

Risks of Depending on the Colorado River for the Lake Powell Pipeline

By Jane Whalen, revised 2017

The State of Utah (Utah) wants to develop 341,000 acre feet of its remaining share of the Colorado River with a portion allocated for the Lake Powell Pipeline. But, there are risks depending on this remaining share that include: it may not be present in the river system; over allocation; evaporation from rising temperatures; reduced flows; junior priority of pipeline's water right; unsettled Federal Reserve Water Rights claims. Since 2002 water demand has outstripped supply. The river is over allocated and there is not enough water present to meet all of the current obligations. The Bureau of Reclamation indicated in a study the "apportioned water in accordance with the Law of River exceeds the approximate 100 year average flow of river of 15 million acre feet year (MAFY) at Lees Ferry and is 16.4 MAFY."¹ "The Basin faces a wide range of plausible future long-term imbalance between supply and demand. This imbalance computed as a 10-year running average, ranges from no imbalance to 6 million acre feet with a median of 3.2 MAF in 2060."² Compounding the problem is river flows at Lees Ferry during last 15 years have only been 12.5 -13 (MAFY).

The risks of lower flows for the Upper Basin States are explained in Bradley Udall and Jonathan Overpeak's 2017 study. *The Twenty-First Century Colorado River hot drought and implications for the future.*³

An excerpt from the study:

"The Upper Basin also has serious issues, one of which ripples into the Lower Basin. Under such low reservoir conditions, there is also a high likelihood that the Upper Basin states would have to curtail existing water deliveries to cities such as Denver, Colorado Springs, Albuquerque and Salt Lake City in order to make required deliveries to Lake Mead. Heretofore, largely because of the structure of the Colorado River Compact, the Upper Basin and Lower Basin have been managed separately. With permanent flow declines of approximately 20%, however, the required deliveries to Lake Mead would become a hardship on the Upper Basin, as well as create Lower Basin delivery shortages [Reclamation, 2007; Barnett and Pierce, 2009; Rajagopalan et al., 2009]. The original compact, signed during one of the wettest periods in the last 450 years [Woodhouse et al., 2006], did not envision how large scale flow declines would be managed between the basins, and such declines could cause an allocation crisis between the Upper and Lower Basins [Adler, 2008]."

¹ Colorado River Basin Stakeholders *Moving Forward* to address Challenges identified in the Colorado River Basin Water Supply and Demand Study, Phase 1 Report: Executive Summary, Bureau of Reclamation, May 2015.

² Colorado River Basin Stakeholders *Moving Forward* to address Challenges identified in the Colorado River Basin Water Supply and Demand Study, Phase 1 Report: Executive Summary, Bureau of Reclamation, May 2015, page 3

³ See at http://conserveswu.org/wp-content/uploads/Udall_et_al-2017-Water_Resources_Research.pdf.

Over Allocation of Utah's Water Rights

Utah's water managers explain the over allocation of water.

Excerpts from a Deseret News article:

The Water Question: The staggering problem of determining water rights.

"Many of the files are outdated, which means there could be a big difference between what is in the file — paper water — and the actual water that exists or is available — wet water. "We are growing so much as a state and there is so much demand for water, it is critical we know where these existing uses are and protect them," said Mike Styler, executive director of the Utah Department of Natural Resources. "And there is really no new water to be had."

Why should Utahns care? Because the nature of water rights is that there are far more rights than the water that actually exists, so the task is to determine what is real and what is not. "Your paper water right may look very big and supply everything you are asking, but the wet water, in reality, can be very different," Kent Jones, the state engineer over water rights, said. The Colorado River, for example, holds 1.4 million acre-feet of water for Utah to put to use. There are applications approved for more than 2 million acre-feet, and about one half of that is currently in use. Jones said the imbalance has yet to be a problem because the water has not been developed — but the struggle will come with time, and those holding "junior" rights will go wanting.

Of the 15 major watershed areas in Utah, just two of them have been researched and adjudicated, which means that the investigation and documentation work was carried out and a judge then issued a decree." "4

The Adjudication process validates water rights in a court proceeding. It is a long, tedious process of verifying water rights and making a formal determination about the volume of water available and whether it is being put to "beneficial" use. Time and resources are necessary to involve all claimants and collect sufficient data to complete the adjudication process. With growing demands for water, it is imperative the adjudication process be expedited to determine current use and what water might yet be available. As the value of water continues to increase, water right files need to be up to date and accurate through use of the adjudication process. Current funding for State Engineer's office is insufficient to complete the adjudication process in a timely manner. A water official mentioned at the pace they are going it would take a 150 years to complete the process. The Adjudication process does not take into account lower flows in the future due do a warming climate. This will impact wildlife, fish and recreation and there will be

⁴ <http://www.deseretnews.com/article/865617715/The-water-question-The-staggering-problem-of-determining-water-rights.html>; 2014 by Amy Joi O'Donoghue

less water supply to divide among water rights users. In Utah the rivers, streams and aquifers are over allocated. Disputes will become more frequent. Unfortunately, it is the wildlife, the fish and recreation that will suffer the most because they are not recognized as a *beneficial use in Utah Law*.

1922 Colorado River Compact

Before the Colorado River Compact was created in 1922 annual river flows were originally thought to be in the range of 17-21 million acre feet a year (MAFY) at Lees Ferry, Arizona. Lees Ferry is the dividing line between the Upper and Lower Colorado River Basin States. The Lower Basin States of Arizona, Nevada and California were apportioned 7.5 (MAFY) which are fixed allocations and draw their water supply from Lake Mead. The Upper Basin States of Colorado, New Mexico, Wyoming and Utah were apportioned 7.5 (MAFY) and these rights are more uncertain and variable because they are allocated only a percentage of what is left after obligations to the Lower Basin, and higher priority water rights are met.

According to various agreements, 8.25 million acre-feet per year (MAFY), on average, must pass the “Compact Point” (the gage one mile downstream of Lees Ferry) every year for use by the lower basin states of Nevada, Arizona, California. This includes 7.45 MAFY for lower basin states⁵ and 750,000 acre feet for 1944 treaty with Mexico.

1948 Utah’s Water Rights are only 23%

In 1948 the Upper Basin Compact was agreed to by Utah, Colorado, Wyoming and New Mexico. The states realized a state’s water right couldn’t be a fixed amount like the lower basin. Consequently, each state divided the 7.45 MAFY upper basin share by a percentage depending on how much the state’s watershed contributes to the Colorado River.

There are additional "upstream" aspect of the Law of the River that might affect the amount of water for the Pipeline, particularly in times of drought. Under the Law of the River (the 1922 Colorado River Compact and the 1928 Boulder Canyon Dam Act), the Upper Basin states (Colorado, Wyoming, Utah and New Mexico) were allocated 7.5 MAF annually. Of this 7.5 MAF, 51.75% was allocated to Colorado, 23% to Utah, 14% to Wyoming and 11.25% to New Mexico. In times of shortage/drought, these percentages apply to any reductions. In a drying climate, Colorado gets 51.75% of the water -- meaning there is not much left over for Utah and the other two Upper Basin states to divide. Given that the State of Colorado is allocated the lion-share (51.75%) of the Upper Basin allocation, in times of drought, Utah’s 23% remaining share of the Colorado River is particularly vulnerable. In 1988 the Department of Interior determined the upper basin share 7.45 MAFY needed to be reduced due to lower flows.

⁵ The 1922 Compact Article III (d) states: “The States of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in continuing progressive series ...”

1988 Hydrologic Determination (safe yield)

The 1988 hydrologic determination by the Department of Interior determined the upper basin states share of 7.45 MAFY should be reduced to 6 MAFY. The State of Utah portion is 23% of that or 1.36 MAFY. Over time the 6 MAFY called safe yield will likely be lowered again because of predicted less snow pack feeding the river; or the Department of Interior adopting a lower annual flow. Utah is currently using about 1.008 million acre foot a year (MAFY) and has about 341,000 acre feet left to develop.

Another problem is the Bureau of Reclamation is using 15 MAFY as an average flow for the Colorado River to make decisions yet flows have been much less at 12.5-13 MAFY. This overestimates the flows.

Are Utah’s remaining rights of 341,000 acre feet still there?

If you use lower flows it is not.

Figure 1. (DWRe chart)

Utah’s planned new users Colorado River	Utah’s Total Allocation 1.369 MAFY 1.008 MAFY used
<i>Ute Tribe Reserved Water</i>	105,000 acre feet
<i>Navajo Nation Reserved Water</i>	81,000 acre feet plus
Lake Powell Pipeline	86,000 acre feet
New Ag uses	40,000 acre feet
New M & I Uses	29,000 acre feet
Total new planned uses	341,000 acre feet

As Figure 1 illustrates Utah assumes it has 341,000 acre feet of water from Colorado River Compact water left to develop. However, if lower flows of below 15 million acre feet a year (MAFY) are used in the analysis Utah’s compact rights are reduced and that eliminates the availability of water for the Lake Powell.

Federal Reserved Water Rights

When the United States reserved public land for uses such as Indian reservations, military reservations, national parks, forests, or monuments and other public lands, it also implicitly reserved sufficient water to satisfy the primary purposes for which the reservation was created. Reservations made by presidential executive order or those made by an act of Congress have implied Federal Reserved Water Rights. The date of priority of a Federal Reserved Water Right is the date the reservation was established. The United States Supreme Court has determined that the measure of a Federal Reserved Water Right is not dependent on beneficial uses to which the water has been historically applied, but should be quantified based on the water needed to accomplish the primary purpose for which the reservation was established.

While some Federal Reserved Water Rights in Utah have been settled many have not.⁶ This situation creates the potential for unknown and unquantified Federal Reserve Water Rights to disrupt long established appropriative state water rights if or when the reservation uses are developed even though the rights may have been un-quantified, undeveloped, and unrecorded under state water rights laws for decades. Utah has completed Federal Reserved Water Rights settlement agreements on 10 of the 17 National Parks and Monuments and with other federal agencies. Before the state allocates water to the Lake Powell Pipeline it should settle all of its Federal Reserved Water Rights claims.

Tribal Water Rights

The Indian Tribes were not at the table in the 1922 Colorado River Compact, nor in any later compacts and the compacts didn't change or reduce any of their rights. The states have to settle water rights claims with the tribes who have reservations in Utah because Indian rights have to come out of the Utah's remaining 341,000 acre feet Colorado River water right. As river flows are reduced this could become problematic for the Lake Powell Pipeline water right because tribal rights have priority over the junior water right of 1957 Lake Powell Pipeline.

The Utah Navajo Water Rights Settlement Act was introduced in Congress by Senator Hatch in 2017 (<https://www.congress.gov/bill/115th-congress/senate-bill/664>). The agreement is for 81,500 acre of feet of water annually from the San Juan River; \$200 million from U.S. Congress; and \$8 million from the state. The Bureau of Reclamation shall: (1) plan, design, and construct the water diversion, delivery, and conservation features of the Navajo water development projects. This agreement must be approved by Congress and ratified by the Utah legislature and the Navajo Nation before it can be implemented.

⁶ Reserved water rights power point, Boyd Clayton DWRe, September 26, 2016
https://westernstateengineers.files.wordpress.com/2016/12/clayton_2016fall.pdf

The Northern Ute Tribe of the Uintah and Ouray Indian Reservations in Duchesne, Uintah and Grand Counties have Federal Reserved Water Right claims in Utah. Negotiations culminated in a settlement agreement approved by Congress in 1992. But it was never ratified by the tribe. Also, the proposed Ute Indian Water Compact of September 22, 2009 was not ratified by the tribe.⁷ This agreement quantified water rights for the tribe limited to 470,594 acre-feet diversion rights and 258,943 acre-feet of depletion from the Upper Colorado River System of the Uinta and Lake Front Rivers and Duchesne River in Utah. The 2009 compact had a provision to take some of tribes' Green River water rights by exchange, or transfer from the Green River since the ultimate phase of the Central Utah Project was never built. The priority date for the Tribal Water Rights when transferred to the Green River is October 3, 1861. Negotiation is also underway to resolve claims of the Confederated Tribes of the Goshute Reservation in northwestern Utah. A settlement agreement was completed and passed by congress with the Shivwitts Band of Paiute Indians in southern Utah.

Utah is now in negotiations with the Bureau of Reclamation to use its assigned water right from the Ultimate Phase of Central Utah Project that was never built. It would exchange Utah's high water spring water right on the Green River for water rights in Lake Powell from Colorado River Storage Project (CRSP) for the Lake Powell Pipeline. The Ute Tribe also has an interest in the Green River in the remaining Ultimate Phase of the Central Utah Project.

Resolving Indian water rights and the other Federal Reserved Water Rights before allocating more water projects would remove significant uncertainty to what Utah's remaining share of Colorado River water should be used for. Federal Reserved Water Rights in the Colorado River Drainage have to come out of Utah's remaining share of its Colorado River Compact rights, which is about 341,000 acre feet. With Colorado River flows declining and Utah's share being only 23% of what remains it is uncertain how Utah will meet its obligations to higher priority water rights over the 50 year term of Lake Powell Pipeline's hydropower license.

Lake Powell Pipeline Junior Water Right

The priority date for Lake Powell Pipeline water right is 1957 when the Flaming Gorge reservoir and Central Utah project were approved. This means that all water rights granted prior to 1957 have a higher priority than the Lake Powell Pipeline. Any reduction of flow from 6 MAFY for the Upper Basin the Lake Powell Pipeline's water right may not be available. Also, the Lake Powell Pipeline water right is junior to the Central Utah Project and junior to the Lower Basin States water rights.

As flows diminish over time Utah's junior priority water right of 1957 for the Lake Powell Pipeline will be subordinated to senior water rights holders.

⁷ Compacts and agreements, <https://www.waterrights.utah.gov/wrinfo/policy/compacts.asp>

For instance, the obligations having priority over the Lake Powell Pipeline water rights include:

- Water required for Mexico in the 1922 Compact, Article III (c): “If, as a matter of international comity, the United States of America shall hereafter recognize in the United State of Mexico any right to the use of any waters of the Colorado River System.....”⁸
- Water required for the Lower Basin is 7.5 million acre feet a year. The 1922 Compact Article III (d) states: “The States of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years reckoned in continuing progressive series ...”⁹
- The Upper Basin Compact of 1948 Article III. also includes lower basin requirement:¹⁰
 - Article IV – “In the event curtailment of use of water by the States of the Upper Division at any time shall become necessary in order that the flow at Lee Ferry shall not be depleted below that required by Article III of the Colorado River Compact, the extent of curtailment by each State of the consumptive use of water apportioned to it by Article III of this Compact shall be in such quantities and at such times as shall be determined by the Commission.....”

Additionally, there is a 2014 Emergency drought Resolution passed by the Upper Colorado River Commission. This Emergency Resolution is to assure that the Upper Basin States will take measures to keep the level of Lake Powell above the minimum power pool elevation. For this reason, it is unlikely Utah will be able to ignore this goal and continue to pump from Lake Powell using junior priority water rights below this minimum power pool elevation. However, Utah claims is can pump water out of Lake Powell in dire conditions.

The resolution reads:

- “Whereas, hydropower generated from Lake Powell provides stability for the Western Power Interconnection and funding for operation and maintenance of the primary (Colorado River Storage Project) CRSP Act units and for environmental and development programs throughout the Upper Basin;
- Whereas, if the water elevations at Lake Powell reach minimum power pool levels, water supply and development for consumptive and non-

⁸ The Colorado River Compact Article III (c); see at <https://www.usbr.gov/lc/region/pao/pdffiles/crcompct.pdf>

⁹ Ibid. Article III (d)

¹⁰ Upper Basin Compact 1948, See at: <https://www.usbr.gov/lc/region/pao/pdffiles/ucbsnact.pdf> (emphasis added)

consumptive uses in the Upper Basin and power supply options for the Western Area Power grid could be compromised.”¹¹

Also, it is not certain all states agreed to Utah moving water for the Lake Powell Pipeline from the Upper Basin to use in the Lower Basin mentioned in this resolution. A 2003 Resolution of the Upper Colorado River Commission explains the issue:

*“Whereas, the states of Colorado, New Mexico, Utah and Wyoming all support the proposed Lake Powell Pipeline project, but the **states are not in agreement** as to whether, under the Law of River, Utah may use a part of its Upper Basin apportionment to serve uses in the Lower Basin portion of Utah, without obtaining the consent of the other states. However in the spirit of comity, and without prejudice to the position of any state regarding **these unresolved issues**, all the states support and to the extent necessary consent to the Lake Powell Pipeline Project in Utah.”*¹²

According to legal scholars water cannot be taken from an Upper Basin water right for use in the Lower Basin as this Project does. This could set a precedent.¹³

Only using 15 MAFY to Assess Risk?
The problem of over allocation continues

The Bureau of Reclamation’s (BOR) is using 15 million acre feet a year (MAFY) to make water management decisions, that over estimates the flow. The problem of over allocation of the river is continuing as new diversions are being approved by Utah and the BOR. The Colorado River Simulated System (CRSS) river model used to assess the impact of the Lake Powell Pipeline is overly optimistic in projecting reservoir and that river flows will still be as robust in the future as they have been in the past. Bureau of Reclamation’s (BOR) studies have used this higher estimated flow of 15 MAFY for its 100 year average (1906-2010) of the river’s natural flow at Lees Ferry below Glen Canyon Dam. Assuming flows of 15 MAFY to assess environmental impacts of the Lake Powell Pipeline is flawed by assuming that the past will predict the future. Due to the 15 year drought the flows have been about 12.5 MAFY. The BOR stated flows in years 2000-2009 the flows were only 11 million acre feet a year, the lowest ten year average in over 100 years of record keeping on the Colorado River.

In addition, historical records indicate that droughts of various severities occurred periodically. In 1878-2002 a tree ring study by Connie Woodhouse showed a 25 year drought

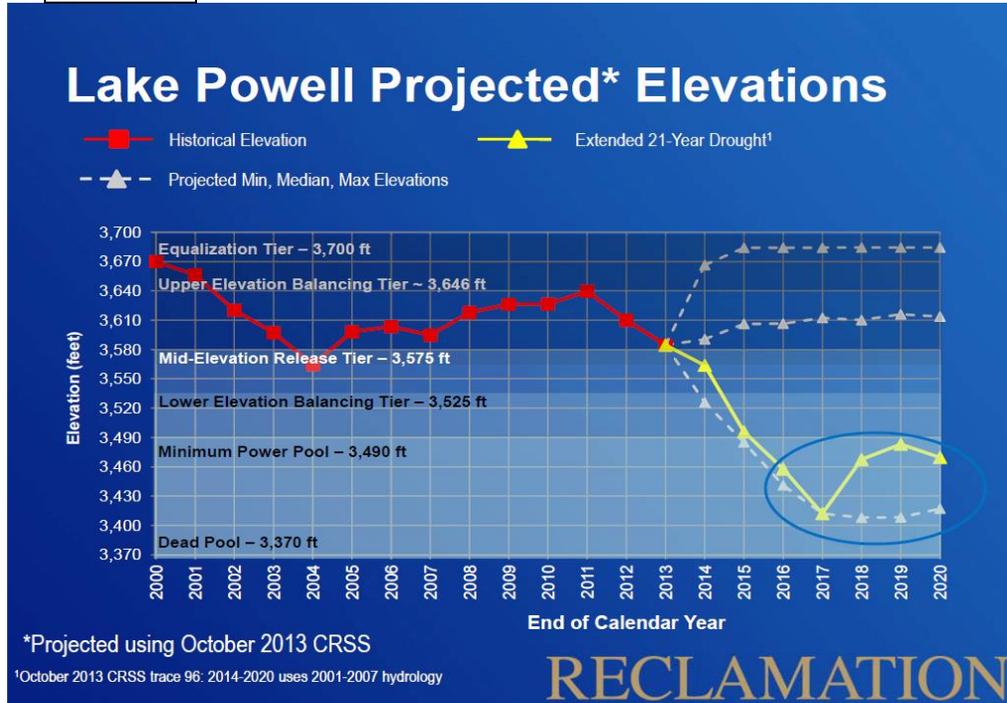
¹¹ Resolution by the Upper Colorado River Commission, “Development of an Emergency Upper Basin Contingency Plan.” (Dec. 10, 2014). See at: <http://conserveswu.org/wp-content/uploads/Upper-Basin-Resolution-Emergency-Drought-2014.pdf>

¹² Resolution of the Upper Colorado River Commission, 2003, See at: <http://www.riversimulator.org/Resources/LawOfTheRiver/HooverDamDocs/Supplements/2003aUCRCResolutionUseAccountingWaterLakePowellPipeline.pdf> (emphasis added).

¹³ James S. Lochhead, An Upper Basin Perspective on the California’s Claims to Water from the Colorado River Part the Law of the River, pp.322-329, See at; <http://conserveswu.org/wp-content/uploads/Lochhead-An-Upper-Basin-Perspective.pdf>

with a natural flow of only 12.36 MAFY. Further, tree records also show that from 1584 to 1593 there was a 9 year drought averaging only 9.7 MAFY. The BOR's using 15 MAFY creates the false sense that there will be adequate water supply to keep reservoirs supplied with enough for all the demands that includes the Lake Powell Pipeline. In addition, to this flawed use of narrow

Figure 2.



piece of river flow history, there has been nothing in this view of history that includes the impact Climate Change on the Colorado River's water availability. In Figure 2, The BOR estimated what will happen if our 15 year drought turns into a 21 year drought with Lake Powell

possibility falling below the level power can be generated.

Water Demand already Outstrips Supply

In Figure 3, the Bureau of Reclamation, depicts 10-year average supply and demand totals for the Colorado River basin, and illustrates that since 2002 demands have exceeded supply. This is nowhere more evident than in the declining volume of water in storage throughout the basin. The Lake Powell Pipeline proponents must acknowledge that while new demands for Colorado River water may be supplied out of storage in the short term, the inevitable, long-term result is that a new demand in a system already fully used will either itself be shorted, or will result in a shortage to another water use somewhere else in the system.¹⁴

¹⁴ Doug Kenney, Rethinking the future of the Colorado River, Colorado River Governance initiative Dec 2010. see at http://scholar.law.colorado.edu/cgi/viewcontent.cgi?article=1013&context=books_reports_studies

The red line represents the water supply and the blue line represents water demand. This figure 3 illustrates clearly that a supply and demand imbalance currently exists the Basin. This imbalance will grow in the future if major changes are not made in how we use water.

Rising Temperatures

The main source of water for community water systems is snow pack that

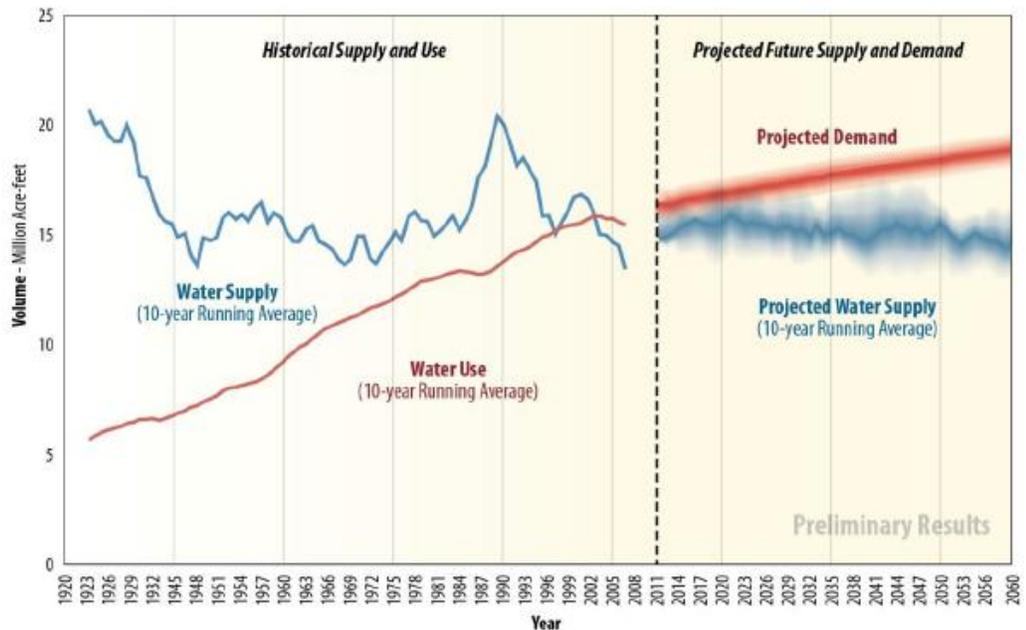
will be impacted greatly by the increase in temperature that will result in a drastic decrease in the snow water equivalent. The annual average temperature in the Colorado River Basin has increased 1.4 degrees C and nearly 2°C at Lee’s Ferry, AZ since 1906.¹⁵

Weather Station

Tony Grove Snotel, NRCS, in Cache Valley, Elevation 8474 ft
SWE- left legend- Snow Water Equivalent is how much water is in snow

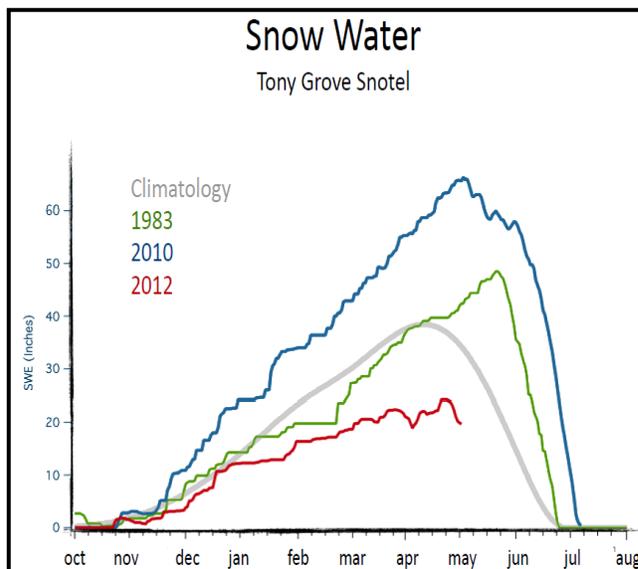
In Figure 4, Dr. Robert Gilles from Utah Climate Center, at Utah State University in Logan, Utah found Utah’s climate is getting warmer with temperatures of all Utah’s cities going up. Moreover, Utah has 9% less snow since 1950 and less winter storms. His Figure 4 illustrates how much less water is in snow since 2012.

Figure 3



¹⁵ The Colorado River Basin and Climate: Perfect storm for the twenty-first Century? 2012 by Carson McMurray; see at <https://www.coloradocollege.edu/dotAsset/74e91de4-a1ff-4062-b628-030e997b4e0b.pdf>

Figure 4



Utah relies heavily on mountain snowpack for its water supply. Traditionally, snowpack accumulates in mountainous regions during the winter months. Water stored in the snowpack is then released to aquifers, streams, lakes, and reservoirs as it melts primarily during spring; this fundamental snowpack hydrology will be impacted by a warming climate.

Our climate is changing because the Earth is warming and Utah is transitioning to a very different hydrological regime. As a result, our water supply will be impacted. Utah's climate has already changed and has

warmed about 2 degrees Fahrenheit, and in many parts of Utah by much more, in the last century¹⁶. In general, Utah's climate has warmed at a rate of two to four times that of the global climate^{17,18}; this is evidenced by the long-term trend of observational temperature records throughout Utah.

The transition to Utah's new climate regime in terms of increasing temperatures and altering precipitation patterns has a probable effect on watershed health. Increased temperatures will drive more evaporation and evapotranspiration (ET), which is the coupled process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants. Increasing air temperatures result in increasing stream temperatures, which in turn will proliferate water pollutant concentrations and so, reduce water quality; also expected is a potential loss of wetlands that purify our water. In addition, higher

¹⁶ EPA What Climate change means for Utah. <https://www.epa.gov/sites/production/files/2016-09/documents/climate-change-ut.pdf>

¹⁷ Robert R. Gillies 2017, Director of Utah Climate Center, and state Climatologist for the state of Utah; Observational and synoptic analyses of the winter precipitation regime change over Utah. *Journal of Climate*, GILLIES, R. R., S.-Y. WANG, AND M. R. BOOTH, 2012: 25, 4670-4698; Climate change impact on the roles of temperature and precipitation in western U.S. snowpack variability. *Geophysical Research*, SCALZITTI, JASON, STRONG, COURTENAY, KOCHANSKI, ADAM, 2016: 43, 10

¹⁸ National Climate Assessment (Southwest climate assessment) 2013 (<http://www.globalchange.gov/what-we-do/assessment>).;

temperatures increases evaporation from streams and reservoirs with resultant water quality issues, depletion of soil moisture and so, increased irrigation requirements for crops and plants.

As the climate warms, Utah's precipitation receipt will be more in the form of rain than in snow^{14, 15}, especially in low and mid elevation mountain regions. Run-off due to snowmelt will occur earlier in the year with higher intensities and shorter durations. As such, late summer river flows are projected to diminish, impacting water users who rely on natural river flows during this time of year. Furthermore, water rights providing diversions from Utah's waterways may be diminished, or need to be altered, due to these changes in snowpack, timing of run-off, and streamflow hydrology.

Conclusion

In conclusion, when the BOR lowers the safe yield of 6 MAFY in the upper basin in any amount or lowers 15 MAFY as the average at Lees Ferry the water for the Lake Powell Pipeline would not be physically, or legally in the system.

The Bureau of Reclamation and Utah should not keep over allocating the Colorado River and not approve any more diversions until they do a new hydrologic study to determine how much water is present and available in the upper basin to reasonable use using the lower 12.5-13 MAFY annual flow.

The Lake Powell Pipeline studies do not detail the risks to the water supply for the Project. Utah incorrectly claims it can divert water in dire conditions, and that they don't have a responsibility to address the risk of lower flows. On the contrary, the studies must require a detailed analysis from Utah that proves their assumption about water availability is valid over the 50 year term of license before the EIS process begins. Further, the studies must ensure the environmental information is accurate so that decision makers can understand the consequences of their decision. The current studies lack scientific accuracy that is both reasonable and objective that the agencies and the public can rely upon and must be revised.

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