 | -8.70 | -7.6% | 80 |
| 11-Feb | 112 | 104.39 | -7.61 | -6.80% | 104 | -8.00 | -7.1% | -7.7% | 116 | -11.96 | -10.3% | 80 |
| 12-Feb | 108 | 102.47 | -5.53 | -5.10% | 102 | -6.00 | -5.6% | -5.9% | 112 | -9.72 | -8.7% | 80 |
| 13-Feb | 117 | 108.34 | -8.66 | -7.40% | 108 | -9.00 | -7.7% | -8.3% | 122 | -13.20 | -10.9% | 80 |
| 14-Feb | 113 | 108.5 | -4.5 | -4.00% | 109 | -4.00 | -3.5% | -3.7% | 117 | -8.88 | -7.6% | 80 |
| 15-Feb | 110 | 109.49 | -0.51 | -0.50% | 109 | -1.00 | -0.9% | -0.9% | 114 | -4.78 | -4.2% | 80 |
| 16-Feb | 112 | 111.47 | -0.53 | -0.50% | 111 | -1.00 | -0.9% | -0.9% | 116 | -4.88 | -4.2% | 80 |
| 17-Feb | 113 | 109.49 | -3.51 | -3.10% | 109 | -4.00 | -3.5% | -3.7% | 117 | -7.89 | -6.7% | 80 |
| 18-Feb | 109 | 106.71 | -2.29 | -2.10% | 107 | -2.00 | -1.8% | -1.9% | 113 | -6.52 | -5.8% | 80 |
| 19-Feb | 109 | 105.66 | -3.34 | -3.10% | 106 | -3.00 | -2.8% | -2.8% | 113 | -7.57 | -6.7% | 80 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-Feb | 116 | 109.8 | -6.2 | -5.30% | 110 | -6.00 | -5.2% | -5.5% | 121 | -10.70 | -8.9% | 80 |
| 21-Feb | 116 | 110.11 | -5.89 | -5.10% | 110 | -6.00 | -5.2% | -5.4% | 121 | -10.39 | -8.6% | 80 |
| 22-Feb | 113 | 107.38 | -5.62 | -5.00% | 107 | -6.00 | -5.3% | -5.6% | 117 | -10.00 | -8.5% | 80 |
| 23-Feb | 114 | 106.1 | -7.9 | -6.90% | 106 | -8.00 | -7.0% | -7.5% | 118 | -12.32 | -10.4% | 80 |
| 24-Feb | 112 | 104.09 | -7.91 | -7.10% | 104 | -8.00 | -7.1% | -7.7% | 116 | -12.26 | -10.5% | 80 |
| 25-Feb | 111 | 104.18 | -6.82 | -6.10% | 104 | -7.00 | -6.3% | -6.7% | 115 | -11.13 | -9.6% | 80 |
| 26-Feb | 107 | 102.13 | -4.87 | -4.60% | 102 | -5.00 | -4.7% | -4.9% | 111 | -9.02 | -8.1% | 80 |
| 27-Feb | 107 | 105.16 | -1.84 | -1.70% | 105 | -2.00 | -1.9% | -1.9% | 111 | -5.99 | -5.4% | 80 |
| 28-Feb | 110 | 107.91 | -2.09 | -1.90% | 108 | -2.00 | -1.8% | -1.9% | 114 | -6.36 | -5.6% | 80 |
| 29-Feb | 112 | 106.99 | -5.01 | -4.50% | 107 | -5.00 | -4.5% | -4.7% | 116 | -9.36 | -8.0% | 80 |
| 1-Mar | 122 | 114.28 | -7.72 | -6.30% | 114 | -8.00 | -6.6% | -7.0% | 127 | -12.45 | -9.8% | 115 |
| 2-Mar | 134 | 115.3 | -18.7 | -14.00% | 115 | -19.00 | -14.2% | -16.5% | 139 | -23.90 | -17.2% | 115 |
| 3-Mar | 133 | 117.78 | -15.22 | -11.40% | 118 | -15.00 | -11.3% | -12.7% | 138 | -20.38 | -14.8% | 115 |
| 4-Mar | 127 | 115.3 | -11.7 | -9.20% | 115 | -12.00 | -9.4% | -10.4% | 132 | -16.63 | -12.6% | 115 |
| 5-Mar | 118 | 110.33 | -7.67 | -6.50% | 110 | -8.00 | -6.8% | -7.3% | 123 | -12.25 | -10.0% | 115 |
| 6-Mar | 123 | 115.84 | -7.16 | -5.80% | 116 | -7.00 | -5.7% | -6.0% | 128 | -11.93 | -9.3% | 115 |
| 7-Mar | 141 | 122.01 | -18.99 | -13.50% | 122 | -19.00 | -13.5% | -15.6% | 146 | -24.46 | -16.7% | 115 |
| 8-Mar | 163 | 123.44 | -39.56 | -24.30% | 123 | -40.00 | -24.5% | -32.4% | 169 | -45.88 | -27.1% | 115 |
| 9-Mar | 139 | 119.83 | -19.17 | -13.80% | 120 | -19.00 | -13.7% | -15.9% | 144 | -24.56 | -17.0% | 115 |
| 10-Mar | 141 | 120.33 | -20.67 | -14.70% | 120 | -21.00 | -14.9% | -17.5% | 146 | -26.14 | -17.8% | 115 |
| 11-Mar | 143 | 125.23 | -17.77 | -12.40% | 125 | -18.00 | -12.6% | -14.4% | 149 | -23.32 | -15.7% | 115 |
| 12-Mar | 149 | 129.24 | -19.76 | -13.30% | 129 | -20.00 | -13.4% | -15.5% | 155 | -25.54 | -16.5% | 115 |
| 13-Mar | 157 | 134.05 | -22.95 | -14.60% | 134 | -23.00 | -14.6% | -17.2% | 163 | -29.04 | -17.8% | 115 |
| 14-Mar | 171 | 143 | -28 | -16.40% | 143 | -28.00 | -16.4% | -19.6% | 178 | -34.63 | -19.5% | 115 |
| 15-Mar | 171 | 144.23 | -26.77 | -15.70% | 144 | -27.00 | -15.8% | -18.7% | 178 | -33.40 | -18.8% | 115 |
| 16-Mar | 177 | 148.65 | -28.35 | -16.00% | 149 | -28.00 | -15.8% | -18.8% | 184 | -35.22 | -19.2% | 115 |
| 17-Mar | 180 | 149.08 | -30.92 | -17.20% | 149 | -31.00 | -17.2% | -20.8% | 187 | -37.90 | -20.3% | 115 |
| 18-Mar | 189 | 150.93 | -38.07 | -20.10% | 151 | -38.00 | -20.1% | -25.2% | 196 | -45.40 | -23.1% | 115 |
| 19-Mar | 202 | 153.8 | -48.2 | -23.90% | 154 | -48.00 | -23.8% | -31.2% | 210 | -56.04 | -26.7% | 115 |
| 20-Mar | 218 | 163.25 | -54.75 | -25.10% | 163 | -55.00 | -25.2% | -33.7% | 226 | -63.21 | -27.9% | 115 |
| 21-Mar | 245 | 168.56 | -76.44 | -31.20% | 169 | -76.00 | -31.0% | -45.1% | 255 | -85.95 | -33.8% | 115 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22-Mar | 254 | 177.12 | -76.88 | -30.30% | 177 | -77.00 | -30.3% | -43.5% | 264 | -86.74 | -32.9% | 115 |
| 23-Mar | 269 | 185.5 | -83.5 | -31.00% | 186 | -83.00 | -30.9% | -44.7% | 279 | -93.94 | -33.6% | 115 |
| 24-Mar | 289 | 196.5 | -92.5 | -32.00% | 197 | -92.00 | -31.8% | -46.8% | 300 | -103.71 | -34.5% | 115 |
| 25-Mar | 301 | 207.59 | -93.41 | -31.00% | 208 | -93.00 | -30.9% | -44.8% | 313 | -105.09 | -33.6% | 115 |
| 26-Mar | 326 | 219.32 | -106.68 | -32.70% | 219 | -107.00 | -32.8% | -48.8% | 339 | -119.33 | -35.2% | 115 |
| 27-Mar | 323 | 224.59 | -98.41 | -30.50% | 225 | -98.00 | -30.3% | -43.6% | 336 | -110.94 | -33.1% | 115 |
| 28-Mar | 319 | 225.41 | -93.59 | -29.30% | 225 | -94.00 | -29.5% | -41.7% | 331 | -105.97 | -32.0% | 115 |
| 29-Mar | 301 | 221.34 | -79.66 | -26.50% | 221 | -80.00 | -26.6% | -36.1% | 313 | -91.34 | -29.2% | 115 |
| 30-Mar | 282 | 219.54 | -62.46 | -22.10% | 220 | -62.00 | -22.0% | -28.2% | 293 | -73.40 | -25.1% | 115 |
| 31-Mar | 290 | 225.43 | -64.57 | -22.30% | 225 | -65.00 | -22.4% | -28.8% | 301 | -75.82 | -25.2% | 115 |
| 1-Apr | 312 | 279.77 | -32.23 | -10.30% | 280 | -32.00 | -10.3% | -11.4% | 324 | -44.34 | -13.7% | 115 |
| 2-Apr | 338 | 296.76 | -41.24 | -12.20% | 297 | -41.00 | -12.1% | -13.8% | 351 | -54.35 | -15.5% | 115 |
| 3-Apr | 336 | 308.17 | -27.83 | -8.30% | 308 | -28.00 | -8.3% | -9.1% | 349 | -40.87 | -11.7% | 115 |
| 4-Apr | 391 | 338.18 | -52.82 | -13.50% | 338 | -53.00 | -13.6% | -15.7% | 406 | -67.99 | -16.7% | 115 |
| 5-Apr | 413 | 361.2 | -51.8 | -12.50% | 361 | -52.00 | -12.6% | -14.4% | 429 | -67.82 | -15.8% | 115 |
| 6-Apr | 461 | 390.62 | -70.38 | -15.30% | 391 | -70.00 | -15.2% | -17.9% | 479 | -88.27 | -18.4% | 115 |
| 7-Apr | 515 | 421.47 | -93.53 | -18.20% | 421 | -94.00 | -18.3% | -22.3% | 535 | -113.51 | -21.2% | 115 |
| 8-Apr | 595 | 469.05 | -125.95 | -21.20% | 469 | -126.00 | -21.2% | -26.9% | 618 | -149.04 | -24.1% | 115 |
| 9-Apr | 621 | 482.28 | -138.72 | -22.30% | 482 | -139.00 | -22.4% | -28.8% | 645 | -162.81 | -25.2% | 115 |
| 10-Apr | 657 | 521.75 | -135.25 | -20.60% | 522 | -135.00 | -20.5% | -25.9% | 682 | -160.74 | -23.6% | 115 |
| 11-Apr | 666 | 542.95 | -123.05 | -18.50% | 543 | -123.00 | -18.5% | -22.7% | 692 | -148.89 | -21.5% | 115 |
| 12-Apr | 659 | 539.9 | -119.1 | -18.10% | 540 | -119.00 | -18.1% | -22.0% | 685 | -144.67 | -21.1% | 115 |
| 13-Apr | 664 | 546.39 | -117.61 | -17.70% | 546 | -118.00 | -17.8% | -21.6% | 690 | -143.37 | -20.8% | 115 |
| 14-Apr | 708 | 580.85 | -127.15 | -18.00% | 581 | -127.00 | -17.9% | -21.9% | 735 | -154.62 | -21.0% | 115 |
| 15-Apr | 792 | 636.27 | -155.73 | -19.70% | 636 | -156.00 | -19.7% | -24.5% | 823 | -186.46 | -22.7% | 325 |
| 16-Apr | 895 | 700.78 | -194.22 | -21.70% | 701 | -194.00 | -21.7% | -27.7% | 930 | -228.95 | -24.6% | 325 |
| 17-Apr | 1010 | 779.55 | -230.45 | -22.80% | 780 | -230.00 | -22.8% | -29.5% | 1049 | -269.64 | -25.7% | 325 |
| 18-Apr | 1170 | 869.21 | -300.79 | -25.70% | 869 | -301.00 | -25.7% | -34.6% | 1215 | -346.19 | -28.5% | 325 |
| 19-Apr | 1180 | 883.86 | -296.14 | -25.10% | 884 | -296.00 | -25.1% | -33.5% | 1226 | -341.92 | -27.9% | 325 |
| 20-Apr | 1060 | 824.45 | -235.55 | -22.20% | 824 | -236.00 | -22.3% | -28.6% | 1101 | -276.68 | -25.1% | 325 |
| 21-Apr | 1010 | 841.64 | -168.36 | -16.70% | 842 | -168.00 | -16.6% | -20.0% | 1049 | -207.55 | -19.8% | 325 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22-Apr | 1070 | 913.09 | -156.91 | -14.70% | 913 | -157.00 | -14.7% | -17.2% | 1112 | -198.43 | -17.9% | 325 |
| 23-Apr | 1120 | 922.13 | -197.87 | -17.70% | 922 | -198.00 | -17.7% | -21.5% | 1163 | -241.33 | -20.7% | 325 |
| 24-Apr | 1190 | 950.52 | -239.48 | -20.10% | 951 | -239.00 | -20.1% | -25.1% | 1236 | -285.65 | -23.1% | 325 |
| 25-Apr | 1160 | 946.98 | -213.02 | -18.40% | 947 | -213.00 | -18.4% | -22.5% | 1205 | -258.03 | -21.4% | 325 |
| 26-Apr | 1120 | 934.34 | -185.66 | -16.60% | 934 | -186.00 | -16.6% | -19.9% | 1163 | -229.12 | -19.7% | 325 |
| 27-Apr | 1070 | 913.57 | -156.43 | -14.60% | 914 | -156.00 | -14.6% | -17.1% | 1112 | -197.95 | -17.8% | 325 |
| 28-Apr | 1020 | 884.23 | -135.77 | -13.30% | 884 | -136.00 | -13.3% | -15.4% | 1060 | -175.35 | -16.5% | 325 |
| 29-Apr | 1040 | 892.5 | -147.5 | -14.20% | 893 | -147.00 | -14.1% | -16.5% | 1080 | -187.85 | -17.4% | 325 |
| 30-Apr | 1030 | 893.13 | -136.87 | -13.3 | 893 | -137.00 | -13.3% | -15.3% | 1070 | -176.83 | -16.5% | 325 |
| 1-May | 1,030 | 947.3 | -82.7 | -8.00% | 947 | -83.00 | -8.1% | -8.8% | 1070 | -122.66 | -11.5% | 325 |
| 2-May | 1,040 | 976.21 | -63.79 | -6.10% | 976 | -64.00 | -6.2% | -6.6% | 1080 | -104.14 | -9.6% | 325 |
| 3-May | 1,040 | 978.86 | -61.14 | -5.90% | 979 | -61.00 | -5.9% | -6.2% | 1080 | -101.49 | -9.4% | 325 |
| 4-May | 1,110 | 1014.32 | -95.68 | -8.60% | 1014 | -96.00 | -8.6% | -9.5% | 1153 | -138.75 | -12.0% | 325 |
| 5-May | 1,160 | 1025.55 | -134.45 | -11.60% | 1026 | -134.00 | -11.6% | -13.1% | 1205 | -179.46 | -14.9% | 325 |
| 6-May | 1,130 | 1014.95 | -115.05 | -10.20% | 1015 | -115.00 | -10.2% | -11.3% | 1174 | -158.89 | -13.5% | 325 |
| 7-May | 1,110 | 1020.25 | -89.75 | -8.10% | 1020 | -90.00 | -8.1% | -8.8% | 1153 | -132.82 | -11.5% | 325 |
| 8-May | 1,130 | 1039.98 | -90.02 | -8.00% | 1040 | -90.00 | -8.0% | -8.7% | 1174 | -133.86 | -11.4% | 325 |
| 9-May | 1,170 | 1075.89 | -94.11 | -8.00% | 1076 | -94.00 | -8.0% | -8.7% | 1215 | -139.51 | -11.5% | 325 |
| 10-May | 1,140 | 1054.45 | -85.55 | -7.50% | 1054 | -86.00 | -7.5% | -8.2% | 1184 | -129.78 | -11.0% | 325 |
| 11-May | 1,170 | 1059.09 | -110.91 | -9.50% | 1059 | -111.00 | -9.5% | -10.5% | 1215 | -156.31 | -12.9% | 325 |
| 12-May | 1,120 | 1054 | -66 | -5.90% | 1054 | -66.00 | -5.9% | -6.3% | 1163 | -109.46 | -9.4% | 325 |
| 13-May | 1,090 | 1067.24 | -22.76 | -2.10% | 1067 | -23.00 | -2.1% | -2.2% | 1132 | -65.05 | -5.7% | 325 |
| 14-May | 1,080 | 1072.69 | -7.31 | -0.70% | 1073 | -7.00 | -0.6% | -0.7% | 1122 | -49.21 | -4.4% | 325 |
| 15-May | 1,120 | 1108.12 | -11.88 | -1.10% | 1108 | -12.00 | -1.1% | -1.1% | 1163 | -55.34 | -4.8% | 325 |
| 16-May | 1,130 | 1131.7 | 1.7 | 0.20% | 1132 | 2.00 | 0.2% | 0.2% | 1174 | -42.14 | -3.6% | 325 |
| 17-May | 1,140 | 1130.14 | -9.86 | -0.90% | 1130 | -10.00 | -0.9% | -0.9% | 1184 | -54.09 | -4.6% | 325 |
| 18-May | 1,090 | 1104.8 | 14.8 | 1.40% | 1105 | 15.00 | 1.4% | 1.4% | 1132 | -27.49 | -2.4% | 325 |
| 19-May | 1,060 | 1117.81 | 57.81 | 5.50% | 1118 | 58.00 | 5.5% | 5.2% | 1101 | 16.68 | 1.5% | 325 |
| 20-May | 1,090 | 1127.25 | 37.25 | 3.40% | 1127 | 37.00 | 3.4% | 3.3% | 1132 | -5.04 | -0.4% | 325 |
| 21-May | 1,130 | 1140.65 | 10.65 | 0.90% | 1141 | 11.00 | 1.0% | 1.0% | 1174 | -33.19 | -2.8% | 325 |
| 22-May | 1,150 | 1151.65 | 1.65 | 0.10% | 1152 | 2.00 | 0.2% | 0.2% | 1195 | -42.97 | -3.6% | 325 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23-May | 1,150 | 1144.75 | -5.25 | -0.50% | 1145 | -5.00 | -0.4% | -0.4% | 1195 | -49.87 | -4.2% | 325 |
| 24-May | 1,150 | 1131.89 | -18.11 | -1.60% | 1132 | -18.00 | -1.6% | -1.6% | 1195 | -62.73 | -5.3% | 325 |
| 25-May | 1,140 | 1121.88 | -18.12 | -1.60% | 1122 | -18.00 | -1.6% | -1.6% | 1184 | -62.35 | -5.3% | 325 |
| 26-May | 1,110 | 1094.81 | -15.19 | -1.40% | 1095 | -15.00 | -1.4% | -1.4% | 1153 | -58.26 | -5.1% | 325 |
| 27-May | 1,130 | 1110.28 | -19.72 | -1.70% | 1110 | -20.00 | -1.8% | -1.8% | 1174 | -63.56 | -5.4% | 325 |
| 28-May | 1,150 | 1135.45 | -14.55 | -1.30% | 1135 | -15.00 | -1.3% | -1.3% | 1195 | -59.17 | -5.0% | 325 |
| 29-May | 1,150 | 1161.1 | 11.1 | 1.00% | 1161 | 11.00 | 1.0% | 0.9% | 1195 | -33.52 | -2.8% | 325 |
| 30-May | 1,150 | 1171.5 | 21.5 | 1.90% | 1172 | 22.00 | 1.9% | 1.9% | 1195 | -23.12 | -1.9% | 325 |
| 31-May | 1120 | 1157.4 | 37.4 | 3.30% | 1157 | 37.00 | 3.3% | 3.2% | 1163 | -6.06 | -0.5% | 325 |
| 1-Jun | 1,100 | 1156.98 | 56.98 | 5.20% | 1157 | 57.00 | 5.2% | 4.9% | 1143 | 14.30 | 1.3% | 325 |
| 2-Jun | 1,090 | 1149.25 | 59.25 | 5.40% | 1149 | 59.00 | 5.4% | 5.1% | 1132 | 16.96 | 1.5% | 325 |
| 3-Jun | 1,060 | 1145.33 | 85.33 | 8.10% | 1145 | 85.00 | 8.0% | 7.4% | 1101 | 44.20 | 4.0% | 325 |
| 4-Jun | 1,060 | 1152.22 | 92.22 | 8.70% | 1152 | 92.00 | 8.7% | 8.0% | 1101 | 51.09 | 4.6% | 325 |
| 5-Jun | 1,070 | 1167.55 | 97.55 | 9.10% | 1168 | 98.00 | 9.2% | 8.4% | 1112 | 56.03 | 5.0% | 325 |
| 6-Jun | 1,090 | 1190.12 | 100.12 | 9.20% | 1190 | 100.00 | 9.2% | 8.4% | 1132 | 57.83 | 5.1% | 325 |
| 7-Jun | 1,090 | 1197.89 | 107.89 | 9.90% | 1198 | 108.00 | 9.9% | 9.0% | 1132 | 65.60 | 5.8% | 325 |
| 8-Jun | 1,100 | 1203.36 | 103.36 | 9.40% | 1203 | 103.00 | 9.4% | 8.6% | 1143 | 60.68 | 5.3% | 325 |
| 9-Jun | 1,090 | 1210.41 | 120.41 | 11.00% | 1210 | 120.00 | 11.0% | 9.9% | 1132 | 78.12 | 6.9% | 325 |
| 10-Jun | 1,050 | 1187.73 | 137.73 | 13.10% | 1188 | 138.00 | 13.1% | 11.6% | 1091 | 96.99 | 8.9% | 325 |
| 11-Jun | 995 | 1140.2 | 145.2 | 14.60% | 1140 | 145.00 | 14.6% | 12.7% | 1034 | 106.59 | 10.3% | 325 |
| 12-Jun | 967 | 1105.17 | 138.17 | 14.30% | 1105 | 138.00 | 14.3% | 12.5% | 1005 | 100.65 | 10.0% | 325 |
| 13-Jun | 958 | 1091.4 | 133.4 | 13.90% | 1091 | 133.00 | 13.9% | 12.2% | 995 | 96.23 | 9.7% | 325 |
| 14-Jun | 957 | 1082.83 | 125.83 | 13.10% | 1083 | 126.00 | 13.2% | 11.6% | 994 | 88.70 | 8.9% | 325 |
| 15-Jun | 944 | 1086.42 | 142.42 | 15.10% | 1086 | 142.00 | 15.0% | 13.1% | 981 | 105.79 | 10.8% | 170 |
| 16-Jun | 924 | 1022.9 | 98.9 | 10.70% | 1023 | 99.00 | 10.7% | 9.7% | 960 | 63.05 | 6.6% | 170 |
| 17-Jun | 882 | 993.25 | 111.25 | 12.60% | 993 | 111.00 | 12.6% | 11.2% | 916 | 77.03 | 8.4% | 170 |
| 18-Jun | 887 | 983.51 | 96.51 | 10.90% | 984 | 97.00 | 10.9% | 9.9% | 921 | 62.09 | 6.7% | 170 |
| 19-Jun | 890 | 973.14 | 83.14 | 9.30% | 973 | 83.00 | 9.3% | 8.5% | 925 | 48.61 | 5.3% | 170 |
| 20-Jun | 881 | 965.45 | 84.45 | 9.60% | 965 | 84.00 | 9.5% | 8.7% | 915 | 50.27 | 5.5% | 170 |
| 21-Jun | 869 | 948.41 | 79.41 | 9.10% | 948 | 79.00 | 9.1% | 8.3% | 903 | 45.69 | 5.1% | 170 |
| 22-Jun | 848 | 933.04 | 85.04 | 10.00% | 933 | 85.00 | 10.0% | 9.1% | 881 | 52.14 | 5.9% | 170 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23-Jun | 821 | 902.94 | 81.94 | 10.00% | 903 | 82.00 | 10.0% | 9.1% | 853 | 50.09 | 5.9% | 170 |
| 24-Jun | 812 | 875.01 | 63.01 | 7.80% | 875 | 63.00 | 7.8% | 7.2% | 844 | 31.50 | 3.7% | 170 |
| 25-Jun | 789 | 849.31 | 60.31 | 7.60% | 849 | 60.00 | 7.6% | 7.1% | 820 | 29.70 | 3.6% | 170 |
| 26-Jun | 786 | 826.59 | 40.59 | 5.20% | 827 | 41.00 | 5.2% | 5.0% | 816 | 10.09 | 1.2% | 170 |
| 27-Jun | 757 | 797.78 | 40.78 | 5.40% | 798 | 41.00 | 5.4% | 5.1% | 786 | 11.41 | 1.5% | 170 |
| 28-Jun | 732 | 772.49 | 40.49 | 5.50% | 772 | 40.00 | 5.5% | 5.2% | 760 | 12.09 | 1.6% | 170 |
| 29-Jun | 710 | 758.92 | 48.92 | 6.90% | 759 | 49.00 | 6.9% | 6.5% | 738 | 21.37 | 2.9% | 170 |
| 30-Jun | 677 | 731.14 | 54.14 | 8.00% | 731 | 54.00 | 8.0% | 7.4% | 703 | 27.87 | 4.0% | 170 |
| 1-Jul | 659 | 712.55 | 53.55 | 8.10% | 713 | 54.00 | 8.2% | 7.6% | 685 | 27.98 | 4.1% | 170 |
| 2-Jul | 628 | 684.12 | 56.12 | 8.90% | 684 | 56.00 | 8.9% | 8.2% | 652 | 31.75 | 4.9% | 170 |
| 3-Jul | 597 | 660.57 | 63.57 | 10.60% | 661 | 64.00 | 10.7% | 9.7% | 620 | 40.41 | 6.5% | 170 |
| 4-Jul | 572 | 635.3 | 63.3 | 11.10% | 635 | 63.00 | 11.0% | 9.9% | 594 | 41.11 | 6.9% | 170 |
| 5-Jul | 540 | 613.45 | 73.45 | 13.60% | 613 | 73.00 | 13.5% | 11.9% | 561 | 52.50 | 9.4% | 170 |
| 6-Jul | 508 | 593.59 | 85.59 | 16.80% | 594 | 86.00 | 16.9% | 14.5% | 528 | 65.88 | 12.5% | 170 |
| 7-Jul | 487 | 575.66 | 88.66 | 18.20% | 576 | 89.00 | 18.3% | 15.5% | 506 | 69.76 | 13.8% | 170 |
| 8-Jul | 482 | 560.8 | 78.8 | 16.30% | 561 | 79.00 | 16.4% | 14.1% | 501 | 60.10 | 12.0% | 170 |
| 9-Jul | 470 | 546.35 | 76.35 | 16.20% | 546 | 76.00 | 16.2% | 13.9% | 488 | 58.11 | 11.9% | 170 |
| 10-Jul | 473 | 539.38 | 66.38 | 14.00% | 539 | 66.00 | 14.0% | 12.2% | 491 | 48.03 | 9.8% | 170 |
| 11-Jul | 444 | 519.92 | 75.92 | 17.10% | 520 | 76.00 | 17.1% | 14.6% | 461 | 58.69 | 12.7% | 170 |
| 12-Jul | 430 | 508.9 | 78.9 | 18.30% | 509 | 79.00 | 18.4% | 15.5% | 447 | 62.22 | 13.9% | 170 |
| 13-Jul | 401 | 490.76 | 89.76 | 22.40% | 491 | 90.00 | 22.4% | 18.3% | 417 | 74.20 | 17.8% | 170 |
| 14-Jul | 372 | 463.87 | 91.87 | 24.70% | 464 | 92.00 | 24.7% | 19.8% | 386 | 77.44 | 20.0% | 170 |
| 15-Jul | 362 | 447.31 | 85.31 | 23.60% | 447 | 85.00 | 23.5% | 19.0% | 376 | 71.26 | 19.0% | 170 |
| 16-Jul | 343 | 428.72 | 85.72 | 25.00% | 429 | 86.00 | 25.1% | 20.1% | 356 | 72.41 | 20.3% | 170 |
| 17-Jul | 328 | 409.42 | 81.42 | 24.80% | 409 | 81.00 | 24.7% | 19.8% | 341 | 68.69 | 20.2% | 170 |
| 18-Jul | 324 | 404.75 | 80.75 | 24.90% | 405 | 81.00 | 25.0% | 20.0% | 337 | 68.18 | 20.3% | 170 |
| 19-Jul | 328 | 401.78 | 73.78 | 22.50% | 402 | 74.00 | 22.6% | 18.4% | 341 | 61.05 | 17.9% | 170 |
| 20-Jul | 311 | 398.6 | 87.6 | 28.20% | 399 | 88.00 | 28.3% | 22.1% | 323 | 75.53 | 23.4% | 170 |
| 21-Jul | 292 | 382.39 | 90.39 | 31.00% | 382 | 90.00 | 30.8% | 23.5% | 303 | 79.06 | 26.1% | 170 |
| 22-Jul | 298 | 381.37 | 83.37 | 28.00% | 381 | 83.00 | 27.9% | 21.8% | 310 | 71.81 | 23.2% | 170 |
| 23-Jul | 295 | 369.73 | 74.73 | 25.30% | 370 | 75.00 | 25.4% | 20.3% | 306 | 63.28 | 20.7% | 170 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-Jul | 302 | 367.72 | 65.72 | 21.80% | 368 | 66.00 | 21.9% | 17.9% | 314 | 54.00 | 17.2% | 170 |
| 25-Jul | 287 | 354.27 | 67.27 | 23.40% | 354 | 67.00 | 23.3% | 18.9% | 298 | 56.13 | 18.8% | 170 |
| 26-Jul | 292 | 354.84 | 62.84 | 21.50% | 355 | 63.00 | 21.6% | 17.8% | 303 | 51.51 | 17.0% | 170 |
| 27-Jul | 313 | 360.83 | 47.83 | 15.30% | 361 | 48.00 | 15.3% | 13.3% | 325 | 35.69 | 11.0% | 170 |
| 28-Jul | 278 | 350.13 | 72.13 | 25.90% | 350 | 72.00 | 25.9% | 20.6% | 289 | 61.34 | 21.2% | 170 |
| 29-Jul | 268 | 337.86 | 69.86 | 26.10% | 338 | 70.00 | 26.1% | 20.7% | 278 | 59.46 | 21.4% | 170 |
| 30-Jul | 270 | 334.63 | 64.63 | 23.90% | 335 | 65.00 | 24.1% | 19.4% | 280 | 54.15 | 19.3% | 170 |
| 31-Jul | 274 | 339.55 | 65.55 | 23.90% | 340 | 66.00 | 24.1% | 19.4% | 285 | 54.92 | 19.3% | 170 |
| 1-Aug | 251 | 332.86 | 81.86 | 32.60% | 333 | 82.00 | 32.7% | 24.6% | 261 | 72.12 | 27.7% | 115 |
| 2-Aug | 233 | 335.24 | 102.24 | 43.90% | 335 | 102.00 | 43.8% | 30.4% | 242 | 93.20 | 38.5% | 115 |
| 3-Aug | 224 | 327.02 | 103.02 | 46.00% | 327 | 103.00 | 46.0% | 31.5% | 233 | 94.33 | 40.5% | 115 |
| 4-Aug | 230 | 328.17 | 98.17 | 42.70% | 328 | 98.00 | 42.6% | 29.9% | 239 | 89.25 | 37.4% | 115 |
| 5-Aug | 221 | 311.19 | 90.19 | 40.80% | 311 | 90.00 | 40.7% | 28.9% | 230 | 81.62 | 35.6% | 115 |
| 6-Aug | 232 | 313.29 | 81.29 | 35.00% | 313 | 81.00 | 34.9% | 25.9% | 241 | 72.29 | 30.0% | 115 |
| 7-Aug | 226 | 308.31 | 82.31 | 36.40% | 308 | 82.00 | 36.3% | 26.6% | 235 | 73.54 | 31.3% | 115 |
| 8-Aug | 211 | 293.69 | 82.69 | 39.20% | 294 | 83.00 | 39.3% | 28.3% | 219 | 74.50 | 34.0% | 115 |
| 9-Aug | 198 | 283.72 | 85.72 | 43.30% | 284 | 86.00 | 43.4% | 30.3% | 206 | 78.04 | 37.9% | 115 |
| 10-Aug | 182 | 273.76 | 91.76 | 50.40% | 274 | 92.00 | 50.5% | 33.6% | 189 | 84.70 | 44.8% | 115 |
| 11-Aug | 196 | 269.96 | 73.96 | 37.70% | 270 | 74.00 | 37.8% | 27.4% | 204 | 66.36 | 32.6% | 115 |
| 12-Aug | 185 | 266.04 | 81.04 | 43.80% | 266 | 81.00 | 43.8% | 30.4% | 192 | 73.86 | 38.4% | 115 |
| 13-Aug | 171 | 255.58 | 84.58 | 49.50% | 256 | 85.00 | 49.7% | 33.3% | 178 | 77.95 | 43.9% | 115 |
| 14-Aug | 164 | 254.47 | 90.47 | 55.20% | 254 | 90.00 | 54.9% | 35.4% | 170 | 84.11 | 49.4% | 115 |
| 15-Aug | 177 | 277.09 | 100.09 | 56.50% | 277 | 100.00 | 56.5% | 36.1% | 184 | 93.22 | 50.7% | 115 |
| 16-Aug | 200 | 282.45 | 82.45 | 41.20% | 282 | 82.00 | 41.0% | 29.0% | 208 | 74.69 | 36.0% | 115 |
| 17-Aug | 162 | 263.6 | 101.6 | 62.70% | 264 | 102.00 | 63.0% | 38.7% | 168 | 95.31 | 56.6% | 115 |
| 18-Aug | 175 | 260.85 | 85.85 | 49.10% | 261 | 86.00 | 49.1% | 33.0% | 182 | 79.06 | 43.5% | 115 |
| 19-Aug | 155 | 250.37 | 95.37 | 61.50% | 250 | 95.00 | 61.3% | 37.9% | 161 | 89.36 | 55.5% | 115 |
| 20-Aug | 167 | 249.72 | 82.72 | 49.50% | 250 | 83.00 | 49.7% | 33.2% | 173 | 76.24 | 43.9% | 115 |
| 21-Aug | 164 | 251.65 | 87.65 | 53.40% | 252 | 88.00 | 53.7% | 35.0% | 170 | 81.29 | 47.7% | 115 |
| 22-Aug | 153 | 237.79 | 84.79 | 55.40% | 238 | 85.00 | 55.6% | 35.7% | 159 | 78.85 | 49.6% | 115 |
| 23-Aug | 162 | 244.45 | 82.45 | 50.90% | 244 | 82.00 | 50.6% | 33.5% | 168 | 76.16 | 45.3% | 115 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-Aug | 191 | 238.03 | 47.03 | 24.60% | 238 | 47.00 | 24.6% | 19.7% | 198 | 39.62 | 20.0% | 115 |
| 25-Aug | 192 | 238.49 | 46.49 | 24.20% | 238 | 46.00 | 24.0% | 19.3% | 199 | 39.04 | 19.6% | 115 |
| 26-Aug | 187 | 239.07 | 52.07 | 27.80% | 239 | 52.00 | 27.8% | 21.8% | 194 | 44.81 | 23.1% | 115 |
| 27-Aug | 169 | 230.65 | 61.65 | 36.50% | 231 | 62.00 | 36.7% | 26.9% | 176 | 55.09 | 31.4% | 115 |
| 28-Aug | 149 | 216.13 | 67.13 | 45.10% | 216 | 67.00 | 45.0% | 31.0% | 155 | 61.35 | 39.6% | 115 |
| 29-Aug | 145 | 211.57 | 66.57 | 45.90% | 212 | 67.00 | 46.2% | 31.7% | 151 | 60.94 | 40.5% | 115 |
| 30-Aug | 172 | 208.78 | 36.78 | 21.40% | 209 | 37.00 | 21.5% | 17.7% | 179 | 30.11 | 16.8% | 115 |
| 31-Aug | 155 | 200.62 | 45.62 | 29.40% | 201 | 46.00 | 29.7% | 22.9% | 161 | 39.61 | 24.6% | 115 |
| 1-Sep | 135 | 200.12 | 65.12 | 48.20% | 200 | 65.00 | 48.1% | 32.5% | 140 | 59.88 | 42.7% | 80 |
| 2-Sep | 125 | 192.16 | 67.16 | 53.70% | 192 | 67.00 | 53.6% | 34.9% | 130 | 62.31 | 48.0% | 80 |
| 3-Sep | 119 | 186.68 | 67.68 | 56.90% | 187 | 68.00 | 57.1% | 36.4% | 124 | 63.06 | 51.0% | 80 |
| 4-Sep | 114 | 187.03 | 73.03 | 64.10% | 187 | 73.00 | 64.0% | 39.0% | 118 | 68.61 | 57.9% | 80 |
| 5-Sep | 112 | 186.23 | 74.23 | 66.30% | 186 | 74.00 | 66.1% | 39.7% | 116 | 69.88 | 60.1% | 80 |
| 6-Sep | 112 | 186.26 | 74.26 | 66.30% | 186 | 74.00 | 66.1% | 39.7% | 116 | 69.91 | 60.1% | 80 |
| 7-Sep | 109 | 187.17 | 78.17 | 71.70% | 187 | 78.00 | 71.6% | 41.7% | 113 | 73.94 | 65.3% | 80 |
| 8-Sep | 112 | 190.08 | 78.08 | 69.70% | 190 | 78.00 | 69.6% | 41.0% | 116 | 73.73 | 63.4% | 80 |
| 9-Sep | 132 | 197.28 | 65.28 | 49.50% | 197 | 65.00 | 49.2% | 32.9% | 137 | 60.16 | 43.9% | 80 |
| 10-Sep | 160 | 199.42 | 39.42 | 24.60% | 199 | 39.00 | 24.4% | 19.6% | 166 | 33.21 | 20.0% | 80 |
| 11-Sep | 134 | 194.11 | 60.11 | 44.90% | 194 | 60.00 | 44.8% | 30.9% | 139 | 54.91 | 39.4% | 80 |
| 12-Sep | 144 | 199.26 | 55.26 | 38.40% | 199 | 55.00 | 38.2% | 27.6% | 150 | 49.67 | 33.2% | 80 |
| 13-Sep | 157 | 197.34 | 40.34 | 25.70% | 197 | 40.00 | 25.5% | 20.3% | 163 | 34.25 | 21.0% | 80 |
| 14-Sep | 143 | 190.06 | 47.06 | 32.90% | 190 | 47.00 | 32.9% | 24.7% | 149 | 41.51 | 27.9% | 80 |
| 15-Sep | 131 | 182.34 | 51.34 | 39.20% | 182 | 51.00 | 38.9% | 28.0% | 136 | 46.26 | 34.0% | 80 |
| 16-Sep | 143 | 206.28 | 63.28 | 44.30% | 206 | 63.00 | 44.1% | 30.5% | 149 | 57.73 | 38.9% | 80 |
| 17-Sep | 135 | 201.04 | 66.04 | 48.90% | 201 | 66.00 | 48.9% | 32.8% | 140 | 60.80 | 43.4% | 80 |
| 18-Sep | 128 | 197.59 | 69.59 | 54.40% | 198 | 70.00 | 54.7% | 35.4% | 133 | 64.62 | 48.6% | 80 |
| 19-Sep | 129 | 197.95 | 68.95 | 53.50% | 198 | 69.00 | 53.5% | 34.9% | 134 | 63.94 | 47.7% | 80 |
| 20-Sep | 131 | 194.13 | 63.13 | 48.20% | 194 | 63.00 | 48.1% | 32.5% | 136 | 58.05 | 42.7% | 80 |
| 21-Sep | 139 | 196.2 | 57.2 | 41.10% | 196 | 57.00 | 41.0% | 29.1% | 144 | 51.81 | 35.9% | 80 |
| 22-Sep | 137 | 194.71 | 57.71 | 42.10% | 195 | 58.00 | 42.3% | 29.8% | 142 | 52.39 | 36.8% | 80 |
| 23-Sep | 136 | 193.9 | 57.9 | 42.60% | 194 | 58.00 | 42.6% | 29.9% | 141 | 52.62 | 37.2% | 80 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-Sep | 150 | 196.4 | 46.4 | 30.90% | 196 | 46.00 | 30.7% | 23.4% | 156 | 40.58 | 26.0% | 80 |
| 25-Sep | 140 | 190.77 | 50.77 | 36.30% | 191 | 51.00 | 36.4% | 26.7% | 145 | 45.34 | 31.2% | 80 |
| 26-Sep | 126 | 183.99 | 57.99 | 46.00% | 184 | 58.00 | 46.0% | 31.5% | 131 | 53.10 | 40.6% | 80 |
| 27-Sep | 118 | 178.95 | 60.95 | 51.70% | 179 | 61.00 | 51.7% | 34.1% | 123 | 56.37 | 46.0% | 80 |
| 28-Sep | 120 | 180.44 | 60.44 | 50.40% | 180 | 60.00 | 50.0% | 33.3% | 125 | 55.78 | 44.8% | 80 |
| 29-Sep | 117 | 185.96 | 68.96 | 58.90% | 186 | 69.00 | 59.0% | 37.1% | 122 | 64.42 | 53.0% | 80 |
| 30-Sep | 120 | 188.9 | 68.9 | 57.40% | 189 | 69.00 | 57.5% | 36.5% | 125 | 64.24 | 51.5% | 80 |
| 1-Oct | 120 | 172.33 | 52.33 | 43.60% | 172 | 52.00 | 43.3% | 30.2% | 125 | 47.67 | 38.2% | 80 |
| 2-Oct | 127 | 177.4 | 50.4 | 39.70% | 177 | 50.00 | 39.4% | 28.2% | 132 | 45.47 | 34.5% | 80 |
| 3-Oct | 159 | 184.85 | 25.85 | 16.30% | 185 | 26.00 | 16.4% | 14.1% | 165 | 19.68 | 11.9% | 80 |
| 4-Oct | 143 | 183.44 | 40.44 | 28.30% | 183 | 40.00 | 28.0% | 21.8% | 149 | 34.89 | 23.5% | 80 |
| 5-Oct | 135 | 183.06 | 48.06 | 35.60% | 183 | 48.00 | 35.6% | 26.2% | 140 | 42.82 | 30.5% | 80 |
| 6-Oct | 177 | 186.96 | 9.96 | 5.60% | 187 | 10.00 | 5.6% | 5.3% | 184 | 3.09 | 1.7% | 80 |
| 7-Oct | 182 | 196.42 | 14.42 | 7.90% | 196 | 14.00 | 7.7% | 7.1% | 189 | 7.36 | 3.9% | 80 |
| 8-Oct | 164 | 193.86 | 29.86 | 18.20% | 194 | 30.00 | 18.3% | 15.5% | 170 | 23.50 | 13.8% | 80 |
| 9-Oct | 172 | 202.21 | 30.21 | 17.60% | 202 | 30.00 | 17.4% | 14.8% | 179 | 23.54 | 13.2% | 80 |
| 10-Oct | 170 | 198.02 | 28.02 | 16.50% | 198 | 28.00 | 16.5% | 14.1% | 177 | 21.42 | 12.1% | 80 |
| 11-Oct | 158 | 197.11 | 39.11 | 24.80% | 197 | 39.00 | 24.7% | 19.8% | 164 | 32.98 | 20.1% | 80 |
| 12-Oct | 154 | 195.39 | 41.39 | 26.90% | 195 | 41.00 | 26.6% | 21.0% | 160 | 35.41 | 22.1% | 80 |
| 13-Oct | 155 | 197.67 | 42.67 | 27.50% | 198 | 43.00 | 27.7% | 21.8% | 161 | 36.66 | 22.8% | 80 |
| 14-Oct | 149 | 196.87 | 47.87 | 32.10% | 197 | 48.00 | 32.2% | 24.4% | 155 | 42.09 | 27.2% | 80 |
| 15-Oct | 152 | 197.7 | 45.7 | 30.10% | 198 | 46.00 | 30.3% | 23.3% | 158 | 39.80 | 25.2% | 80 |
| 16-Oct | 153 | 200.92 | 47.92 | 31.30% | 201 | 48.00 | 31.4% | 23.9% | 159 | 41.98 | 26.4% | 80 |
| 17-Oct | 147 | 200.24 | 53.24 | 36.20% | 200 | 53.00 | 36.1% | 26.5% | 153 | 47.54 | 31.1% | 80 |
| 18-Oct | 148 | 200.95 | 52.95 | 35.80% | 201 | 53.00 | 35.8% | 26.4% | 154 | 47.21 | 30.7% | 80 |
| 19-Oct | 148 | 201.91 | 53.91 | 36.40% | 202 | 54.00 | 36.5% | 26.7% | 154 | 48.17 | 31.3% | 80 |
| 20-Oct | 145 | 199.54 | 54.54 | 37.60% | 200 | 55.00 | 37.9% | 27.6% | 151 | 48.91 | 32.5% | 80 |
| 21-Oct | 148 | 195.64 | 47.64 | 32.20% | 196 | 48.00 | 32.4% | 24.5% | 154 | 41.90 | 27.3% | 80 |
| 22-Oct | 139 | 194.48 | 55.48 | 39.90% | 194 | 55.00 | 39.6% | 28.3% | 144 | 50.09 | 34.7% | 80 |
| 23-Oct | 135 | 192.98 | 57.98 | 42.90% | 193 | 58.00 | 43.0% | 30.1% | 140 | 52.74 | 37.6% | 80 |
| 24-Oct | 136 | 194.42 | 58.42 | 43.00% | 194 | 58.00 | 42.6% | 29.8% | 141 | 53.14 | 37.6% | 80 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25-Oct | 135 | 191.65 | 56.65 | 42.00% | 192 | 57.00 | 42.2% | 29.7% | 140 | 51.41 | 36.7% | 80 |
| 26-Oct | 139 | 197.87 | 58.87 | 42.40% | 198 | 59.00 | 42.4% | 29.8% | 144 | 53.48 | 37.0% | 80 |
| 27-Oct | 143 | 207.89 | 64.89 | 45.40% | 208 | 65.00 | 45.5% | 31.3% | 149 | 59.34 | 39.9% | 80 |
| 28-Oct | 136 | 207.07 | 71.07 | 52.30% | 207 | 71.00 | 52.2% | 34.3% | 141 | 65.79 | 46.6% | 80 |
| 29-Oct | 140 | 215.07 | 75.07 | 53.60% | 215 | 75.00 | 53.6% | 34.9% | 145 | 69.64 | 47.9% | 80 |
| 30-Oct | 137 | 216.86 | 79.86 | 58.30% | 217 | 80.00 | 58.4% | 36.9% | 142 | 74.54 | 52.4% | 80 |
| 31-Oct | 137 | 181.24 | 44.24 | 32.30% | 181 | 44.00 | 32.1% | 24.3% | 142 | 38.92 | 27.4% | 80 |
| 1-Nov | 143 | 133.24 | -9.76 | -6.80% | 133 | -10.00 | -7.0% | -7.5% | 149 | -15.31 | -10.3% | 80 |
| 2-Nov | 144 | 134.23 | -9.77 | -6.80% | 134 | -10.00 | -6.9% | -7.4% | 150 | -15.36 | -10.3% | 80 |
| 3-Nov | 135 | 131.41 | -3.59 | -2.70% | 131 | -4.00 | -3.0% | -3.0% | 140 | -8.83 | -6.3% | 80 |
| 4-Nov | 130 | 125.92 | -4.08 | -3.10% | 126 | -4.00 | -3.1% | -3.2% | 135 | -9.12 | -6.8% | 80 |
| 5-Nov | 130 | 125.08 | -4.92 | -3.80% | 125 | -5.00 | -3.8% | -4.0% | 135 | -9.96 | -7.4% | 80 |
| 6-Nov | 138 | 128.24 | -9.76 | -7.10% | 128 | -10.00 | -7.2% | -7.8% | 143 | -15.11 | -10.5% | 80 |
| 7-Nov | 132 | 127.6 | -4.4 | -3.30% | 128 | -4.00 | -3.0% | -3.1% | 137 | -9.52 | -6.9% | 80 |
| 8-Nov | 127 | 123.85 | -3.15 | -2.50% | 124 | -3.00 | -2.4% | -2.4% | 132 | -8.08 | -6.1% | 80 |
| 9-Nov | 128 | 125.58 | -2.42 | -1.90% | 126 | -2.00 | -1.6% | -1.6% | 133 | -7.39 | -5.6% | 80 |
| 10-Nov | 126 | 124.95 | -1.05 | -0.80% | 125 | -1.00 | -0.8% | -0.8% | 131 | -5.94 | -4.5% | 80 |
| 11-Nov | 123 | 121.82 | -1.18 | -1.00% | 122 | -1.00 | -0.8% | -0.8% | 128 | -5.95 | -4.7% | 80 |
| 12-Nov | 127 | 123.7 | -3.3 | -2.60% | 124 | -3.00 | -2.4% | -2.4% | 132 | -8.23 | -6.2% | 80 |
| 13-Nov | 121 | 117.18 | -3.82 | -3.20% | 117 | -4.00 | -3.3% | -3.4% | 126 | -8.51 | -6.8% | 80 |
| 14-Nov | 116 | 112.07 | -3.93 | -3.40% | 112 | -4.00 | -3.4% | -3.6% | 121 | -8.43 | -7.0% | 80 |
| 15-Nov | 116 | 111.98 | -4.02 | -3.50% | 112 | -4.00 | -3.4% | -3.6% | 121 | -8.52 | -7.1% | 80 |
| 16-Nov | 108 | 105.18 | -2.82 | -2.60% | 105 | -3.00 | -2.8% | -2.9% | 112 | -7.01 | -6.2% | 80 |
| 17-Nov | 103 | 98.28 | -4.72 | -4.60% | 98 | -5.00 | -4.9% | -5.1% | 107 | -8.72 | -8.1% | 80 |
| 18-Nov | 101 | 94.97 | -6.03 | -6.00% | 95 | -6.00 | -5.9% | -6.3% | 105 | -9.95 | -9.5% | 80 |
| 19-Nov | 118 | 94.3 | -23.7 | -20.10% | 94 | -24.00 | -20.3% | -25.5% | 123 | -28.28 | -23.1% | 80 |
| 20-Nov | 111 | 93.36 | -17.64 | -15.90% | 93 | -18.00 | -16.2% | -19.3% | 115 | -21.95 | -19.0% | 80 |
| 21-Nov | 106 | 96.7 | -9.3 | -8.80% | 97 | -9.00 | -8.5% | -9.3% | 110 | -13.41 | -12.2% | 80 |
| 22-Nov | 105 | 97.72 | -7.28 | -6.90% | 98 | -7.00 | -6.7% | -7.2% | 109 | -11.35 | -10.4% | 80 |
| 23-Nov | 108 | 100.85 | -7.15 | -6.60% | 101 | -7.00 | -6.5% | -6.9% | 112 | -11.34 | -10.1% | 80 |
| 24-Nov | 106 | 103.03 | -2.97 | -2.80% | 103 | -3.00 | -2.8% | -2.9% | 110 | -7.08 | -6.4% | 80 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 25-Nov | 109 | 103.5 | -5.5 | -5.00% | 104 | -5.00 | -4.6% | -4.8% | 113 | -9.73 | -8.6% | 80 |
| 26-Nov | 111 | 103.81 | -7.19 | -6.50% | 104 | -7.00 | -6.3% | -6.7% | 115 | -11.50 | -10.0% | 80 |
| 27-Nov | 104 | 97.41 | -6.59 | -6.30% | 97 | -7.00 | -6.7% | -7.2% | 108 | -10.63 | -9.8% | 80 |
| 28-Nov | 100 | 94.12 | -5.88 | -5.90% | 94 | -6.00 | -6.0% | -6.4% | 104 | -9.76 | -9.4% | 80 |
| 29-Nov | 100 | 91.55 | -8.45 | -8.40% | 92 | -8.00 | -8.0% | -8.7% | 104 | -12.33 | -11.9% | 80 |
| 30-Nov | 101 | 92.36 | -8.64 | -8.60% | 92 | -9.00 | -8.9% | -9.7% | 105 | -12.56 | -12.0% | 80 |
| 1-Dec | 101 | 98.72 | -2.28 | -2.30% | 99 | -2.00 | -2.0% | -2.0% | 105 | -6.20 | -5.9% | 80 |
| 2-Dec | 101 | 100.86 | -0.14 | -0.10% | 101 | 0.00 | 0.0% | 0.0% | 105 | -4.06 | -3.9% | 80 |
| 3-Dec | 103 | 102.72 | -0.28 | -0.30% | 103 | 0.00 | 0.0% | 0.0% | 107 | -4.28 | -4.0% | 80 |
| 4-Dec | 102 | 100.97 | -1.03 | -1.00% | 101 | -1.00 | -1.0% | -1.0% | 106 | -4.99 | -4.7% | 80 |
| 5-Dec | 101 | 101.19 | 0.19 | 0.20% | 101 | 0.00 | 0.0% | 0.0% | 105 | -3.73 | -3.6% | 80 |
| 6-Dec | 98 | 97.63 | -0.37 | -0.40% | 98 | 0.00 | 0.0% | 0.0% | 102 | -4.17 | -4.1% | 80 |
| 7-Dec | 100 | 101.18 | 1.18 | 1.20% | 101 | 1.00 | 1.0% | 1.0% | 104 | -2.70 | -2.6% | 80 |
| 8-Dec | 100 | 101.39 | 1.39 | 1.40% | 101 | 1.00 | 1.0% | 1.0% | 104 | -2.49 | -2.4% | 80 |
| 9-Dec | 98 | 96.57 | -1.43 | -1.50% | 97 | -1.00 | -1.0% | -1.0% | 102 | -5.23 | -5.1% | 80 |
| 10-Dec | 95 | 93.26 | -1.74 | -1.80% | 93 | -2.00 | -2.1% | -2.1% | 99 | -5.43 | -5.5% | 80 |
| 11-Dec | 97 | 96.86 | -0.14 | -0.10% | 97 | 0.00 | 0.0% | 0.0% | 101 | -3.90 | -3.9% | 80 |
| 12-Dec | 93 | 93.28 | 0.28 | 0.30% | 93 | 0.00 | 0.0% | 0.0% | 97 | -3.33 | -3.4% | 80 |
| 13-Dec | 92 | 92.05 | 0.05 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.52 | -3.7% | 80 |
| 14-Dec | 90 | 88.93 | -1.07 | -1.20% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.56 | -4.9% | 80 |
| 15-Dec | 89 | 89.18 | 0.18 | 0.20% | 89 | 0.00 | 0.0% | 0.0% | 92 | -3.27 | -3.5% | 80 |
| 16-Dec | 91 | 91.22 | 0.22 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.31 | -3.5% | 80 |
| 17-Dec | 93 | 91.75 | -1.25 | -1.30% | 92 | -1.00 | -1.1% | -1.1% | 97 | -4.86 | -5.0% | 80 |
| 18-Dec | 91 | 90.25 | -0.75 | -0.80% | 90 | -1.00 | -1.1% | -1.1% | 95 | -4.28 | -4.5% | 80 |
| 19-Dec | 93 | 91.6 | -1.4 | -1.50% | 92 | -1.00 | -1.1% | -1.1% | 97 | -5.01 | -5.2% | 80 |
| 20-Dec | 92 | 90.02 | -1.98 | -2.20% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.55 | -5.8% | 80 |
| 21-Dec | 91 | 88.57 | -2.43 | -2.70% | 89 | -2.00 | -2.2% | -2.3% | 95 | -5.96 | -6.3% | 80 |
| 22-Dec | 90 | 89.28 | -0.72 | -0.80% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.21 | -4.5% | 80 |
| 23-Dec | 92 | 91.43 | -0.57 | -0.60% | 91 | -1.00 | -1.1% | -1.1% | 96 | -4.14 | -4.3% | 80 |
| 24-Dec | 90 | 89.49 | -0.51 | -0.60% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.00 | -4.3% | 80 |
| 25-Dec | 91 | 90.04 | -0.96 | -1.10% | 90 | -1.00 | -1.1% | -1.1% | 95 | -4.49 | -4.8% | 80 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26-Dec | 92 | 90.36 | -1.64 | -1.80% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.21 | -5.5% | 80 |
| 27-Dec | 91 | 88.6 | -2.4 | -2.60% | 89 | -2.00 | -2.2% | -2.3% | 95 | -5.93 | -6.3% | 80 |
| 28-Dec | 92 | 89.97 | -2.03 | -2.20% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.60 | -5.9% | 80 |
| 29-Dec | 93 | 90.77 | -2.23 | -2.40% | 91 | -2.00 | -2.2% | -2.2% | 97 | -5.84 | -6.0% | 80 |
| 30-Dec | 94 | 88.63 | -5.37 | -5.70% | 89 | -5.00 | -5.3% | -5.6% | 98 | -9.02 | -9.2% | 80 |
| 31-Dec | 89 | 88.15 | -0.85 | -1.00% | 88 | -1.00 | -1.1% | -1.1% | 92 | -4.30 | -4.7% | 80 |
| Average | 360 | 370.27 | 9.88 | 5.2% | 370 | 9.86 | 8.8% | 4.2% | 374 | -4.10 | 4.7% | |
| Min | 81 | 80.21 | -300.79 | -1330.0% | 80 | -301.00 | -32.8% | -48.8% | 84 | -3.93 | -35.2% | |
| Max | 1190 | 1210.41 | 145.20 | 71.7% | 1210 | 145.00 | 71.6% | 41.7% | 1236 | -25.76 | 65.3% | |

Table 3. Comparisons with San Miguel R. at Uravan (Adjusted by Area Ratio, Number Rounding and with San Miguel @ LT in Denominator)

| | Mean Daily Discharge San Miguel River @ Uravan (cfs) | CWCB Adjusted Flow @ LT Gage (cfs) | Adjustment (cfs) | Percent Adjustment (%) | CWCB Values Rounded to whole Numbers as in Col G (cfs) | Adjustment (cfs) | Percent Adjustment (%) | % Adj w/ CWCB as Denominator (%) | Mean Daily Discharge San Miguel River @ Uravan x 1.0388 (cfs) | Adjustment (cfs) | Percent Adjustment (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Jan | 88 | 87.97 | -0.03 | 0.00% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.41 | -3.7% |
| 2-Jan | 82 | 82.24 | 0.24 | 0.30% | 82 | 0.00 | 0.0% | 0.0% | 85 | -3.18 | -3.7% |
| 3-Jan | 81 | 81.55 | 0.55 | 0.70% | 82 | 1.00 | 1.2% | 1.2% | 84 | -2.14 | -2.5% |
| 4-Jan | 82 | 80.7 | -1.3 | -1.60% | 81 | -1.00 | -1.2% | -1.2% | 85 | -4.18 | -4.9% |
| 5-Jan | 86 | 86.31 | 0.31 | 0.40% | 86 | 0.00 | 0.0% | 0.0% | 89 | -3.34 | -3.7% |
| 6-Jan | 87 | 87.5 | 0.5 | 0.60% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.38 | -2.6% |
| 7-Jan | 89 | 89.03 | 0.03 | 0.00% | 89 | 0.00 | 0.0% | 0.0% | 92 | -3.45 | -3.7% |
| 8-Jan | 90 | 89.91 | -0.09 | -0.10% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.49 | -3.7% |
| 9-Jan | 93 | 92.51 | -0.49 | -0.50% | 93 | 0.00 | 0.0% | 0.0% | 97 | -3.61 | -3.7% |
| 10-Jan | 92 | 91.98 | -0.02 | 0.00% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.57 | -3.7% |
| 11-Jan | 92 | 89.47 | -2.53 | -2.70% | 89 | -3.00 | -3.3% | -3.4% | 96 | -6.57 | -6.9% |
| 12-Jan | 91 | 86.78 | -4.22 | -4.60% | 87 | -4.00 | -4.4% | -4.6% | 95 | -7.53 | -8.0% |
| 13-Jan | 90 | 89.52 | -0.48 | -0.50% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.49 | -3.7% |
| 14-Jan | 94 | 92.44 | -1.56 | -1.70% | 92 | -2.00 | -2.1% | -2.2% | 98 | -5.65 | -5.8% |
| 15-Jan | 92 | 92.12 | 0.12 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.57 | -3.7% |
| 16-Jan | 89 | 90.57 | 1.57 | 1.80% | 91 | 2.00 | 2.2% | 2.2% | 92 | -1.45 | -1.6% |
| 17-Jan | 88 | 89.4 | 1.4 | 1.60% | 89 | 1.00 | 1.1% | 1.1% | 91 | -2.41 | -2.6% |
| 18-Jan | 88 | 87.85 | -0.15 | -0.20% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.41 | -3.7% |
| 19-Jan | 89 | 87.77 | -1.23 | -1.40% | 88 | -1.00 | -1.1% | -1.1% | 92 | -4.45 | -4.8% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-Jan | 88 | 86.99 | -1.01 | -1.10% | 87 | -1.00 | -1.1% | -1.1% | 91 | -4.41 | -4.8% |
| 21-Jan | 88 | 87.65 | -0.35 | -0.40% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.41 | -3.7% |
| 22-Jan | 85 | 85.54 | 0.54 | 0.60% | 86 | 1.00 | 1.2% | 1.2% | 88 | -2.30 | -2.6% |
| 23-Jan | 83 | 83.44 | 0.44 | 0.50% | 83 | 0.00 | 0.0% | 0.0% | 86 | -3.22 | -3.7% |
| 24-Jan | 81 | 80.21 | -0.79 | -1.00% | 80 | -1.00 | -1.2% | -1.2% | 84 | -4.14 | -4.9% |
| 25-Jan | 83 | 81.88 | -1.12 | -1.30% | 82 | -1.00 | -1.2% | -1.2% | 86 | -4.22 | -4.9% |
| 26-Jan | 88 | 87.75 | -0.25 | -0.30% | 88 | 0.00 | 0.0% | 0.0% | 91 | -3.41 | -3.7% |
| 27-Jan | 92 | 92.12 | 0.12 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.57 | -3.7% |
| 28-Jan | 91 | 91.22 | 0.22 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.53 | -3.7% |
| 29-Jan | 87 | 88.02 | 1.02 | 1.20% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.38 | -2.6% |
| 30-Jan | 87 | 88.23 | 1.23 | 1.40% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.38 | -2.6% |
| 31-Jan | 87 | 88.38 | 1.38 | 1.60% | 88 | 1.00 | 1.1% | 1.1% | 90 | -2.38 | -2.6% |
| Ave | 87.8 | 87.65 | -0.19 | -0.20% | 88 | -0.16 | -0.2% | -0.2% | 91 | -3.57 | -3.9% |
| Min | 81 | 80.21 | -4.22 | -4.60% | 80 | -4.00 | -4.4% | -4.6% | 84 | -7.53 | -8.0% |
| Max | 94 | 92.51 | 1.57 | 1.80% | 93 | 2.00 | 2.2% | 2.2% | 98 | -1.45 | -1.6% |
| | | | | | | | | | | | |
| 1-Feb | 89 | 90.35 | 1.35 | 1.50% | 90 | 1.00 | 1.1% | 1.1% | 92 | -2.45 | -2.7% |
| 2-Feb | 91 | 91.46 | 0.46 | 0.50% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.53 | -3.7% |
| 3-Feb | 92 | 91.17 | -0.83 | -0.90% | 91 | -1.00 | -1.1% | -1.1% | 96 | -4.57 | -4.8% |
| 4-Feb | 91 | 91.44 | 0.44 | 0.50% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.53 | -3.7% |
| 5-Feb | 93 | 92.01 | -0.99 | -1.10% | 92 | -1.00 | -1.1% | -1.1% | 97 | -4.61 | -4.8% |
| 6-Feb | 90 | 90.33 | 0.33 | 0.40% | 90 | 0.00 | 0.0% | 0.0% | 93 | -3.49 | -3.7% |
| 7-Feb | 91 | 91.14 | 0.14 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.53 | -3.7% |
| 8-Feb | 95 | 93.06 | -1.94 | -2.00% | 93 | -2.00 | -2.1% | -2.1% | 99 | -5.69 | -5.8% |
| 9-Feb | 110 | 102.61 | -7.39 | -6.70% | 103 | -7.00 | -6.4% | -6.8% | 114 | -11.27 | -9.9% |
| 10-Feb | 110 | 105.57 | -4.43 | -4.00% | 106 | -4.00 | -3.6% | -3.8% | 114 | -8.27 | -7.2% |
| 11-Feb | 112 | 104.39 | -7.61 | -6.80% | 104 | -8.00 | -7.1% | -7.7% | 116 | -12.35 | -10.6% |
| 12-Feb | 108 | 102.47 | -5.53 | -5.10% | 102 | -6.00 | -5.6% | -5.9% | 112 | -10.19 | -9.1% |
| 13-Feb | 117 | 108.34 | -8.66 | -7.40% | 108 | -9.00 | -7.7% | -8.3% | 122 | -13.54 | -11.1% |
| 14-Feb | 113 | 108.5 | -4.5 | -4.00% | 109 | -4.00 | -3.5% | -3.7% | 117 | -8.38 | -7.1% |
| 15-Feb | 110 | 109.49 | -0.51 | -0.50% | 109 | -1.00 | -0.9% | -0.9% | 114 | -5.27 | -4.6% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16-Feb | 112 | 111.47 | -0.53 | -0.50% | 111 | -1.00 | -0.9% | -0.9% | 116 | -5.35 | -4.6% |
| 17-Feb | 113 | 109.49 | -3.51 | -3.10% | 109 | -4.00 | -3.5% | -3.7% | 117 | -8.38 | -7.1% |
| 18-Feb | 109 | 106.71 | -2.29 | -2.10% | 107 | -2.00 | -1.8% | -1.9% | 113 | -6.23 | -5.5% |
| 19-Feb | 109 | 105.66 | -3.34 | -3.10% | 106 | -3.00 | -2.8% | -2.8% | 113 | -7.23 | -6.4% |
| 20-Feb | 116 | 109.8 | -6.2 | -5.30% | 110 | -6.00 | -5.2% | -5.5% | 121 | -10.50 | -8.7% |
| 21-Feb | 116 | 110.11 | -5.89 | -5.10% | 110 | -6.00 | -5.2% | -5.4% | 121 | -10.50 | -8.7% |
| 22-Feb | 113 | 107.38 | -5.62 | -5.00% | 107 | -6.00 | -5.3% | -5.6% | 117 | -10.38 | -8.8% |
| 23-Feb | 114 | 106.1 | -7.9 | -6.90% | 106 | -8.00 | -7.0% | -7.5% | 118 | -12.42 | -10.5% |
| 24-Feb | 112 | 104.09 | -7.91 | -7.10% | 104 | -8.00 | -7.1% | -7.7% | 116 | -12.35 | -10.6% |
| 25-Feb | 111 | 104.18 | -6.82 | -6.10% | 104 | -7.00 | -6.3% | -6.7% | 115 | -11.31 | -9.8% |
| 26-Feb | 107 | 102.13 | -4.87 | -4.60% | 102 | -5.00 | -4.7% | -4.9% | 111 | -9.15 | -8.2% |
| 27-Feb | 107 | 105.16 | -1.84 | -1.70% | 105 | -2.00 | -1.9% | -1.9% | 111 | -6.15 | -5.5% |
| 28-Feb | 110 | 107.91 | -2.09 | -1.90% | 108 | -2.00 | -1.8% | -1.9% | 114 | -6.27 | -5.5% |
| 29-Feb | 112 | 106.99 | -5.01 | -4.50% | 107 | -5.00 | -4.5% | -4.7% | 116 | -9.35 | -8.0% |
| Ave | 106 | 102.40 | -3.57 | -3.19% | 102 | -3.69 | -3.3% | -3.5% | 110 | -7.80 | -6.9% |
| Min | 89 | 90.33 | -8.66 | -7.40% | 90 | -9.00 | -7.7% | -8.3% | 92 | -13.54 | -11.1% |
| Max | 117 | 111.47 | 1.35 | 1.50% | 111 | 1.00 | 1.1% | 1.1% | 122 | -2.45 | -2.7% |
| | | | | | | | | | | | |
| 1-Mar | 122 | 114.28 | -7.72 | -6.30% | 114 | -8.00 | -6.6% | -7.0% | 127 | -12.73 | -10.0% |
| 2-Mar | 134 | 115.3 | -18.7 | -14.00% | 115 | -19.00 | -14.2% | -16.5% | 139 | -24.20 | -17.4% |
| 3-Mar | 133 | 117.78 | -15.22 | -11.40% | 118 | -15.00 | -11.3% | -12.7% | 138 | -20.16 | -14.6% |
| 4-Mar | 127 | 115.3 | -11.7 | -9.20% | 115 | -12.00 | -9.4% | -10.4% | 132 | -16.93 | -12.8% |
| 5-Mar | 118 | 110.33 | -7.67 | -6.50% | 110 | -8.00 | -6.8% | -7.3% | 123 | -12.58 | -10.3% |
| 6-Mar | 123 | 115.84 | -7.16 | -5.80% | 116 | -7.00 | -5.7% | -6.0% | 128 | -11.77 | -9.2% |
| 7-Mar | 141 | 122.01 | -18.99 | -13.50% | 122 | -19.00 | -13.5% | -15.6% | 146 | -24.47 | -16.7% |
| 8-Mar | 163 | 123.44 | -39.56 | -24.30% | 123 | -40.00 | -24.5% | -32.4% | 169 | -46.32 | -27.4% |
| 9-Mar | 139 | 119.83 | -19.17 | -13.80% | 120 | -19.00 | -13.7% | -15.9% | 144 | -24.39 | -16.9% |
| 10-Mar | 141 | 120.33 | -20.67 | -14.70% | 120 | -21.00 | -14.9% | -17.5% | 146 | -26.47 | -18.1% |
| 11-Mar | 143 | 125.23 | -17.77 | -12.40% | 125 | -18.00 | -12.6% | -14.4% | 149 | -23.55 | -15.9% |
| 12-Mar | 149 | 129.24 | -19.76 | -13.30% | 129 | -20.00 | -13.4% | -15.5% | 155 | -25.78 | -16.7% |
| 13-Mar | 157 | 134.05 | -22.95 | -14.60% | 134 | -23.00 | -14.6% | -17.2% | 163 | -29.09 | -17.8% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14-Mar | 171 | 143 | -28 | -16.40% | 143 | -28.00 | -16.4% | -19.6% | 178 | -34.63 | -19.5% |
| 15-Mar | 171 | 144.23 | -26.77 | -15.70% | 144 | -27.00 | -15.8% | -18.7% | 178 | -33.63 | -18.9% |
| 16-Mar | 177 | 148.65 | -28.35 | -16.00% | 149 | -28.00 | -15.8% | -18.8% | 184 | -34.87 | -19.0% |
| 17-Mar | 180 | 149.08 | -30.92 | -17.20% | 149 | -31.00 | -17.2% | -20.8% | 187 | -37.98 | -20.3% |
| 18-Mar | 189 | 150.93 | -38.07 | -20.10% | 151 | -38.00 | -20.1% | -25.2% | 196 | -45.33 | -23.1% |
| 19-Mar | 202 | 153.8 | -48.2 | -23.90% | 154 | -48.00 | -23.8% | -31.2% | 210 | -55.84 | -26.6% |
| 20-Mar | 218 | 163.25 | -54.75 | -25.10% | 163 | -55.00 | -25.2% | -33.7% | 226 | -63.46 | -28.0% |
| 21-Mar | 245 | 168.56 | -76.44 | -31.20% | 169 | -76.00 | -31.0% | -45.1% | 255 | -85.51 | -33.6% |
| 22-Mar | 254 | 177.12 | -76.88 | -30.30% | 177 | -77.00 | -30.3% | -43.5% | 264 | -86.86 | -32.9% |
| 23-Mar | 269 | 185.5 | -83.5 | -31.00% | 186 | -83.00 | -30.9% | -44.7% | 279 | -93.44 | -33.4% |
| 24-Mar | 289 | 196.5 | -92.5 | -32.00% | 197 | -92.00 | -31.8% | -46.8% | 300 | -103.21 | -34.4% |
| 25-Mar | 301 | 207.59 | -93.41 | -31.00% | 208 | -93.00 | -30.9% | -44.8% | 313 | -104.68 | -33.5% |
| 26-Mar | 326 | 219.32 | -106.68 | -32.70% | 219 | -107.00 | -32.8% | -48.8% | 339 | -119.65 | -35.3% |
| 27-Mar | 323 | 224.59 | -98.41 | -30.50% | 225 | -98.00 | -30.3% | -43.6% | 336 | -110.53 | -32.9% |
| 28-Mar | 319 | 225.41 | -93.59 | -29.30% | 225 | -94.00 | -29.5% | -41.7% | 331 | -106.38 | -32.1% |
| 29-Mar | 301 | 221.34 | -79.66 | -26.50% | 221 | -80.00 | -26.6% | -36.1% | 313 | -91.68 | -29.3% |
| 30-Mar | 282 | 219.54 | -62.46 | -22.10% | 220 | -62.00 | -22.0% | -28.2% | 293 | -72.94 | -24.9% |
| 31-Mar | 290 | 225.43 | -64.57 | -22.30% | 225 | -65.00 | -22.4% | -28.8% | 301 | -76.25 | -25.3% |
| Ave | 203 | 158 | -45.49 | -19.78% | 158 | -45.52 | -19.8% | -26.1% | 211 | -53.40 | -22.8% |
| Min | 118 | 110 | -106.68 | -32.70% | 110 | -107.00 | -32.8% | -48.8% | 123 | -119.65 | -35.3% |
| Max | 326 | 225 | -7.16 | -5.80% | 225 | -7.00 | -5.7% | -6.0% | 339 | -11.77 | -9.2% |
| | | | | | | | | | | | |
| 1-Apr | 312 | 279.77 | -32.23 | -10.30% | 280 | -32.00 | -10.3% | -11.4% | 324 | -44.11 | -13.6% |
| 2-Apr | 338 | 296.76 | -41.24 | -12.20% | 297 | -41.00 | -12.1% | -13.8% | 351 | -54.11 | -15.4% |
| 3-Apr | 336 | 308.17 | -27.83 | -8.30% | 308 | -28.00 | -8.3% | -9.1% | 349 | -41.04 | -11.8% |
| 4-Apr | 391 | 338.18 | -52.82 | -13.50% | 338 | -53.00 | -13.6% | -15.7% | 406 | -68.17 | -16.8% |
| 5-Apr | 413 | 361.2 | -51.8 | -12.50% | 361 | -52.00 | -12.6% | -14.4% | 429 | -68.02 | -15.9% |
| 6-Apr | 461 | 390.62 | -70.38 | -15.30% | 391 | -70.00 | -15.2% | -17.9% | 479 | -87.89 | -18.4% |
| 7-Apr | 515 | 421.47 | -93.53 | -18.20% | 421 | -94.00 | -18.3% | -22.3% | 535 | -113.98 | -21.3% |
| 8-Apr | 595 | 469.05 | -125.95 | -21.20% | 469 | -126.00 | -21.2% | -26.9% | 618 | -149.09 | -24.1% |
| 9-Apr | 621 | 482.28 | -138.72 | -22.30% | 482 | -139.00 | -22.4% | -28.8% | 645 | -163.09 | -25.3% |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-Apr | 657 | 521.75 | -135.25 | -20.60% | 522 | -135.00 | -20.5% | -25.9% | 682 | -160.49 | -23.5% |
| 11-Apr | 666 | 542.95 | -123.05 | -18.50% | 543 | -123.00 | -18.5% | -22.7% | 692 | -148.84 | -21.5% |
| 12-Apr | 659 | 539.9 | -119.1 | -18.10% | 540 | -119.00 | -18.1% | -22.0% | 685 | -144.57 | -21.1% |
| 13-Apr | 664 | 546.39 | -117.61 | -17.70% | 546 | -118.00 | -17.8% | -21.6% | 690 | -143.76 | -20.8% |
| 14-Apr | 708 | 580.85 | -127.15 | -18.00% | 581 | -127.00 | -17.9% | -21.9% | 735 | -154.47 | -21.0% |
| 15-Apr | 792 | 636.27 | -155.73 | -19.70% | 636 | -156.00 | -19.7% | -24.5% | 823 | -186.73 | -22.7% |
| 16-Apr | 895 | 700.78 | -194.22 | -21.70% | 701 | -194.00 | -21.7% | -27.7% | 930 | -228.73 | -24.6% |
| 17-Apr | 1010 | 779.55 | -230.45 | -22.80% | 780 | -230.00 | -22.8% | -29.5% | 1049 | -269.19 | -25.7% |
| 18-Apr | 1170 | 869.21 | -300.79 | -25.70% | 869 | -301.00 | -25.7% | -34.6% | 1215 | -346.40 | -28.5% |
| 19-Apr | 1180 | 883.86 | -296.14 | -25.10% | 884 | -296.00 | -25.1% | -33.5% | 1226 | -341.78 | -27.9% |
| 20-Apr | 1060 | 824.45 | -235.55 | -22.20% | 824 | -236.00 | -22.3% | -28.6% | 1101 | -277.13 | -25.2% |
| 21-Apr | 1010 | 841.64 | -168.36 | -16.70% | 842 | -168.00 | -16.6% | -20.0% | 1049 | -207.19 | -19.7% |
| 22-Apr | 1070 | 913.09 | -156.91 | -14.70% | 913 | -157.00 | -14.7% | -17.2% | 1112 | -198.52 | -17.9% |
| 23-Apr | 1120 | 922.13 | -197.87 | -17.70% | 922 | -198.00 | -17.7% | -21.5% | 1163 | -241.46 | -20.8% |
| 24-Apr | 1190 | 950.52 | -239.48 | -20.10% | 951 | -239.00 | -20.1% | -25.1% | 1236 | -285.17 | -23.1% |
| 25-Apr | 1160 | 946.98 | -213.02 | -18.40% | 947 | -213.00 | -18.4% | -22.5% | 1205 | -258.01 | -21.4% |
| 26-Apr | 1120 | 934.34 | -185.66 | -16.60% | 934 | -186.00 | -16.6% | -19.9% | 1163 | -229.46 | -19.7% |
| 27-Apr | 1070 | 913.57 | -156.43 | -14.60% | 914 | -156.00 | -14.6% | -17.1% | 1112 | -197.52 | -17.8% |
| 28-Apr | 1020 | 884.23 | -135.77 | -13.30% | 884 | -136.00 | -13.3% | -15.4% | 1060 | -175.58 | -16.6% |
| 29-Apr | 1040 | 892.5 | -147.5 | -14.20% | 893 | -147.00 | -14.1% | -16.5% | 1080 | -187.35 | -17.3% |
| 30-Apr | 1030 | 893.13 | -136.87 | -13.30% | 893 | -137.00 | -13.3% | -15.3% | 1070 | -176.96 | -16.5% |
| Ave | 809 | 662.19 | -146.91 | -17.45% | 662 | -146.90 | -17.4% | -21.4% | 840 | -178.29 | -20.5% |
| Min | 312 | 279.77 | -300.79 | -25.70% | 280 | -301.00 | -25.7% | -34.6% | 324 | -346.40 | -28.5% |
| Max | 1190 | 950.52 | -27.83 | -8.30% | 951 | -28.00 | -8.3% | -9.1% | 1236 | -41.04 | -11.8% |
| | | | | | | | | | | | |
| 1-May | 1,030 | 947.3 | -82.7 | -8.00% | 947 | -83.00 | -8.1% | -8.8% | 1070 | -122.96 | -11.5% |
| 2-May | 1,040 | 976.21 | -63.79 | -6.10% | 976 | -64.00 | -6.2% | -6.6% | 1080 | -104.35 | -9.7% |
| 3-May | 1,040 | 978.86 | -61.14 | -5.90% | 979 | -61.00 | -5.9% | -6.2% | 1080 | -101.35 | -9.4% |
| 4-May | 1,110 | 1014.32 | -95.68 | -8.60% | 1014 | -96.00 | -8.6% | -9.5% | 1153 | -139.07 | -12.1% |
| 5-May | 1,160 | 1025.55 | -134.45 | -11.60% | 1026 | -134.00 | -11.6% | -13.1% | 1205 | -179.01 | -14.9% |
| 6-May | 1,130 | 1014.95 | -115.05 | -10.20% | 1015 | -115.00 | -10.2% | -11.3% | 1174 | -158.84 | -13.5% |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 7-May | 1,110 | 1020.25 | -89.75 | -8.10% | 1020 | -90.00 | -8.1% | -8.8% | 1153 | -133.07 | -11.5% |
| 8-May | 1,130 | 1039.98 | -90.02 | -8.00% | 1040 | -90.00 | -8.0% | -8.7% | 1174 | -133.84 | -11.4% |
| 9-May | 1,170 | 1075.89 | -94.11 | -8.00% | 1076 | -94.00 | -8.0% | -8.7% | 1215 | -139.40 | -11.5% |
| 10-May | 1,140 | 1054.45 | -85.55 | -7.50% | 1054 | -86.00 | -7.5% | -8.2% | 1184 | -130.23 | -11.0% |
| 11-May | 1,170 | 1059.09 | -110.91 | -9.50% | 1059 | -111.00 | -9.5% | -10.5% | 1215 | -156.40 | -12.9% |
| 12-May | 1,120 | 1054 | -66 | -5.90% | 1054 | -66.00 | -5.9% | -6.3% | 1163 | -109.46 | -9.4% |
| 13-May | 1,090 | 1067.24 | -22.76 | -2.10% | 1067 | -23.00 | -2.1% | -2.2% | 1132 | -65.29 | -5.8% |
| 14-May | 1,080 | 1072.69 | -7.31 | -0.70% | 1073 | -7.00 | -0.6% | -0.7% | 1122 | -48.90 | -4.4% |
| 15-May | 1,120 | 1108.12 | -11.88 | -1.10% | 1108 | -12.00 | -1.1% | -1.1% | 1163 | -55.46 | -4.8% |
| 16-May | 1,130 | 1131.7 | 1.7 | 0.20% | 1132 | 2.00 | 0.2% | 0.2% | 1174 | -41.84 | -3.6% |
| 17-May | 1,140 | 1130.14 | -9.86 | -0.90% | 1130 | -10.00 | -0.9% | -0.9% | 1184 | -54.23 | -4.6% |
| 18-May | 1,090 | 1104.8 | 14.8 | 1.40% | 1105 | 15.00 | 1.4% | 1.4% | 1132 | -27.29 | -2.4% |
| 19-May | 1,060 | 1117.81 | 57.81 | 5.50% | 1118 | 58.00 | 5.5% | 5.2% | 1101 | 16.87 | 1.5% |
| 20-May | 1,090 | 1127.25 | 37.25 | 3.40% | 1127 | 37.00 | 3.4% | 3.3% | 1132 | -5.29 | -0.5% |
| 21-May | 1,130 | 1140.65 | 10.65 | 0.90% | 1141 | 11.00 | 1.0% | 1.0% | 1174 | -32.84 | -2.8% |
| 22-May | 1,150 | 1151.65 | 1.65 | 0.10% | 1152 | 2.00 | 0.2% | 0.2% | 1195 | -42.62 | -3.6% |
| 23-May | 1,150 | 1144.75 | -5.25 | -0.50% | 1145 | -5.00 | -0.4% | -0.4% | 1195 | -49.62 | -4.2% |
| 24-May | 1,150 | 1131.89 | -18.11 | -1.60% | 1132 | -18.00 | -1.6% | -1.6% | 1195 | -62.62 | -5.2% |
| 25-May | 1,140 | 1121.88 | -18.12 | -1.60% | 1122 | -18.00 | -1.6% | -1.6% | 1184 | -62.23 | -5.3% |
| 26-May | 1,110 | 1094.81 | -15.19 | -1.40% | 1095 | -15.00 | -1.4% | -1.4% | 1153 | -58.07 | -5.0% |
| 27-May | 1,130 | 1110.28 | -19.72 | -1.70% | 1110 | -20.00 | -1.8% | -1.8% | 1174 | -63.84 | -5.4% |
| 28-May | 1,150 | 1135.45 | -14.55 | -1.30% | 1135 | -15.00 | -1.3% | -1.3% | 1195 | -59.62 | -5.0% |
| 29-May | 1,150 | 1161.1 | 11.10 | 1.00% | 1161 | 11.00 | 1.0% | 0.9% | 1195 | -33.62 | -2.8% |
| 30-May | 1,150 | 1171.5 | 21.50 | 1.90% | 1172 | 22.00 | 1.9% | 1.9% | 1195 | -22.62 | -1.9% |
| 31-May | 1120 | 1157.4 | 37.40 | 3.30% | 1157 | 37.00 | 3.3% | 3.2% | 1163 | -6.46 | -0.6% |
| Ave | 1119 | 1085.22 | -33.49 | -2.99% | 1085 | -33.48 | -3.0% | -3.3% | 1162 | -76.89 | -6.6% |
| Min | 1030 | 947.30 | -134.45 | -11.60% | 947 | -134.00 | -11.6% | -13.1% | 1070 | -179.01 | -14.9% |
| Max | 1170 | 1171.50 | 57.81 | 5.50% | 1172 | 58.00 | 5.5% | 5.2% | 1215 | 16.87 | 1.5% |
| | | | | | | | | | | | |
| 1-Jun | 1,100 | 1156.98 | 56.98 | 5.20% | 1157 | 57.00 | 5.2% | 4.9% | 1143 | 14.32 | 1.3% |
| 2-Jun | 1,090 | 1149.25 | 59.25 | 5.40% | 1149 | 59.00 | 5.4% | 5.1% | 1132 | 16.71 | 1.5% |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Jun | 1,060 | 1145.33 | 85.33 | 8.10% | 1145 | 85.00 | 8.0% | 7.4% | 1101 | 43.87 | 4.0% |
| 4-Jun | 1,060 | 1152.22 | 92.22 | 8.70% | 1152 | 92.00 | 8.7% | 8.0% | 1101 | 50.87 | 4.6% |
| 5-Jun | 1,070 | 1167.55 | 97.55 | 9.10% | 1168 | 98.00 | 9.2% | 8.4% | 1112 | 56.48 | 5.1% |
| 6-Jun | 1,090 | 1190.12 | 100.12 | 9.20% | 1190 | 100.00 | 9.2% | 8.4% | 1132 | 57.71 | 5.1% |
| 7-Jun | 1,090 | 1197.89 | 107.89 | 9.90% | 1198 | 108.00 | 9.9% | 9.0% | 1132 | 65.71 | 5.8% |
| 8-Jun | 1,100 | 1203.36 | 103.36 | 9.40% | 1203 | 103.00 | 9.4% | 8.6% | 1143 | 60.32 | 5.3% |
| 9-Jun | 1,090 | 1210.41 | 120.41 | 11.00% | 1210 | 120.00 | 11.0% | 9.9% | 1132 | 77.71 | 6.9% |
| 10-Jun | 1,050 | 1187.73 | 137.73 | 13.10% | 1188 | 138.00 | 13.1% | 11.6% | 1091 | 97.26 | 8.9% |
| 11-Jun | 995 | 1140.2 | 145.2 | 14.60% | 1140 | 145.00 | 14.6% | 12.7% | 1034 | 106.39 | 10.3% |
| 12-Jun | 967 | 1105.17 | 138.17 | 14.30% | 1105 | 138.00 | 14.3% | 12.5% | 1005 | 100.48 | 10.0% |
| 13-Jun | 958 | 1091.4 | 133.4 | 13.90% | 1091 | 133.00 | 13.9% | 12.2% | 995 | 95.83 | 9.6% |
| 14-Jun | 957 | 1082.83 | 125.83 | 13.10% | 1083 | 126.00 | 13.2% | 11.6% | 994 | 88.87 | 8.9% |
| 15-Jun | 944 | 1086.42 | 142.42 | 15.10% | 1086 | 142.00 | 15.0% | 13.1% | 981 | 105.37 | 10.7% |
| 16-Jun | 924 | 1022.9 | 98.9 | 10.70% | 1023 | 99.00 | 10.7% | 9.7% | 960 | 63.15 | 6.6% |
| 17-Jun | 882 | 993.25 | 111.25 | 12.60% | 993 | 111.00 | 12.6% | 11.2% | 916 | 76.78 | 8.4% |
| 18-Jun | 887 | 983.51 | 96.51 | 10.90% | 984 | 97.00 | 10.9% | 9.9% | 921 | 62.58 | 6.8% |
| 19-Jun | 890 | 973.14 | 83.14 | 9.30% | 973 | 83.00 | 9.3% | 8.5% | 925 | 48.47 | 5.2% |
| 20-Jun | 881 | 965.45 | 84.45 | 9.60% | 965 | 84.00 | 9.5% | 8.7% | 915 | 49.82 | 5.4% |
| 21-Jun | 869 | 948.41 | 79.41 | 9.10% | 948 | 79.00 | 9.1% | 8.3% | 903 | 45.28 | 5.0% |
| 22-Jun | 848 | 933.04 | 85.04 | 10.00% | 933 | 85.00 | 10.0% | 9.1% | 881 | 52.10 | 5.9% |
| 23-Jun | 821 | 902.94 | 81.94 | 10.00% | 903 | 82.00 | 10.0% | 9.1% | 853 | 50.15 | 5.9% |
| 24-Jun | 812 | 875.01 | 63.01 | 7.80% | 875 | 63.00 | 7.8% | 7.2% | 844 | 31.49 | 3.7% |
| 25-Jun | 789 | 849.31 | 60.31 | 7.60% | 849 | 60.00 | 7.6% | 7.1% | 820 | 29.39 | 3.6% |
| 26-Jun | 786 | 826.59 | 40.59 | 5.20% | 827 | 41.00 | 5.2% | 5.0% | 816 | 10.50 | 1.3% |
| 27-Jun | 757 | 797.78 | 40.78 | 5.40% | 798 | 41.00 | 5.4% | 5.1% | 786 | 11.63 | 1.5% |
| 28-Jun | 732 | 772.49 | 40.49 | 5.50% | 772 | 40.00 | 5.5% | 5.2% | 760 | 11.60 | 1.5% |
| 29-Jun | 710 | 758.92 | 48.92 | 6.90% | 759 | 49.00 | 6.9% | 6.5% | 738 | 21.45 | 2.9% |
| 30-Jun | 677 | 731.14 | 54.14 | 8.00% | 731 | 54.00 | 8.0% | 7.4% | 703 | 27.73 | 3.9% |
| Ave | 930 | 1020.02 | 90.49 | 9.62% | 1020 | 90.40 | 9.6% | 8.7% | 966 | 54.33 | 5.5% |
| Min | 677 | 731.14 | 40.49 | 5.20% | 731 | 40.00 | 5.2% | 4.9% | 703 | 10.50 | 1.3% |
| Max | 1100 | 1210.41 | 145.20 | 15.10% | 1210 | 145.00 | 15.0% | 13.1% | 1143 | 106.39 | 10.7% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Jul | 659 | 712.55 | 53.55 | 8.10% | 713 | 54.00 | 8.2% | 7.6% | 685 | 28.43 | 4.2% |
| 2-Jul | 628 | 684.12 | 56.12 | 8.90% | 684 | 56.00 | 8.9% | 8.2% | 652 | 31.63 | 4.8% |
| 3-Jul | 597 | 660.57 | 63.57 | 10.60% | 661 | 64.00 | 10.7% | 9.7% | 620 | 40.84 | 6.6% |
| 4-Jul | 572 | 635.3 | 63.3 | 11.10% | 635 | 63.00 | 11.0% | 9.9% | 594 | 40.81 | 6.9% |
| 5-Jul | 540 | 613.45 | 73.45 | 13.60% | 613 | 73.00 | 13.5% | 11.9% | 561 | 52.05 | 9.3% |
| 6-Jul | 508 | 593.59 | 85.59 | 16.80% | 594 | 86.00 | 16.9% | 14.5% | 528 | 66.29 | 12.6% |
| 7-Jul | 487 | 575.66 | 88.66 | 18.20% | 576 | 89.00 | 18.3% | 15.5% | 506 | 70.10 | 13.9% |
| 8-Jul | 482 | 560.8 | 78.8 | 16.30% | 561 | 79.00 | 16.4% | 14.1% | 501 | 60.30 | 12.0% |
| 9-Jul | 470 | 546.35 | 76.35 | 16.20% | 546 | 76.00 | 16.2% | 13.9% | 488 | 57.76 | 11.8% |
| 10-Jul | 473 | 539.38 | 66.38 | 14.00% | 539 | 66.00 | 14.0% | 12.2% | 491 | 47.65 | 9.7% |
| 11-Jul | 444 | 519.92 | 75.92 | 17.10% | 520 | 76.00 | 17.1% | 14.6% | 461 | 58.77 | 12.7% |
| 12-Jul | 430 | 508.9 | 78.9 | 18.30% | 509 | 79.00 | 18.4% | 15.5% | 447 | 62.32 | 14.0% |
| 13-Jul | 401 | 490.76 | 89.76 | 22.40% | 491 | 90.00 | 22.4% | 18.3% | 417 | 74.44 | 17.9% |
| 14-Jul | 372 | 463.87 | 91.87 | 24.70% | 464 | 92.00 | 24.7% | 19.8% | 386 | 77.57 | 20.1% |
| 15-Jul | 362 | 447.31 | 85.31 | 23.60% | 447 | 85.00 | 23.5% | 19.0% | 376 | 70.95 | 18.9% |
| 16-Jul | 343 | 428.72 | 85.72 | 25.00% | 429 | 86.00 | 25.1% | 20.1% | 356 | 72.69 | 20.4% |
| 17-Jul | 328 | 409.42 | 81.42 | 24.80% | 409 | 81.00 | 24.7% | 19.8% | 341 | 68.27 | 20.0% |
| 18-Jul | 324 | 404.75 | 80.75 | 24.90% | 405 | 81.00 | 25.0% | 20.0% | 337 | 68.43 | 20.3% |
| 19-Jul | 328 | 401.78 | 73.78 | 22.50% | 402 | 74.00 | 22.6% | 18.4% | 341 | 61.27 | 18.0% |
| 20-Jul | 311 | 398.6 | 87.6 | 28.20% | 399 | 88.00 | 28.3% | 22.1% | 323 | 75.93 | 23.5% |
| 21-Jul | 292 | 382.39 | 90.39 | 31.00% | 382 | 90.00 | 30.8% | 23.5% | 303 | 78.67 | 25.9% |
| 22-Jul | 298 | 381.37 | 83.37 | 28.00% | 381 | 83.00 | 27.9% | 21.8% | 310 | 71.44 | 23.1% |
| 23-Jul | 295 | 369.73 | 74.73 | 25.30% | 370 | 75.00 | 25.4% | 20.3% | 306 | 63.55 | 20.7% |
| 24-Jul | 302 | 367.72 | 65.72 | 21.80% | 368 | 66.00 | 21.9% | 17.9% | 314 | 54.28 | 17.3% |
| 25-Jul | 287 | 354.27 | 67.27 | 23.40% | 354 | 67.00 | 23.3% | 18.9% | 298 | 55.86 | 18.7% |
| 26-Jul | 292 | 354.84 | 62.84 | 21.50% | 355 | 63.00 | 21.6% | 17.8% | 303 | 51.67 | 17.0% |
| 27-Jul | 313 | 360.83 | 47.83 | 15.30% | 361 | 48.00 | 15.3% | 13.3% | 325 | 35.86 | 11.0% |
| 28-Jul | 278 | 350.13 | 72.13 | 25.90% | 350 | 72.00 | 25.9% | 20.6% | 289 | 61.21 | 21.2% |
| 29-Jul | 268 | 337.86 | 69.86 | 26.10% | 338 | 70.00 | 26.1% | 20.7% | 278 | 59.60 | 21.4% |
| 30-Jul | 270 | 334.63 | 64.63 | 23.90% | 335 | 65.00 | 24.1% | 19.4% | 280 | 54.52 | 19.4% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31-Jul | 274 | 339.55 | 65.55 | 23.90% | 340 | 66.00 | 24.1% | 19.4% | 285 | 55.37 | 19.5% |
| Ave | 394 | 468.68 | 74.23 | 20.37% | 469 | 74.29 | 20.4% | 16.7% | 410 | 58.99 | 15.9% |
| Min | 268 | 334.63 | 47.83 | 8.10% | 335 | 48.00 | 8.2% | 7.6% | 278 | 28.43 | 4.2% |
| Max | 659 | 712.55 | 91.87 | 31.00% | 713 | 92.00 | 30.8% | 23.5% | 685 | 78.67 | 25.9% |
| | | | | | | | | | | | |
| 1-Aug | 251 | 332.86 | 81.86 | 32.60% | 333 | 82.00 | 32.7% | 24.6% | 261 | 72.26 | 27.7% |
| 2-Aug | 233 | 335.24 | 102.24 | 43.90% | 335 | 102.00 | 43.8% | 30.4% | 242 | 92.96 | 38.4% |
| 3-Aug | 224 | 327.02 | 103.02 | 46.00% | 327 | 103.00 | 46.0% | 31.5% | 233 | 94.31 | 40.5% |
| 4-Aug | 230 | 328.17 | 98.17 | 42.70% | 328 | 98.00 | 42.6% | 29.9% | 239 | 89.08 | 37.3% |
| 5-Aug | 221 | 311.19 | 90.19 | 40.80% | 311 | 90.00 | 40.7% | 28.9% | 230 | 81.43 | 35.5% |
| 6-Aug | 232 | 313.29 | 81.29 | 35.00% | 313 | 81.00 | 34.9% | 25.9% | 241 | 72.00 | 29.9% |
| 7-Aug | 226 | 308.31 | 82.31 | 36.40% | 308 | 82.00 | 36.3% | 26.6% | 235 | 73.23 | 31.2% |
| 8-Aug | 211 | 293.69 | 82.69 | 39.20% | 294 | 83.00 | 39.3% | 28.3% | 219 | 74.81 | 34.1% |
| 9-Aug | 198 | 283.72 | 85.72 | 43.30% | 284 | 86.00 | 43.4% | 30.3% | 206 | 78.32 | 38.1% |
| 10-Aug | 182 | 273.76 | 91.76 | 50.40% | 274 | 92.00 | 50.5% | 33.6% | 189 | 84.94 | 44.9% |
| 11-Aug | 196 | 269.96 | 73.96 | 37.70% | 270 | 74.00 | 37.8% | 27.4% | 204 | 66.40 | 32.6% |
| 12-Aug | 185 | 266.04 | 81.04 | 43.80% | 266 | 81.00 | 43.8% | 30.4% | 192 | 73.82 | 38.4% |
| 13-Aug | 171 | 255.58 | 84.58 | 49.50% | 256 | 85.00 | 49.7% | 33.3% | 178 | 78.37 | 44.1% |
| 14-Aug | 164 | 254.47 | 90.47 | 55.20% | 254 | 90.00 | 54.9% | 35.4% | 170 | 83.64 | 49.1% |
| 15-Aug | 177 | 277.09 | 100.09 | 56.50% | 277 | 100.00 | 56.5% | 36.1% | 184 | 93.13 | 50.7% |
| 16-Aug | 200 | 282.45 | 82.45 | 41.20% | 282 | 82.00 | 41.0% | 29.0% | 208 | 74.24 | 35.7% |
| 17-Aug | 162 | 263.6 | 101.6 | 62.70% | 264 | 102.00 | 63.0% | 38.7% | 168 | 95.71 | 56.9% |
| 18-Aug | 175 | 260.85 | 85.85 | 49.10% | 261 | 86.00 | 49.1% | 33.0% | 182 | 79.21 | 43.6% |
| 19-Aug | 155 | 250.37 | 95.37 | 61.50% | 250 | 95.00 | 61.3% | 37.9% | 161 | 88.99 | 55.3% |
| 20-Aug | 167 | 249.72 | 82.72 | 49.50% | 250 | 83.00 | 49.7% | 33.2% | 173 | 76.52 | 44.1% |
| 21-Aug | 164 | 251.65 | 87.65 | 53.40% | 252 | 88.00 | 53.7% | 35.0% | 170 | 81.64 | 47.9% |
| 22-Aug | 153 | 237.79 | 84.79 | 55.40% | 238 | 85.00 | 55.6% | 35.7% | 159 | 79.06 | 49.7% |
| 23-Aug | 162 | 244.45 | 82.45 | 50.90% | 244 | 82.00 | 50.6% | 33.5% | 168 | 75.71 | 45.0% |
| 24-Aug | 191 | 238.03 | 47.03 | 24.60% | 238 | 47.00 | 24.6% | 19.7% | 198 | 39.59 | 20.0% |
| 25-Aug | 192 | 238.49 | 46.49 | 24.20% | 238 | 46.00 | 24.0% | 19.3% | 199 | 38.55 | 19.3% |
| 26-Aug | 187 | 239.07 | 52.07 | 27.80% | 239 | 52.00 | 27.8% | 21.8% | 194 | 44.74 | 23.0% |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 27-Aug | 169 | 230.65 | 61.65 | 36.50% | 231 | 62.00 | 36.7% | 26.9% | 176 | 55.44 | 31.6% |
| 28-Aug | 149 | 216.13 | 67.13 | 45.10% | 216 | 67.00 | 45.0% | 31.0% | 155 | 61.22 | 39.6% |
| 29-Aug | 145 | 211.57 | 66.57 | 45.90% | 212 | 67.00 | 46.2% | 31.7% | 151 | 61.37 | 40.7% |
| 30-Aug | 172 | 208.78 | 36.78 | 21.40% | 209 | 37.00 | 21.5% | 17.7% | 179 | 30.33 | 17.0% |
| 31-Aug | 155 | 200.62 | 45.62 | 29.40% | 201 | 46.00 | 29.7% | 22.9% | 161 | 39.99 | 24.8% |
| Ave | 187 | 266.28 | 79.21 | 42.95% | 266 | 79.23 | 43.0% | 29.7% | 194 | 71.97 | 37.6% |
| Min | 145 | 200.62 | 36.78 | 21.40% | 201 | 37.00 | 21.5% | 17.7% | 151 | 30.33 | 17.0% |
| Max | 251 | 335.24 | 103.02 | 62.70% | 335 | 103.00 | 63.0% | 38.7% | 261 | 95.71 | 56.9% |
| 1-Sep | 135 | 200.12 | 65.12 | 48.20% | 200 | 65.00 | 48.1% | 32.5% | 140 | 59.76 | 42.6% |
| 2-Sep | 125 | 192.16 | 67.16 | 53.70% | 192 | 67.00 | 53.6% | 34.9% | 130 | 62.15 | 47.9% |
| 3-Sep | 119 | 186.68 | 67.68 | 56.90% | 187 | 68.00 | 57.1% | 36.4% | 124 | 63.38 | 51.3% |
| 4-Sep | 114 | 187.03 | 73.03 | 64.10% | 187 | 73.00 | 64.0% | 39.0% | 118 | 68.58 | 57.9% |
| 5-Sep | 112 | 186.23 | 74.23 | 66.30% | 186 | 74.00 | 66.1% | 39.7% | 116 | 69.65 | 59.9% |
| 6-Sep | 112 | 186.26 | 74.26 | 66.30% | 186 | 74.00 | 66.1% | 39.7% | 116 | 69.65 | 59.9% |
| 7-Sep | 109 | 187.17 | 78.17 | 71.70% | 187 | 78.00 | 71.6% | 41.7% | 113 | 73.77 | 65.2% |
| 8-Sep | 112 | 190.08 | 78.08 | 69.70% | 190 | 78.00 | 69.6% | 41.0% | 116 | 73.65 | 63.3% |
| 9-Sep | 132 | 197.28 | 65.28 | 49.50% | 197 | 65.00 | 49.2% | 32.9% | 137 | 59.88 | 43.7% |
| 10-Sep | 160 | 199.42 | 39.42 | 24.60% | 199 | 39.00 | 24.4% | 19.6% | 166 | 32.79 | 19.7% |
| 11-Sep | 134 | 194.11 | 60.11 | 44.90% | 194 | 60.00 | 44.8% | 30.9% | 139 | 54.80 | 39.4% |
| 12-Sep | 144 | 199.26 | 55.26 | 38.40% | 199 | 55.00 | 38.2% | 27.6% | 150 | 49.41 | 33.0% |
| 13-Sep | 157 | 197.34 | 40.34 | 25.70% | 197 | 40.00 | 25.5% | 20.3% | 163 | 33.91 | 20.8% |
| 14-Sep | 143 | 190.06 | 47.06 | 32.90% | 190 | 47.00 | 32.9% | 24.7% | 149 | 41.45 | 27.9% |
| 15-Sep | 131 | 182.34 | 51.34 | 39.20% | 182 | 51.00 | 38.9% | 28.0% | 136 | 45.92 | 33.7% |
| 16-Sep | 143 | 206.28 | 63.28 | 44.30% | 206 | 63.00 | 44.1% | 30.5% | 149 | 57.45 | 38.7% |
| 17-Sep | 135 | 201.04 | 66.04 | 48.90% | 201 | 66.00 | 48.9% | 32.8% | 140 | 60.76 | 43.3% |
| 18-Sep | 128 | 197.59 | 69.59 | 54.40% | 198 | 70.00 | 54.7% | 35.4% | 133 | 65.03 | 48.9% |
| 19-Sep | 129 | 197.95 | 68.95 | 53.50% | 198 | 69.00 | 53.5% | 34.9% | 134 | 63.99 | 47.8% |
| 20-Sep | 131 | 194.13 | 63.13 | 48.20% | 194 | 63.00 | 48.1% | 32.5% | 136 | 57.92 | 42.6% |
| 21-Sep | 139 | 196.2 | 57.2 | 41.10% | 196 | 57.00 | 41.0% | 29.1% | 144 | 51.61 | 35.7% |
| 22-Sep | 137 | 194.71 | 57.71 | 42.10% | 195 | 58.00 | 42.3% | 29.8% | 142 | 52.68 | 37.0% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 23-Sep | 136 | 193.9 | 57.9 | 42.60% | 194 | 58.00 | 42.6% | 29.9% | 141 | 52.72 | 37.3% |
| 24-Sep | 150 | 196.4 | 46.4 | 30.90% | 196 | 46.00 | 30.7% | 23.4% | 156 | 40.18 | 25.8% |
| 25-Sep | 140 | 190.77 | 50.77 | 36.30% | 191 | 51.00 | 36.4% | 26.7% | 145 | 45.57 | 31.3% |
| 26-Sep | 126 | 183.99 | 57.99 | 46.00% | 184 | 58.00 | 46.0% | 31.5% | 131 | 53.11 | 40.6% |
| 27-Sep | 118 | 178.95 | 60.95 | 51.70% | 179 | 61.00 | 51.7% | 34.1% | 123 | 56.42 | 46.0% |
| 28-Sep | 120 | 180.44 | 60.44 | 50.40% | 180 | 60.00 | 50.0% | 33.3% | 125 | 55.34 | 44.4% |
| 29-Sep | 117 | 185.96 | 68.96 | 58.90% | 186 | 69.00 | 59.0% | 37.1% | 122 | 64.46 | 53.0% |
| 30-Sep | 120 | 188.90 | 68.9 | 57.40% | 189 | 69.00 | 57.5% | 36.5% | 125 | 64.34 | 51.6% |
| Ave | 130 | 192.09 | 61.83 | 48.63% | 192 | 61.73 | 48.6% | 32.2% | 135 | 56.68 | 43.0% |
| Min | 109 | 178.95 | 39.42 | 24.60% | 179 | 39.00 | 24.4% | 19.6% | 113 | 32.79 | 19.7% |
| Max | 160 | 206.28 | 78.17 | 71.70% | 206 | 78.00 | 71.6% | 41.7% | 166 | 73.77 | 65.2% |
| | | | | | | | | | | | |
| 1-Oct | 120 | 172.33 | 52.33 | 43.60% | 172 | 52.00 | 43.3% | 30.2% | 125 | 47.34 | 38.0% |
| 2-Oct | 127 | 177.4 | 50.4 | 39.70% | 177 | 50.00 | 39.4% | 28.2% | 132 | 45.07 | 34.2% |
| 3-Oct | 159 | 184.85 | 25.85 | 16.30% | 185 | 26.00 | 16.4% | 14.1% | 165 | 19.83 | 12.0% |
| 4-Oct | 143 | 183.44 | 40.44 | 28.30% | 183 | 40.00 | 28.0% | 21.8% | 149 | 34.45 | 23.2% |
| 5-Oct | 135 | 183.06 | 48.06 | 35.60% | 183 | 48.00 | 35.6% | 26.2% | 140 | 42.76 | 30.5% |
| 6-Oct | 177 | 186.96 | 9.96 | 5.60% | 187 | 10.00 | 5.6% | 5.3% | 184 | 3.13 | 1.7% |
| 7-Oct | 182 | 196.42 | 14.42 | 7.90% | 196 | 14.00 | 7.7% | 7.1% | 189 | 6.94 | 3.7% |
| 8-Oct | 164 | 193.86 | 29.86 | 18.20% | 194 | 30.00 | 18.3% | 15.5% | 170 | 23.64 | 13.9% |
| 9-Oct | 172 | 202.21 | 30.21 | 17.60% | 202 | 30.00 | 17.4% | 14.8% | 179 | 23.33 | 13.1% |
| 10-Oct | 170 | 198.02 | 28.02 | 16.50% | 198 | 28.00 | 16.5% | 14.1% | 177 | 21.40 | 12.1% |
| 11-Oct | 158 | 197.11 | 39.11 | 24.80% | 197 | 39.00 | 24.7% | 19.8% | 164 | 32.87 | 20.0% |
| 12-Oct | 154 | 195.39 | 41.39 | 26.90% | 195 | 41.00 | 26.6% | 21.0% | 160 | 35.02 | 21.9% |
| 13-Oct | 155 | 197.67 | 42.67 | 27.50% | 198 | 43.00 | 27.7% | 21.8% | 161 | 36.99 | 23.0% |
| 14-Oct | 149 | 196.87 | 47.87 | 32.10% | 197 | 48.00 | 32.2% | 24.4% | 155 | 42.22 | 27.3% |
| 15-Oct | 152 | 197.7 | 45.7 | 30.10% | 198 | 46.00 | 30.3% | 23.3% | 158 | 40.10 | 25.4% |
| 16-Oct | 153 | 200.92 | 47.92 | 31.30% | 201 | 48.00 | 31.4% | 23.9% | 159 | 42.06 | 26.5% |
| 17-Oct | 147 | 200.24 | 53.24 | 36.20% | 200 | 53.00 | 36.1% | 26.5% | 153 | 47.30 | 31.0% |
| 18-Oct | 148 | 200.95 | 52.95 | 35.80% | 201 | 53.00 | 35.8% | 26.4% | 154 | 47.26 | 30.7% |
| 19-Oct | 148 | 201.91 | 53.91 | 36.40% | 202 | 54.00 | 36.5% | 26.7% | 154 | 48.26 | 31.4% |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-Oct | 145 | 199.54 | 54.54 | 37.60% | 200 | 55.00 | 37.9% | 27.6% | 151 | 49.37 | 32.8% |
| 21-Oct | 148 | 195.64 | 47.64 | 32.20% | 196 | 48.00 | 32.4% | 24.5% | 154 | 42.26 | 27.5% |
| 22-Oct | 139 | 194.48 | 55.48 | 39.90% | 194 | 55.00 | 39.6% | 28.3% | 144 | 49.61 | 34.4% |
| 23-Oct | 135 | 192.98 | 57.98 | 42.90% | 193 | 58.00 | 43.0% | 30.1% | 140 | 52.76 | 37.6% |
| 24-Oct | 136 | 194.42 | 58.42 | 43.00% | 194 | 58.00 | 42.6% | 29.8% | 141 | 52.72 | 37.3% |
| 25-Oct | 135 | 191.65 | 56.65 | 42.00% | 192 | 57.00 | 42.2% | 29.7% | 140 | 51.76 | 36.9% |
| 26-Oct | 139 | 197.87 | 58.87 | 42.40% | 198 | 59.00 | 42.4% | 29.8% | 144 | 53.61 | 37.1% |
| 27-Oct | 143 | 207.89 | 64.89 | 45.40% | 208 | 65.00 | 45.5% | 31.3% | 149 | 59.45 | 40.0% |
| 28-Oct | 136 | 207.07 | 71.07 | 52.30% | 207 | 71.00 | 52.2% | 34.3% | 141 | 65.72 | 46.5% |
| 29-Oct | 140 | 215.07 | 75.07 | 53.60% | 215 | 75.00 | 53.6% | 34.9% | 145 | 69.57 | 47.8% |
| 30-Oct | 137 | 216.86 | 79.86 | 58.30% | 217 | 80.00 | 58.4% | 36.9% | 142 | 74.68 | 52.5% |
| 31-Oct | 137 | 181.24 | 44.24 | 32.30% | 181 | 44.00 | 32.1% | 24.3% | 142 | 38.68 | 27.2% |
| Ave | 148 | 195.55 | 47.71 | 33.30% | 196 | 47.68 | 33.3% | 24.3% | 154 | 41.94 | 28.3% |
| Min | 120 | 172.33 | 9.96 | 5.60% | 172 | 10.00 | 5.6% | 5.3% | 125 | 3.13 | 1.7% |
| Max | 182 | 216.86 | 79.86 | 58.30% | 217 | 80.00 | 58.4% | 36.9% | 189 | 74.68 | 52.5% |
| 1-Nov | 143 | 133.24 | -9.76 | -6.80% | 133 | -10.00 | -7.0% | -7.5% | 149 | -15.55 | -10.5% |
| 2-Nov | 144 | 134.23 | -9.77 | -6.80% | 134 | -10.00 | -6.9% | -7.4% | 150 | -15.59 | -10.4% |
| 3-Nov | 135 | 131.41 | -3.59 | -2.70% | 131 | -4.00 | -3.0% | -3.0% | 140 | -9.24 | -6.6% |
| 4-Nov | 130 | 125.92 | -4.08 | -3.10% | 126 | -4.00 | -3.1% | -3.2% | 135 | -9.04 | -6.7% |
| 5-Nov | 130 | 125.08 | -4.92 | -3.80% | 125 | -5.00 | -3.8% | -4.0% | 135 | -10.04 | -7.4% |
| 6-Nov | 138 | 128.24 | -9.76 | -7.10% | 128 | -10.00 | -7.2% | -7.8% | 143 | -15.35 | -10.7% |
| 7-Nov | 132 | 127.6 | -4.4 | -3.30% | 128 | -4.00 | -3.0% | -3.1% | 137 | -9.12 | -6.7% |
| 8-Nov | 127 | 123.85 | -3.15 | -2.50% | 124 | -3.00 | -2.4% | -2.4% | 132 | -7.93 | -6.0% |
| 9-Nov | 128 | 125.58 | -2.42 | -1.90% | 126 | -2.00 | -1.6% | -1.6% | 133 | -6.97 | -5.2% |
| 10-Nov | 126 | 124.95 | -1.05 | -0.80% | 125 | -1.00 | -0.8% | -0.8% | 131 | -5.89 | -4.5% |
| 11-Nov | 123 | 121.82 | -1.18 | -1.00% | 122 | -1.00 | -0.8% | -0.8% | 128 | -5.77 | -4.5% |
| 12-Nov | 127 | 123.7 | -3.3 | -2.60% | 124 | -3.00 | -2.4% | -2.4% | 132 | -7.93 | -6.0% |
| 13-Nov | 121 | 117.18 | -3.82 | -3.20% | 117 | -4.00 | -3.3% | -3.4% | 126 | -8.69 | -6.9% |
| 14-Nov | 116 | 112.07 | -3.93 | -3.40% | 112 | -4.00 | -3.4% | -3.6% | 121 | -8.50 | -7.1% |
| 15-Nov | 116 | 111.98 | -4.02 | -3.50% | 112 | -4.00 | -3.4% | -3.6% | 121 | -8.50 | -7.1% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16-Nov | 108 | 105.18 | -2.82 | -2.60% | 105 | -3.00 | -2.8% | -2.9% | 112 | -7.19 | -6.4% |
| 17-Nov | 103 | 98.28 | -4.72 | -4.60% | 98 | -5.00 | -4.9% | -5.1% | 107 | -9.00 | -8.4% |
| 18-Nov | 101 | 94.97 | -6.03 | -6.00% | 95 | -6.00 | -5.9% | -6.3% | 105 | -9.92 | -9.5% |
| 19-Nov | 118 | 94.3 | -23.7 | -20.10% | 94 | -24.00 | -20.3% | -25.5% | 123 | -28.58 | -23.3% |
| 20-Nov | 111 | 93.36 | -17.64 | -15.90% | 93 | -18.00 | -16.2% | -19.3% | 115 | -22.31 | -19.3% |
| 21-Nov | 106 | 96.7 | -9.3 | -8.80% | 97 | -9.00 | -8.5% | -9.3% | 110 | -13.11 | -11.9% |
| 22-Nov | 105 | 97.72 | -7.28 | -6.90% | 98 | -7.00 | -6.7% | -7.2% | 109 | -11.07 | -10.2% |
| 23-Nov | 108 | 100.85 | -7.15 | -6.60% | 101 | -7.00 | -6.5% | -6.9% | 112 | -11.19 | -10.0% |
| 24-Nov | 106 | 103.03 | -2.97 | -2.80% | 103 | -3.00 | -2.8% | -2.9% | 110 | -7.11 | -6.5% |
| 25-Nov | 109 | 103.5 | -5.5 | -5.00% | 104 | -5.00 | -4.6% | -4.8% | 113 | -9.23 | -8.2% |
| 26-Nov | 111 | 103.81 | -7.19 | -6.50% | 104 | -7.00 | -6.3% | -6.7% | 115 | -11.31 | -9.8% |
| 27-Nov | 104 | 97.41 | -6.59 | -6.30% | 97 | -7.00 | -6.7% | -7.2% | 108 | -11.04 | -10.2% |
| 28-Nov | 100 | 94.12 | -5.88 | -5.90% | 94 | -6.00 | -6.0% | -6.4% | 104 | -9.88 | -9.5% |
| 29-Nov | 100 | 91.55 | -8.45 | -8.40% | 92 | -8.00 | -8.0% | -8.7% | 104 | -11.88 | -11.4% |
| 30-Nov | 101 | 92.36 | -8.64 | -8.60% | 92 | -9.00 | -8.9% | -9.7% | 105 | -12.92 | -12.3% |
| Ave | 118 | 111.13 | -6.43 | -5.58% | 111 | -6.43 | -5.6% | -6.1% | 122 | -10.99 | -9.1% |
| Min | 100 | 91.55 | -23.70 | -20.10% | 92 | -24.00 | -20.3% | -25.5% | 104 | -28.58 | -23.3% |
| Max | 144 | 134.23 | -1.05 | -0.80% | 134 | -1.00 | -0.8% | -0.8% | 150 | -5.77 | -4.5% |
| 1-Dec | 101 | 98.72 | -2.28 | -2.30% | 99 | -2.00 | -2.0% | -2.0% | 105 | -5.92 | -5.6% |
| 2-Dec | 101 | 100.86 | -0.14 | -0.10% | 101 | 0.00 | 0.0% | 0.0% | 105 | -3.92 | -3.7% |
| 3-Dec | 103 | 102.72 | -0.28 | -0.30% | 103 | 0.00 | 0.0% | 0.0% | 107 | -4.00 | -3.7% |
| 4-Dec | 102 | 100.97 | -1.03 | -1.00% | 101 | -1.00 | -1.0% | -1.0% | 106 | -4.96 | -4.7% |
| 5-Dec | 101 | 101.19 | 0.19 | 0.20% | 101 | 0.00 | 0.0% | 0.0% | 105 | -3.92 | -3.7% |
| 6-Dec | 98 | 97.63 | -0.37 | -0.40% | 98 | 0.00 | 0.0% | 0.0% | 102 | -3.80 | -3.7% |
| 7-Dec | 100 | 101.18 | 1.18 | 1.20% | 101 | 1.00 | 1.0% | 1.0% | 104 | -2.88 | -2.8% |
| 8-Dec | 100 | 101.39 | 1.39 | 1.40% | 101 | 1.00 | 1.0% | 1.0% | 104 | -2.88 | -2.8% |
| 9-Dec | 98 | 96.57 | -1.43 | -1.50% | 97 | -1.00 | -1.0% | -1.0% | 102 | -4.80 | -4.7% |
| 10-Dec | 95 | 93.26 | -1.74 | -1.80% | 93 | -2.00 | -2.1% | -2.1% | 99 | -5.69 | -5.8% |
| 11-Dec | 97 | 96.86 | -0.14 | -0.10% | 97 | 0.00 | 0.0% | 0.0% | 101 | -3.76 | -3.7% |
| 12-Dec | 93 | 93.28 | 0.28 | 0.30% | 93 | 0.00 | 0.0% | 0.0% | 97 | -3.61 | -3.7% |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13-Dec | 92 | 92.05 | 0.05 | 0.10% | 92 | 0.00 | 0.0% | 0.0% | 96 | -3.57 | -3.7% |
| 14-Dec | 90 | 88.93 | -1.07 | -1.20% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.49 | -4.8% |
| 15-Dec | 89 | 89.18 | 0.18 | 0.20% | 89 | 0.00 | 0.0% | 0.0% | 92 | -3.45 | -3.7% |
| 16-Dec | 91 | 91.22 | 0.22 | 0.20% | 91 | 0.00 | 0.0% | 0.0% | 95 | -3.53 | -3.7% |
| 17-Dec | 93 | 91.75 | -1.25 | -1.30% | 92 | -1.00 | -1.1% | -1.1% | 97 | -4.61 | -4.8% |
| 18-Dec | 91 | 90.25 | -0.75 | -0.80% | 90 | -1.00 | -1.1% | -1.1% | 95 | -4.53 | -4.8% |
| 19-Dec | 93 | 91.6 | -1.4 | -1.50% | 92 | -1.00 | -1.1% | -1.1% | 97 | -4.61 | -4.8% |
| 20-Dec | 92 | 90.02 | -1.98 | -2.20% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.57 | -5.8% |
| 21-Dec | 91 | 88.57 | -2.43 | -2.70% | 89 | -2.00 | -2.2% | -2.3% | 95 | -5.53 | -5.9% |
| 22-Dec | 90 | 89.28 | -0.72 | -0.80% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.49 | -4.8% |
| 23-Dec | 92 | 91.43 | -0.57 | -0.60% | 91 | -1.00 | -1.1% | -1.1% | 96 | -4.57 | -4.8% |
| 24-Dec | 90 | 89.49 | -0.51 | -0.60% | 89 | -1.00 | -1.1% | -1.1% | 93 | -4.49 | -4.8% |
| 25-Dec | 91 | 90.04 | -0.96 | -1.10% | 90 | -1.00 | -1.1% | -1.1% | 95 | -4.53 | -4.8% |
| 26-Dec | 92 | 90.36 | -1.64 | -1.80% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.57 | -5.8% |
| 27-Dec | 91 | 88.6 | -2.4 | -2.60% | 89 | -2.00 | -2.2% | -2.3% | 95 | -5.53 | -5.9% |
| 28-Dec | 92 | 89.97 | -2.03 | -2.20% | 90 | -2.00 | -2.2% | -2.2% | 96 | -5.57 | -5.8% |
| 29-Dec | 93 | 90.77 | -2.23 | -2.40% | 91 | -2.00 | -2.2% | -2.2% | 97 | -5.61 | -5.8% |
| 30-Dec | 94 | 88.63 | -5.37 | -5.70% | 89 | -5.00 | -5.3% | -5.6% | 98 | -8.65 | -8.9% |
| 31-Dec | 89 | 88.15 | -0.85 | -1.00% | 88 | -1.00 | -1.1% | -1.1% | 92 | -4.45 | -4.8% |
| Ave | 94 | 93.38 | -0.97 | -1.05% | 93 | -0.97 | -1.0% | -1.1% | 98 | -4.63 | -4.7% |
| Min | 89 | 88.15 | -5.37 | -5.70% | 88 | -5.00 | -5.3% | -5.6% | 92 | -8.65 | -8.9% |
| Max | 103 | 102.72 | 1.39 | 1.40% | 103 | 1.00 | 1.0% | 1.0% | 107 | -2.88 | -2.8% |

# STATE OF COLORADO

**Colorado Water Conservation Board**
**Department of Natural Resources**
1313 Sherman Street, Room 721
Denver, Colorado 80203
Phone: (303) 866-3441
Fax: (303) 866-4474
www.cwcb.state.co.us



TO: Linda Bassi
Jeff Baessler

FROM: Owen Williams

DATE: August 17, 2011

SUBJECT: **San Miguel River ISF, Southwestern Water Conservation District – Rebuttal Exhibit 3**

In reviewing the Pre-Hearing Statement of Southwestern Water Conservation District (SWCD) I noted in its **Statement of Factual and Legal Claims Asserted** (Statement), the following, "[t]he available hydrology may be inflated by the development of a synthetic hydrology which overestimates water availability at the upper end of the reach." "In evaluating water availability it does not appear that availability at the upper study reach was accurately evaluated, but, instead, may have been inflated by relying on a synthetic hydrology that failed to take into account the gaining nature of the stream." This assertion paraphrases comments made by the SWCD consultant on page 2 of the memo from Tom Wesche. At item 2, Wesche states, "…the synthetic hydrology was developed for the lower terminus of the segment. As the SMR appears to be a gaining stream based on the work by Bikis, the net result could be that while the recommended flows may be lower, their availability may be inflated by the downstream hydrology". "…it would seem reasonable that for evaluating water availability, some consideration should also be given to the hydrology at the study reach."

In large measure, these assertions and comments have been addressed in rebuttal to the pre-hearing statements of other opposers. However, these items take on a slightly different colorin that they address the merits of CPW's measurements and analyses. In responding to SWCD's comments and those of its consultant, it is appropriate that we take note of the fact that the questioned CWCB analysis at the lower terminus is in reasonable agreement with the conclusion evident in the record of the USGS San Miguel River at Uravan gage; that, on average, water is available for the recommended instream flow. Even though the gage data displays the condition of water being available, the USGS gage record does not measure the discharge generated by the entire basin tributary to the lower terminus of the recommended reach. The CWCB analysis, however, does account for the entire watershed area above the lower terminus. The objective of the CWCB analysis at the lower terminus was to determine the water availability situation for the whole basin above the lower terminus "quantification point". Doing its analysis at some upstream point, even if it would be beneficial to the work being done by CPW, CWCB would

not serve the larger purpose of assessing basin water availability as encountered at the lower terminus.

Further discussion of this issue is compelled by Wesche's additional comment that "… some consideration should also be given to the hydrology at the study reach." The implication is again made that water availability should be assessed at some point upstream of the gage. In this instance, a slightly different set of concerns present themselves. Specifically, it is reasonable to expect the data produced from this upstream, ungaged location would be of the same character as that at the lower terminus, i.e., the data would still be "synthetic". There would not be a reasonable expectation of improvement in data quality over that produced at the lower terminus. Furthermore, this data would suffer from the fact that it would characterize less of the basin area potentially affecting or being affected by the recommended ISF. Also, an examination of the data from the USGS gage (09175500) San Miguel River at Naturita demonstrates the proposed ISF amounts have been consistently available at the gage site approximately 4 miles upstream of Calamity Draw (and the upper terminus of the ISF reach) during the 53 years it was in operation (1917 – 1981). If the purpose in establishing an instream flow is the protection of the natural environment of the San Miguel River from Calamity draw to the confluence with Dolores River, the failure to characterize water availability for a significant portion of the basin would surely work against any hypothesized improvements that might accrue to the CPW measurements.

As discussed in Staff Rebuttal Exhibit 1, the Bikis report described the reach of the San Miguel River at issue here as an effluent (gaining) system. Relying upon this report, Wesche contends the water availability analysis might be "inflated." This statement is misleading in that it conveys a notion that water availability should be determined at points upstream of the lower terminus. It must be remembered that Wesche's report is, in essence, a comparison of CPW's measurements and analyses against what might be deemed a textbook example or the "perfect" measurement. To achieve such a level of near perfection, it makes sense that water availability be determined coincidently with the measurements made to describe fish populations and habitat. In such a case, the characterization of the stream as effluent or influent could have value as regards what is needed at other points of habitat measurement. However, were CWCB to pursue such a course of data collection, the following would have to be determined beforehand: the number of measurement points necessary to properly characterize existing and required habitat; which of the upstream points would constitute the "official" location at which the ISF would administered; what level of increased cost and decreased efficiency would be acceptable to increase the number of places at which the ISF would be administered; and would the right(s) be administrable under such a complex scheme. Other issues would likely arise, but it is evident that such an approach would be impractical at the very least. In addition, it is the policy of the Board and it has been its long standing practice to quantify instream flow amounts and water availability at the lower terminus of the reach being considered for protection.

The foregoing discussion did not address the validity of the assumption that this reach of the San Miguel River is an effluent system. If this assumption is valid, it would be unusual; most streams in arid and semi-arid settings are influent (losing). While the reverse can occur in special cases, one is generally well served by making the assumption, if one must be made, that an unfamiliar stream has the same characteristics as are typical in the broader regional context. In any event, before I can accept the assertions of the Bikis report that this portion of the San Miguel River is effluent, a study would have to be completed that looks in greater detail at the operative geo-hydrological processes. As it stands, there are no detailed measurements that address the functioning of the interface between the free water surface and the water table. Without an understanding of timing, seasonality, sources of groundwater if any, head losses and

gains over time and distance, flux/head loss relationships, hydraulic conductivity, matric potential, as well as other issues, little can be said about the nature of water gains or losses. The processes that are responsible for water gain or loss may be isolated to limited areas or occur only under limited circumstances. Substantial cost would be incurred to adequately develop the information that would be necessary to say with confidence the San Miguel at this location is either an influent or an effluent system. Gaining or losing issues aside, the quantification of the instream flow right is made at a point and it is at that point that it will be administered without regard to the origins of the water. The fish, except in such exceptional cases as toxic pollution, have no interest in the source of the water so long as it is available in sufficient amounts. Further, the administration of a water right is a matter of priorities during a "call" and need not be concerned with sources, with the notable exception of "futile calls."

Based upon the foregoing discussion, the assertions of SWCD related to CWCB's analysis of water availability lack merit. The assertions themselves are allegations of possible errors rather than definitive conclusions. The comments made by SWCD and its consultant are not dispositive of CWCB Staff's claim that its determination of water availability is rational, valid and supportable through a methodology that Staff has adopted to produce transparent, systematic, rational analyses. CWCB's determination that water is available to be appropriated for ISF is not disproven by SWCD's assertions regarding stream reach gains or losses from the water table or selection of location for water availability analysis.

**JOHN W. SUTHERS**
Attorney General

**CYNTHIA H. COFFMAN**
Chief Deputy Attorney General

**DANIEL D. DOMENICO**
Solicitor General

**STATE OF COLORADO**
**DEPARTMENT OF LAW**

**OFFICE OF THE ATTORNEY GENERAL**

**STATE SERVICES BUILDING**
1525 Sherman Street - 7th Floor
Denver, Colorado 80203
Phone (303) 866-4500

August 19, 2011

# M E M O R A N D U M

**TO:** Colorado Water Conservation Board

**FROM:** Susan J. Schneider, First Assistant Attorney General

**RE:** **Instream Flow Appropriation on the San Miguel River, Water Division 4**
**Rebuttal Exhibit 4**

## I. FINDINGS OF FACT

ISF Rule 5j.(3) provides that "[i]n a hearing on a contested ISF appropriation, a Party may raise only those issues relevant to the statutory determinations required by section 37-92-102(3)(c), C.R.S. (2010) and the required findings in Rule 5i." The required findings are: (1) that there is a natural environment that can be preserved to a reasonable degree with the Board's water right if granted; (2) that the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made; and (3) that such environment can exist without material injury to water rights.

The staff of the CWCB, the Colorado Division of Parks and Wildlife ("CPW"), (also known as the Colorado Division of Wildlife "CDOW"), and the U.S. Department of the Interior, Bureau of Land Management ("BLM") have shown in their prehearing and rebuttal statements, and will provide evidence at the hearing, that there is a natural environment that can be preserved to a reasonable degree with this proposed instream flow appropriation; that the natural environment will be preserved to a reasonable degree by the water available for the proposed appropriation; and that such environment can exist without material injury to water rights. For the most part, these are factual issues.

The Farmer's Water Development Company ("FWDC"), the Board of County Commissioners of Montrose County, Norwood Water Commission, Lone Cone Ditch and Reservoir Company, Southwestern Water Conservation District, the San Miguel Water Conservancy District, the Board of County Commissioners of San Miguel County and (collectively "the Objectors") argue that the instream flow should not be appropriated because it

fails to meet all 3 requirements, and should be denied for other reasons. The Objectors have failed to provide any valid legal arguments as to why the proposed instream flow should not be appropriated.

## II. OBJECTORS RAISE ISSUES THAT GO BEYOND THE DETERMINATIONS ALLOWED UNDER SECTION 37-92-102(3)(C) AND RULE 5i.

As explained above, the Objectors may only raise issues relevant to the determinations required under section 37-92-102(3)(b) and Rule 5i. Despite that limitation, Objectors raise three additional arguments against appropriating this ISF. First, several Objectors argue that this ISF appropriation will deprive the people of the state of Colorado of the beneficial use of those waters available by law and interstate compact in violation of section 37-92-102(3). Second, others argue that the proposed instream flow conflicts with the CWCB's charge to correlate the activities of mankind with some reasonable preservation of the environment under section 37-92-102(3). Third, FWDC argues that the CWCB would fail to meet all of its statutory duties under section 37-60-106, C.R.S. (2010) if it appropriated this instream flow. There is no valid support for any of these arguments.

### A. The instream flow right will not deprive the people of the state of Colorado of the beneficial use of those waters available by law and interstate compact

The instream flow right will not deprive the people of the state of Colorado of the beneficial use of those waters available by law and interstate compact under any legal theory or reasoning. As a matter of fact, significant volume of water will remain available for new junior water rights and future water development after this instream flow is appropriated. That fact alone proves that the people are not deprived of the beneficial use of those waters available by law and interstate compact.

Additionally, the Objectors have not alleged a specific deprivation as required by law. In discussing what "deprivation" under section 37-92-102(3) means, the Colorado Supreme Court held that "[u]ntil such time as a person is in fact deprived of the beneficial use of available water because of these appropriations the alleged harm is purely speculative and must be rejected." *Colo. River Water Conservation Dist. v. Colo. Water Conservation Board*, 594 P.2d 570, 575 (1979). No objector has alleged a specific deprivation; nor has any objector submitted evidence to prove that the ISF has, in fact, deprived anyone of the beneficial use of available water. The Objectors allege deprivation generally, but fail to show any actual harm. The Objectors' claims are purely speculative, and must be rejected.

Further, some of the Objectors try to apply a lower standard to proving deprivation. For example, the Southwestern Water Conservation District argues that the CWCB must operate the ISF "without impairing Colorado's ability to develop its compact entitlements." Prehearing

Statement of Southwestern Water Conservation District, at p. 3. However, that standard does not apply to ISFs. Instead, it applies to recreational in-channel diversions ("RICDs"). An RICD cannot be granted if the RICD would *impair* the ability of Colorado to fully develop and place to consumptive beneficial use its compact entitlements. § 37-92- 102(6)(b)(I), C.R.S. (2010). Unlike section 37-92-102(6)(b)(I), section 37-92-102(3)(b) does not contemplate future development of compact entitlements. Instead, it only contemplates actual harm, not "alleged harm." *Colo. River*, 594 P.2d at 575.

In addition, "impair" and "deprive" are very different standards. "Deprivation" is a harder standard to meet than "impair." "Deprive" means to divest, deny, and take away. Impair means that "a RICD shields water from a consumptive use that would otherwise be available under a particular compact…." *Colorado Water Conservation Bd. v. Upper Gunnison River Water Conservancy District*, 109 P.3d 585, 595 (Colo. 2005). Shielding water from a use that would otherwise be available is a fairly low standard. Despite this low standard and RICDs' much greater effect on compact development, they have not yet been held to constitute impairment, even though many RICDs have been granted for flows of 2,000 and 1,500 cfs. The availability of water remaining after this instream flow is huge in comparison to that left after the Steamboat Springs RICD, for example, which left the basin over-appropriated, and that RICD was not found to impair compact development.

### B. The ISF correlates the activities of mankind with reasonable preservation of the environment.

Correlating the needs of mankind with reasonable preservation of the environment does not mean that the instream flow should subordinate to future upstream uses or be conditioned upon other water rights being decreed. "The legislative intent is quite clear that these appropriations are to protect and preserve the natural habitat and that the decrees confirming them award priorities which are superior to the rights of those who may later appropriate." *Colo. River*, 594 P.2d at 575. If an instream flow right had to allow future upstream development of junior water rights or were conditioned upon other water rights being decreed, then the stream could be dried up and the "whole purpose of the legislation destroyed." *Id*. Section 37-92-102(3) does not preserve a pool of water for new future uses, or require an instream flow right to yield to future junior upstream users.

Importantly, the CWCB went much further than necessary in this case by giving the people of the San Miguel basin an extensive period of time in which to identify their long-term water needs and file for water rights to meet those needs. This instream flow was first discussed in February of 2005, and formally recommended and publicly noticed in 2008. The Board delayed this ISF by one year to enable filing of water court applications for water rights that would meet projected needs and be senior to the ISF. Many objectors, such as the Board of County Commissioners of Montrose County, the Norwood Water Commission and the Lone Cone Ditch and Reservoir Company, took advantage of the lengthy delay and filed for significant water rights. Montrose County alone filed six water rights applications for a yield of 6,400 acre feet per year of fully consumable and reusable water. This delay both allowed for development of compact entitlements and correlated the needs of mankind with reasonable

preservation of the environment. This instream flow should not be conditioned on decrees for those water rights, as suggested by certain Objectors. If the water court rejects those water rights for being speculative or excessive, that is a water court determination and does not mean that the Board did not correlate the needs of mankind with preservation of the environment.

### C. The CWCB's duties under section 37-60-106 are not at issue.

Finally, FWDC argues that if the CWCB appropriates the proposed instream flow, it will violate its statutory duties under section 37-60-106 that require it to promote conservation of water, to provide greater utilization of water, to maintain balance between development of water and protection of fish and wildlife, and to enhance water availability, *inter alia*. "The scope of the Board's authority to promote conservation and utilization of our waters as set forth in § 37-60-106 is not at issue here" because it is an instream flow appropriation. *Aspen Wilderness Workshop v. Colo. Water Conservation Bd.*, 901 P.2d 1251, 1257 n. 10 (Colo. 1995). The Court held that the provisions of section 37-60-106 are not relevant in an instream flow appropriation because they are neither "in the name of the department of natural resources" nor appropriated for projects sponsored by the Board under sections 37-60-106(1)(m)-(n); 37-60-119 and 37-60-120. FWDC's argument has no merit because the Board's authority under section 37-60-106 is not at issue when appropriating instream flows.

The claims that this instream flow deprives the people of the State of the beneficial uses of water available by law and interstate compact, does not correlate the needs of mankind with preservation of the natural environment, and violates section 37-60-106 must be rejected because there will be water available to develop after this instream flow is decreed, the users were given a considerable amount of time to develop water ahead of this instream flow, and the Objectors merely allege, but fail to show, any harm.

## III. THERE IS A NATURAL ENVIRONMENT THAT CAN BE PRESERVED TO A REASONABLE DEGREE WITH THE PROPOSED INSTREAM FLOW; THE NATURAL ENVIRONMENT WILL BE PRESERVED TO A REASONABLE DEGREE BY THE WATER AVAILABLE FOR THE APPROPRIATION TO BE MADE; AND SUCH ENVIRONMENT CAN EXIST WITHOUT MATERIAL INJURY TO WATER RIGHTS.

The staff, CPW and BLM have provided a sound basis for the Board to determine that there is a natural environment that can be preserved to a reasonable degree with the Board's water right if granted; that the natural environment will be preserved to a reasonable degree by the water available for the appropriation to be made; and that such environment can exist without material injury to water rights. The staff, CPW and BLM have developed the instream flow recommendations based on PHABSIM analysis, as well as standard field and office procedures including, but not limited to, collecting hydraulic and biologic data, surveying stream channel geometry, modeling instream hydraulic parameters, and analyzing water availability using gage flows and statistical stream flow modeling. The scientific bases for the existence and preservation of a natural environment and the biological flow recommendation are well-

established factual issues set forth in Staff's, CPW's and BLM's prehearing and rebuttal statements, and will be further supported by the evidence at the hearing in this matter. The only legal issue raised regarding these determinations is whether injury can occur to other water rights from the instream flow.

FWDC argues that "[t]he current and future uses of the water rights of FWDC and its members would be injured by an appropriation of greater than the minimum flows necessary for the protection of the natural environment of the San Miguel River," and that the proposed flows are excessive. FWDC mistakes the definition of "injury" under Colorado law. Appropriation of more than the minimum necessary to preserve the natural environment to a reasonable degree is not injury. Further, the staff, the CPW and BLM have shown in their prehearing and rebuttal statements, and will provide evidence at the hearing, that the proposed instream flow is the minimum necessary for the preservation of the natural environment of the San Miguel River.

The proposed instream flow water right will not materially injure any existing water rights. The proposed instream flow water right cannot call out senior water rights within or upstream of the ISF reach, and because the instream flow right will not consume any water, it will not injure downstream senior water rights. FWDC is entitled to change any existing water right and the measure of the water right is a pattern of historic diversions and use, so the instream flow will not result in a diminution of the historical consumptive use of that decreed right. *Williams v. Midway Ranches Property Ass'n*., 938 P.2d 515, 521 (Colo. 1980). Additionally, under section 37-92-102(3)(b), the instream flow water right will not impact water uses and practices existing on the date of this ISF appropriation, even if those uses and practices are not decreed.

A future water right or future uses cannot be injured by a 2010 instream flow appropriation. "Injury involves diminution of the available water supply that a water right holder would otherwise enjoy at the time and place and in the amount of demand for beneficial use under the holder's decreed water right operating in priority." *FRICO v. Consolidated Mut. Water Co.*, 33 P.3d 799, 807 (Colo. 2001). If there is no water right, there is no diminution of the amount of water right the holder would otherwise enjoy at the time and place and in the amount by the instream flow. "[W]here senior users can show no injury by the diversion of water, they cannot preclude the beneficial use of water by another." *Cache LaPoudre Water Users Ass'n v. Glacier View Meadows*, 550 P.2d 288, 298 (Colo. 1976). "[S]tanding to assert injury to a water right requires a legally protected interest in a vested water right or a conditional decree, except that the State and Division Engineers have broad standing under the Act to allow them to fulfill their statutory duties…." E*mpire Lodge Homeowners' Association v. Moyer*, 39 P.3d 1139, 1157 (Colo. 2001). An objector must show that it "is in fact deprived of the beneficial use of available water because of these appropriations [or] the alleged harm is purely speculative and must be rejected." *Colo. River Water Conservation Dist. v. Colo. Water Conservation Board*, 594 P.2d at 575. FWDC's argument that future uses of FWDC water rights will be injured by this instream flow has no merit because the instream flow is junior to existing rights and cannot injure future water rights.

FWCD has not shown that the instream flow is greater than the minimum amount necessary. The Colorado Supreme Court has declined to define what constitutes a "minimum instream flow" because such quantification is within the discretion and expertise of the CWCB, in consultation with CDOW. *Colo. River Water Conservation Dist. v. Colo. Water Conservation Board*, 594 P.2d 570, 576 (1979). "Factual determinations regarding such questions as which areas are most amenable to preservation and what life forms are presently flourishing or capable of flourishing should be delegated to an administrative agency which may avail itself of expert scientific opinion. *Id*., at 576. The Court recognized that environmental conditions will vary at each location and that the CWCB has the required expertise, as well as access to expert opinion, to determine the habitat to be preserved and the amount of water needed on a case by case basis. The CWCB's determination that it is appropriating minimum stream flows to maintain the existing aquatic habitat and related fish production when the determination is subject to deference unless shown to be irrational or unfounded. *Id*. at 577.

The determination of the minimum amount of water necessary to preserve the natural environment is properly based on the scientific expertise of Staff, Wildlife, and the BLM, and will be further supported by the evidence at the hearing in this matter.

In conclusion, the Objectors fail to provide any legal basis for the CWCB not to appropriate the proposed instream flow as recommended by the CPW and BLM.