

May 9, 2011

Honorable Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Subject: Lake Powell Hydroelectric Project No. P-12966-001: Initial Study Report

Dear Secretary Bose:

Please accept this corrected comment letter and substitute it for the original submitted by EDF on May 6, 2011.

This letter is submitted on behalf of the Environmental Defense Fund (EDF) and its membership of more than 700,000, regarding study reports submitted for the proposed “Lake Powell Hydroelectric Project.” EDF has a long history of working in the Colorado River Basin to find solutions that address the needs of communities and protect and restore flows for a healthy river. EDF’s recent focus has been to assess how river flows will be altered in a warmer world, and how water management in the basin can adapt to a drier river while meeting 21st century water needs.

Comments in this letter are limited to how the draft study reports assess the impacts of climate change on water supply in the Colorado River Basin, the concomitant effects on water availability for the proposed project, the effects of limited water supply on the ability of the proposed project to and deliver water, and the cascading impacts on water users and third parties both within and outside of the service area of the proposed project. Significantly, this letter includes analyses conducted independently by EDF. We urge the Federal Energy Regulatory Commission (Commission) to consider these new analyses, and we furthermore urge the Commission to require the project proponents to replicate these analyses in the study reports.

The Colorado River basin is ground zero for the hydrologic impacts of climate change. For years studies of climate change on global hydrologic patterns have predicted drier conditions in the desert southwest of North America (see IPCC, 2007). Recent improvement in the downscaling of global circulation models has led to greater specificity in the geospatial representation of results, and paved the way for assessing river system operations under climate change

conditions. The Commission, as a federal agency with permitting authority for water resources development projects, has a special obligation to ensure use of the best available climate change science, as state and local agencies are typically not yet equipped to do so themselves.

Significantly, the Colorado River has entered the age of limits. Figure 1, prepared by 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 Commission and the project 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.

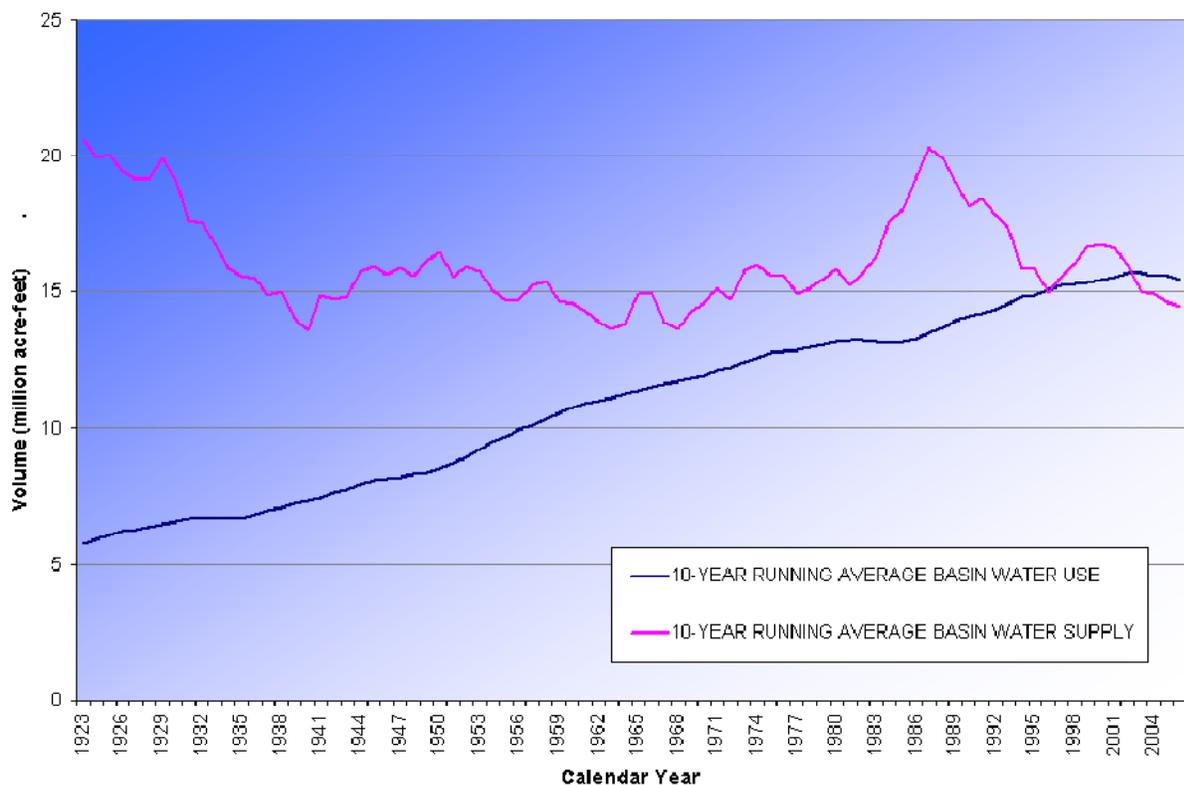


Figure 1. Colorado River Basin Historical Supply and Use (figure prepared by Reclamation and published in Reclamation et al., 2009).

In considering the adequacy of the draft study reports as the basis for the Commission’s decisions on the Lake Powell EIS, the Commission should look carefully at how the analyses address three critical issues: how climate change is projected to impact Colorado River Basin water supply; how physical water availability for the project may be affected by climate change; and how the proposed project will operate in the future if climate change diminishes Colorado River Basin water supply. We recommend to the Commission that study reports #19 and #10 are not complete and request that the Commission not approve the study reports as complete

and ready for environment analysis for the EIS until our concerns below are included in the study reports.

We offer specific comments:

1. **Climate science is improving rapidly and the Commission should require use of the best available information to date in assessments of climate impacts on the proposed project. Specifically, the Commission should require study plan analyses to use Reclamation's April 25, 2011 data as well as any additional climate change inflows data developed by Reclamation.**

Findings regarding water supply in Lake Powell as reported in study report 19: Climate Change are based on rapidly emerging science of downscaling global circulation models. On April 25, 2011 U.S. Bureau of Reclamation released "SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011" that includes projections for Colorado River Basin water supply through the 21st century. Specifically, Reclamation's report projects a decrease in mean annual runoff of 8.5% for the basin above Lees Ferry. In a separate effort, the Upper and Lower Colorado regional offices of Reclamation are developing climate change projections for Colorado River inflows through the 21st century which are expected to be published mid-2011.

2. **The study reports fail to assess how physical water supply may affect the ability of the Lake Powell Pipeline to deliver water. The Commission should require the project proponent to update study report 19 to include analyses of how climate change is projected to impact water availability for the proposed project, specifically also including implementation of the 1922 Colorado River Compact in the modeling analysis.**

Study report 19 briefly addresses the potential impact of climate change on water supply at Lake Powell, noting a 2008 study that projected inflow reductions of 10-20% correlate to a 26-51% probability that Lake Powell would go dry at some point by mid-century, assuming the extension of today's management strategies, and furthermore noting "even without climate change, there is a 50% chance the system would go dry by 2037." This is an important finding that has significant implications for the ability of the proposed project to deliver water (not to mention its ability to offset the energy demand of pumping water for the proposed project with hydroelectric power generation).

However, the study report fails to address an important corollary question: to what extent would limits on water supply in Lake Powell impact the physical ability of the Lake Powell Pipeline to deliver water? Chapter 4 of the same study report 19 assesses water availability in Lake Powell under two hydrologic scenarios, a) "direct natural" (projecting the 1906-2006 hydrologic record into the future), and b) "nonparametric, paleo-conditioned inflows" (projecting long-term past records of inflows, generated through study of tree ring records, into the future). Significantly, neither of these hydrologic scenarios is informed by climate change projections. Moreover, this analysis fails to address the finding reported earlier in the chapter that climate change impacts may cause Lake Powell to go dry.

Figure 2, below, compares total basin inflows under three hydrologic inflow scenarios developed by Reclamation (direct natural, non-parametric paleo-conditioned, and climate change) and demonstrates that the climate change flow scenario is considerably drier than either the direct natural or non-parametric paleo-conditioned flow scenarios.

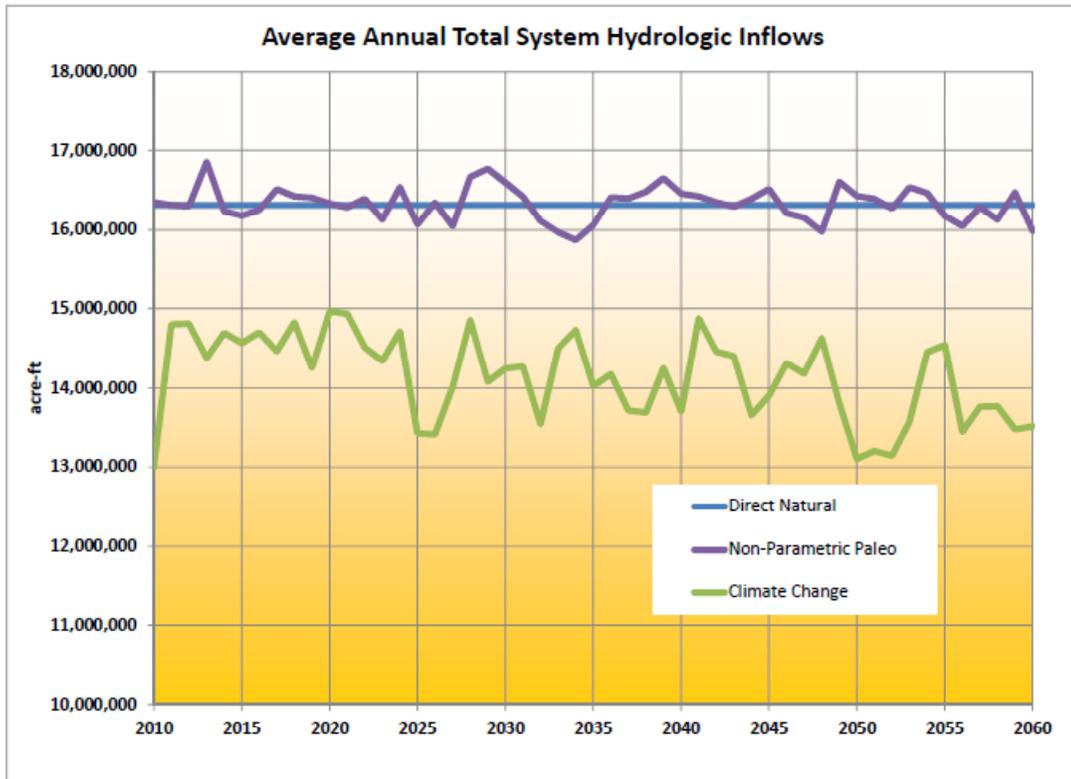


Figure 2. Average annual total system hydrologic inflows for the Colorado River Basin through 2060.¹

Moreover, analysis in chapter 4 of study report 19 fails to project implementation of the Colorado River Compact (Compact), a legally binding interstate compact that has been in effect since 1922. The version of the Colorado River Simulation System (CRSS) model used for analysis in the study report does not include a “rule” for ensuring deliveries from the Upper Basin to the Lower Basin as required by the Compact. The direct natural inflow hydrology used in CRSS is not sufficiently dry as to warrant this analysis. However, the non-parametric paleo inflow hydrology does result in projections that show Upper Basin deliveries to the Lower Basin as insufficient to comply with the with the Compact. The climate change inflow scenario results in a significant probability that the Upper Basin will at some point be required to make additional releases from Lake Powell and possibly curtail water uses in order to ensure compliance with the Colorado River compact. A remaining uncertainty is the volume of deliveries required from the Upper Basin to the Lower Basin under the Compact. One interpretation suggests that 75 million acre-feet is required over any 10-year period. Another interpretation suggests that 82.5 million acre-feet is required over any 10-year period.

We prepared an independent CRSS analysis of Lake Powell water supply that uses a climate change inflow scenario similar to that published in Reclamation’s SECURE report, and assumes Compact deliveries at the 75 million acre-foot level. This analysis projects a 27% probability that the water surface elevation in Lake Powell would be below 3375 feet msl (the stated intake level for the proposed project) in any given year between 2010 and 2099 (see figures 3 and 4). If the compact delivery obligation is assumed to be 82.5 million acre-feet the probability of Lake Powell falling below 3375 feet msl increases to as much as 37%. We urge the Commission to require the project proponent, working with Reclamation, to replicate these analyses themselves. We urge the Commission to find that study report 19 has not been properly conducted because the analysis does not consider hydrologic conditions projected for the time period during which the project is proposed to be operational, and because the CRSS analysis used is flawed in that it does not demonstrate implementation of the Compact.

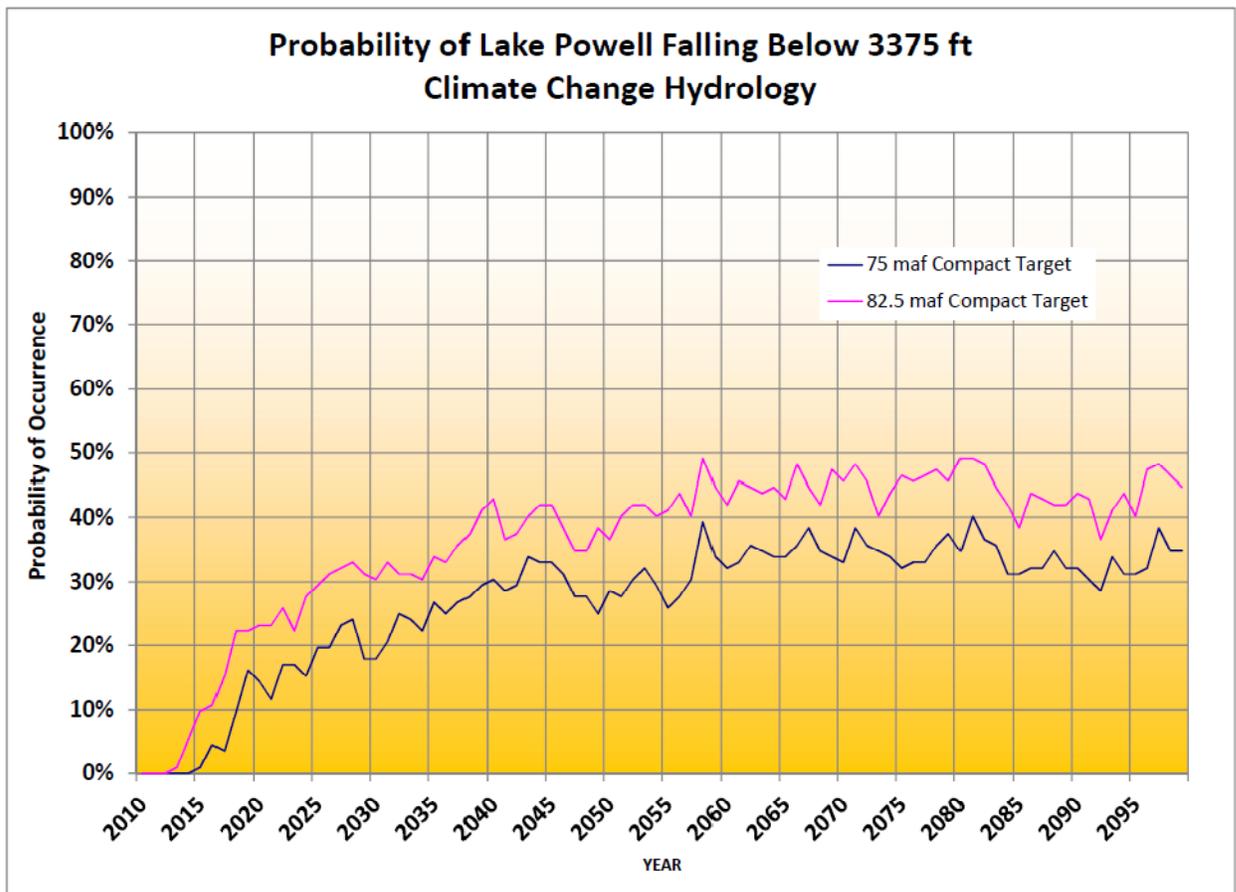


Figure 3. Projections under climate change scenario of the probability of Lake Powell falling below 3375 feet through 2060.ⁱⁱ

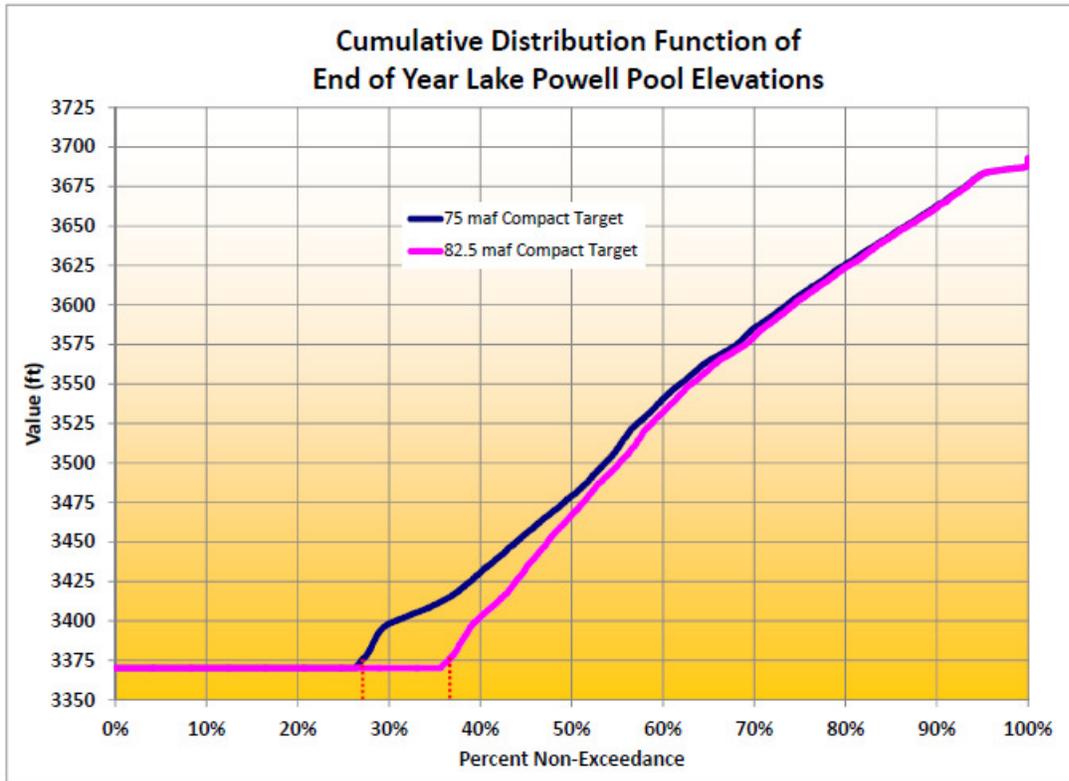


Figure 4. Probability under climate change inflows scenario that the end-of-year Lake Powell elevation would be below elevation 3375 over the course of the 21st century.ⁱⁱⁱ

3. The study reports fail to assess how limitations on water supply for the proposed project, either due to physical shortages or legal requirements, may affect water users throughout Utah. The Commission should require all analyses of cascading impacts of the proposed project to reflect water supply conditions for the proposed project under projected climate change, specifically also including implementation of the 1922 Colorado River Compact.

As explained in comments above, climate change projections suggest that physical supply may not be available to the proposed project in 27-37% of all years through the next century. Study report #10, socioeconomic and water resource economics, does not address the impacts of a proposed project that fails to deliver water. We urge the Commission to find study report #10 incomplete because it fails to address relevant issues such as the cost to both Utah’s taxpayers, and rate payers in the service area of the proposed project, of a physical water shortage for multiple years, which presumably include continued project repayment costs in addition to substitute water supply costs.

We also urge the Commission to find study report 10 incomplete because it fails to analyze the probability that, due to a ‘call’ on the 1922 Compact, the proposed project would be subject to a legal requirement to curtail water use. Moreover, as a hedge against this risk, the managers of the proposed project may enter into a dry-year lease arrangement, or another type of temporary transfer arrangement, in which the proposed project’s water

supply would remain intact while other water users in Utah would forbear use of their water rights. The most probable water users to enter such an agreement with the managers of the proposed project are Utah farmers who irrigate with Colorado River water. We urge the Commission to find that study report 10 is incomplete because it fails to analyze the potential impact of such a transfer of water rights, not only on all parties that hold Colorado River water rights in Utah, but also on the third parties that may be impacted by such a transfer, such as county governments (which would see declines in tax revenues), farm workers, and businesses that supply irrigated farms.

Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in black ink that reads "Jennifer Pitt". The signature is written in a cursive, slightly slanted style.

Jennifer Pitt
Director, Colorado River Project

References

IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Reclamation, et al., 2009. "Colorado River Basin Water Supply and Demand Study: A Proposal Submitted for Consideration under the Basin Study Program" available at <http://www.usbr.gov/lc/region/programs/crbstudy/CRBasinStudy.pdf>

ⁱ This chart uses the two hydrologic scenarios (direct natural and non-parametric paleo) developed by Reclamation, as well as one hydrologic scenario for climate change similar to that developed by Reclamation in "SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011". These three scenarios were input into CRSS by EDF. "Direct Natural" and "Non-parametric paleo" inflows are those used in modeling for the 2007 Colorado River Interim Surplus Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead. These datasets consist of inflow quantities for each of the 29 natural flow nodes used in the CRSS mode, and "average annual total system hydrologic inflows" are generated in CRSS as outputs using each dataset.

ii This plot was generated by EDF using the CRSS model managed by Reclamation, which contains a comprehensive compilation of the operational policies that govern the management of the Colorado River. These policies are developed into logical “rules” which operate the reservoirs and determine allocation to various water users. One known omission from this suite of policies is logic that assures that the provisions in the 1922 Colorado Compact are satisfied which requires the delivery of 75 million acre-feet over a 10-year period at Lee Ferry. The required contribution of the Upper Basin towards the 1.5 million acre-feet annual delivery obligation to Mexico remains an unresolved dispute between the upper and lower states of the basin. The Upper Basin agrees that 75 million acre-feet must be delivered over any 10-year period while the Lower Basin contends that this total should be 82.5 million acre-feet over a 10-year period to account for half of this contribution to Mexico. This dispute is the primary reason that any logic enforcing a “compact call” has not been included in Reclamation’s CRSS model.

Implementation of a ‘call’ on the Colorado River Compact is needed in CRSS to project river management and conditions in extended dry periods, such as are found in the climate change scenario. We developed an addition to CRSS to incorporate a sequence of logic that allows for compact obligations to be met. This methodology recognizes that specifying the particular users who would be subject to this forbearance would likely result in significant dispute, therefore a method was developed that would introduce water into the model directly above the Lee Ferry in the quantity required to meet the deficit. Although this violates mass-balance in the model throughout the reaches of the Upper Basin, this method provides a viable estimation of the pool elevations at Lake Powell and Lake Mead. The amount of supplemental water introduced into the water is equivalent to the amount of water that would be required for forbearance.

System conditions were evaluated throughout this study using both compact targets of 75 million acre-ft and 82.5 million acre-feet over a ten year period. This dual analysis is intended to avoid the ongoing dispute regarding the delivery obligation to Mexico from the Upper Basin.

The general logic sequence for the Compact compliance is as follows.

- 1) Allow UB and Powell Rules to Solve
- 2) Measure Flow Volume Through Lee Ferry
- 3) Add Volume to Previous 119 months
- 4) Compare to Either 82.5 maf or 75 maf => Determine Shortfall
- 5) Increase Releases From Powell to Meet Shortfall
- 6) If Powell is Insufficient, add “Supplement” Water above Lee Ferry (limited to actual depletions in the Upper Basin).

Another new element this modeling adds to CRSS is the protection of pre-22 rights. Although the Colorado Compact specifies a quantity of water that must be delivered to the Lower Basin, the prior appropriations doctrine is thought to supersede the Compact itself. This doctrine generally establishes a prioritization system of senior water rights taking priority over junior water rights when insufficient water exists for all users. In addition, this doctrine also infers that water rights established prior to the signing of the Compact in 1922 are not subjected to the terms of the Compact. The model used in this study incorporates a provision for this protection of senior Upper Basin rights by limiting the amount of water introduced above Lee Ferry to assure that 2.2 million acre-feet per year is available for Upper Basin consumption.

iii Ibid.