
May 9, 2016

Glen Canyon Dam LTEMP Draft EIS
Argonne National Laboratory
9700 S. Cass Ave. EVS/240
Argonne, IL 60439

Transmitted electronically to:
https://parkplanning.nps.gov/commentForm.cfm?documentID=70123

**Re: CLIMATE CHANGE IS REAL, MUST BE ANALYZED IN THE GLEN CANYON DAM LONG-TERM EXPERIMENTAL AND MANAGEMENT PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT (LTEMP DEIS), AND NECESSITATES A FULL CONSIDERATION OF ALTERNATIVES INCLUDING THE DECOMMISSIONING OF GLEN CANYON DAM AND THE DRAINING OF LAKE POWELL**

**Dear Mr. Billerbeck, Ms. Heffernan and Mr. LaGory,**

Save The Colorado appreciates the opportunity to provide comments about your Glen Canyon Dam LTEMP DEIS. We believe your DEIS is insufficient and completely fails to comply with the National Environmental Policy Act and the Endangered Species Act.

The National Environmental Policy Act requires that the Department of Interior take a "hard look" at all direct, indirect, and cumulative impacts associated with the proposed alternatives in the LTEMP DEIS. Although the LTEMP DEIS purports to analyze the environmental impacts of operating Glen Canyon Dam and its impact on the Colorado River ecosystem, the DEIS fails to take climate change seriously, fails to analyze the impacts on the water supply system of climate change for the entire Colorado River including the ecology in the Grand Canyon due to the operation of Glen Canyon Dam and Lake Powell, fails to analyze the likelihood of a "Compact Call" on the Colorado River due to the water lost by evaporation and seepage due to the operation of Glen Canyon Dam and Lake Powell, and fails to analyze a full range of alternatives that should be considered due to climate change including the decommissioning of Glen Canyon Dam and the draining of Lake Powell.

Specifically, your LTEMP DEIS fails to analyze:

**1. How the operation of Glen Canyon Dam and Lake Powell – in conjunction with the acceleration of climate change – increases the likelihood of a "Compact Call" on the Colorado River due to the loss of water by evaporation and seepage at Lake Powell.**

The "Colorado River Compact" is federal law that allocates water in the Colorado River system, approved by Congress on August 19, 1921 (42 Statutes at Large, page 171), and ratified and legislated by the Acts of the Legislatures of participating member States. The Compact provides that the Upper Basin states (Colorado, Wyoming, Utah, New Mexico) shall get 7.5 million acre feet (maf) (Compact Article III(d)) and the Lower Basin states (Nevada, Arizona, California) shall get 7.5 maf.[1] Additional federal treaties have determined that the United States shall deliver 1.5 maf to Mexico annually. Thus 16.5 maf of water are allocated each year. Further, the Colorado River Compact requires that the lower basin has "senior rights" such that the Upper Basin states must deliver at least 7.5 maf to the Lower Basin states over any 10-year period, or 7.5 maf/year on average. Therefore, on average, 9.0 maf/year must be delivered by the upper basin to the lower basin and Mexico each year.

Due to long-term drought and a likelihood that climate change is already occurring in the Colorado River basin, over the past 16 years (1999-2014), the average flow in the Colorado River has equaled approximately 12.5 maf, well under the 16.5 maf allotted to all parties resulting in a large "cumulative streamflow deficit" across the system[2][3]. Despite the shortage, the delivery of water to the Lower Basin has still occurred because the Upper Basin stores water in the Colorado River Storage Project reservoirs – Navajo Reservoir, Blue Mesa Reservoir, Flaming Gorge Reservoir, and Lake Powell. Through "equalization" programs established as part of the 2007 interim guidelines, Upper Basin water can also be stored in Lake Mead. However, the dramatic decline in river flows has also caused a corresponding decline in in reservoir levels in the two biggest reservoirs, Lakes Powell and Mead, and as of this writing the total combined storage in the reservoirs is at its lowest point in history since the reservoirs began to fill in the 1960s[4].

Parties involved in Colorado River management agree that an official "shortage" may be declared in 2017[5] which would cut water deliveries to Arizona and Nevada. The lower basin states may forestall an official shortage by voluntarily cutting water deliveries prior to a shortage declaration[6]. Such a shortage just missed being declared in 2015 due to "miracle rains" in the Upper Basin and the state of Colorado[7].

Climate change models developed and utilized by the U.S. Bureau of Reclamation[8], NASA[9], multiple university research centers[10], and U.S. EPA[11] predict that the Colorado River basin will likely be greatly impacted by future droughts as climate change intensifies. In its recent "Colorado River Basin Study,"

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[1] http://www.usbr.gov/lc/region/g1000/lawofrvr.html
[2] See figure B-14 on page B 24:
http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[3] See figure B-18 on page B 27:
http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[4] http://www.inkstain.net/fleck/2015/07/coases-reservoirs-how-transaction-costs-are-emptying-lake-mead/
[5] http://kjzz.org/content/145015/colorado-river-shortage-looms-arizona-water-managers-look-elsewhere
[6] http://www.wtsp.com/news/nation-now/in-colorado-river-deal-ariz-nev-could-lose-more-water/155723273
[7] http://www.gjsentinel.com/news/articles/miracle-may-8232for-colorado-8232water-levels
[8] http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[9] http://climate.nasa.gov/news/2238/
[10] http://summitcountyvoice.com/2015/08/20/climate-west-may-be-in-permanent-drought-by-2060s/
[11] http://www.epa.gov/climatechange/impacts-adaptation/southwest.html

the U.S. Bureau of Reclamation predicted that temperature would increase across the basin[12], less precipitation and more "drying"[13] would occur across the basin, and total flow in the Colorado River would decrease to 13.7 maf over the period of 2011 - 2060 due to climate change[14]. 13.7 maf is significantly lower than the total 16.5 maf that is allotted, representing a 17% reduction in flows from the quantity the Colorado River Compact anticipates and allocates.

The Colorado River system is on the verge of having a "Compact Call," whereby the lower basin states would legally force the upper basin to deliver their full of 7.5 maf (plus 1.5 maf to Mexico) down the river. The State of Colorado has been preparing for a Compact Call for nearly a decade[15], and the State of Colorado's ongoing "Colorado Water Plan" process has put significant thought and verbiage into how a Compact Call would be addressed as the state diverts more and more water out of the Colorado River system[16],[17].

The likelihood and extent of a Compact Call absolutely would be exacerbated by new diversions out of the Colorado River and its tributaries in the upper basin. Further, each state in the upper basin is currently planning to divert more and more water out of the Colorado River system in Wyoming[18],[19],[20], Utah[21],[22], and Colorado[23],[24],[25],[26]. Current proposed diversions include:

- Moffat Collection System Project (Colorado) = 15,000 acre feet
- Windy Gap Firming Project (Colorado) = 30,000 acre feet
- Lake Powell Pipeline (Utah) = 86,000 acre feet
- Fontenelle Dam re-engineering (Wyoming) = 125,000 acre feet
  **TOTAL: 256,000 acre feet of new water diverted out of the Colorado River system**

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[12] See Figure B-37 on page B 53:
http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[13] See page B 56 and Figure B-40:
http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[14] See page B-65 and Figure B-45:
http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Technical%20Report%20B%20-%20Water%20Supply%20Assessment/TR-B_Water_Supply_Assessment_FINAL.pdf
[15] See slide 10: http://water.state.co.us/DWRIPub/DWR%20Presentations/kknox_0607.pdf
[16] See Draft 2 for discussion about risk of a compact call and trans-mountain diversions:
http://coloradowaterplan.com/
[17] http://aspenjournalism.org/2015/08/26/transmountain-diversion-framework-endorsed/
[18] http://www.wyomingnews.com/articles/2015/05/03/news/01top_05-03-15.txt
[19] http://www.wyofile.com/wyoming-dam-construction-plans-advance/
[20] http://www.sltrib.com/home/2696289-155/wyoming-officials-want-expanded-usable-storage
[21] http://www.standard.net/Environment/2014/09/25/Talk-of-Utah-running-out-of-water-is-scare-tactics-says-conservation-group
[22] http://www.water.utah.gov/lakepowellpipeline/generalinformation/default.asp
[23] http://www.aspentimes.com/news/17406963-113/garco-water-meeting-seeks-to-protect-w-slope
[24] http://www.savethecolorado.org/blog/is-the-colorado-water-plan-ethically-bankrupt/
[25] http://www.sltrib.com/home/1928692-155/story.html
[26] http://www.savethecolorado.org/blog/will-denver-and-the-front-range-drain-the-colorado-river-and-the-west-slope/

At full reservoir, Lake Powell evaporates and seeps out through its banks about 860,000 acre feet of water[27] which is a complete loss to the ecological system as well as the water supply system. Evaporation and bank seepage at Lake Powell will continue to co-mingle with the increasing impacts of climate change as a cumulative effect that will exacerbate the likelihood of a Compact Call on the Colorado River. The Glen Canyon Dam LTEMP DEIS fails to consider how the operation of Glen Canyon Dam and Lake Powell increases the likelihood of a Compact Call, fails to consider the range of climate change impacts on the water supply system that Glen Canyon Dam manages, and fails to consider how the decommissioning of Glen Canyon Dam and the draining of Lake Powell would alleviate the likelihood of a compact call and decrease the impacts of climate change on the water supply system for the entire Southwest U.S. as well as for the ecological health of the Grand Canyon.

**2. How the operation of Glen Canyon Dam and Lake Powell is causing methane emissions that contribute to climate change.**

Reservoirs across the planet cause methane emissions. These emissions are caused by anaerobic decomposition of organic matter – including sediment and vegetation – entrained in the water column and settling out throughout the reservoir system. These emissions are exacerbated in reservoirs that fluctuate in level and are exacerbated by the size of the reservoir, the landmass that the reservoir floods each year, and the warmth of the climate. In addition to the organic matter entrained in the water column, reservoirs also drown landscapes as their water levels go up and down -- which causes vegetation to be grown, drowned, die, decompose, grown, drowned, etc. -- and thus more vegetation is under water and decomposes by anaerobic decomposition causing even more methane emissions[28],[29],[30],[31],[32],[33].

Scientific studies indicate that methane emissions from hydropower dams and reservoirs can vary dramatically. In northern subarctic climates, methane emissions have been measured as a small fraction of greenhouse gas emissions as compared to coal-fired power plants. In temperate climates like much of the U.S. and Europe, methane emission measurements vary by sub-climate, size of reservoir and vegetation growth, but have been measured from small to large as compared to the emissions from coal-fired power plants. In tropical environments, methane emissions from the operations of hydropower dams and reservoirs have been measured as high as double those of the greenhouse emissions of a coal-fired power plant that generates the same amount of electricity.

Further, although the Intergovernmental Panel on Climate Change (IPCC) has guidelines[34] on calculating methane emissions from hydropower dams/reservoirs, there have been very few measurements of these methane emissions at the same time that large hydropower projects are being proposed and built by the thousands across the planet. One Brazilian scientist estimates that methane from hydropower

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[27] http://www.riversimulator.org/Resources/Hydrology/TomMyers2013.pdf
[28] http://ecowatch.com/2014/08/14/dams-not-clean-energy-climate-change/
[29] http://ecowatch.com/2015/10/06/hydropower-methane-bomb/
[30] https://www.internationalrivers.org/campaigns/reservoir-emissions
[31] https://vimeo.com/147261951
[32] http://www.scientificamerican.com/article/methane-emissions-may-swell-from-behind-dams/
[33] http://www.climatecentral.org/news/hydropower-as-major-methane-emitter-18246
[34] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_p_Ap3_WetlandsCH4.pdf

currently accounts for 23 percent of all human-caused worldwide methane emissions. As hydropower plants proliferate, the amount of methane will only increase.

Specifically for Lake Powell and Glen Canyon Dam, the methane emissions have never been studied, but we estimate that those emissions are very high because:

- Lake Powell is the second largest reservoir in the U.S.[35] – the bigger the reservoir the greater the methane emissions.

- The water level in Lake Powell fluctuates dramatically on a yearly cycle[36] – the more a reservoir fluctuates, the greater the methane emissions.

- The sediment load in Lake Powell is enormous[37] -- the sediment carries organic material that decomposes anaerobically.

- The surface area of Lake Powell fluctuates dramatically[38] causing massive sediment walls and miles-long sediment flats that are sources of methane emissions[39].

- Lake Powell is in a moderate climate in the Southwestern U.S.[40]

A study is in progress that will estimate those methane emissions[41]. Preliminary estimates of methane emissions from the operation of Glen Canyon Dam and Lake Powell indicate that the combined life cycle GHG equivalents may be as high as one-third of a natural gas powerplant. As this study is finalized we will submit it for the public record for the LTEMP DEIS.

In summary, the LTEMP DEIS has failed to take climate change seriously, has failed to consider the climate change impacts of operating Glen Canyon Dam and Lake Powell on the water supply system in the Colorado River basin and on the ecological health of the Grand Canyon, and has failed to analyze the GHG emissions caused by the operation of Glen Canyon Dam and Lake Powell. Further, due to the seriousness of the impacts of climate change, the LTEMP DEIS has completely failed to analyze a full range of alternatives to address the threat to the ecological health of the Grand Canyon and the water supply system of the Colorado River including the alternative to decommission Glen Canyon Dam and drain Lake Powell.

Failure to analyze these impacts and alternatives violates the National Environmental Policy Act and Endangered Species Act.

Please insert this letter into the public record for the LTEMP DEIS.

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[35] https://en.wikipedia.org/wiki/List_of_largest_reservoirs_in_the_United_States
[36] http://lakepowell.water-data.com/
[37] http://www.onthecolorado.com/resources.cfm?mode=section&id=Sediment
[38] http://earthobservatory.nasa.gov/Features/WorldOfChange/lake_powell.php
[39] http://ecowatch.com/2014/08/14/dams-not-clean-energy-climate-change/
[40] http://www.usclimatedata.com/climate/lake-powell/utah/united-states/usut0284
[41] The study is not yet complete, but we retain the opportunity to insert it into the public record before the release of the FEIS for the LTEMP DEIS.

Thank you,

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Gary Wockner, PhD, Executive Director
Save the Colorado
PO Box 1066, Fort Collins, CO 80522
http://savethecolorado.org
http://www.facebook.com/savethecolorado
https://twitter.com/savethecolorado
970-218-8310

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