BEFORE THE UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Pumped Hydro Storage, LLC: Navajo Nation Little Colorado River Pumped Storage Project	Project No. 14994-000
and	Project No. 14992-000
Pumped Hydro Storage, LLC: Navajo Nation Salt Trail Canyon Pumped Storage Project	Center for Biological Diversity Motions to Intervene

CENTER FOR BIOLOGICAL DIVERSITY
MOTION TO INTERVENE RE: PROJECT NO. 14994-000 and 14992-000

I. INTRODUCTION

On September 17, 2019, the Federal Energy Regulatory Commission (FERC) issued a NOTICE OF PRELIMINARY PERMIT APPLICATION ACCEPTED FOR FILING AND SOLICITING COMMENTS, MOTIONS TO INTERVENE, AND COMPETING APPLICATIONS ("Notice")[1] regarding an application from Pumped Hydro Storage, LLC ("PHS") for a proposed project called the Navajo Nation Little Colorado River Pumped Storage Project ("proposed LCR Project").

In accordance with the Notice and Rule 214 of the Commission's Rules of Practice and Procedure, 18 CFR § 385.214, the Center for Biological Diversity (the "Center") hereby timely moves to intervene and become a party in the proceeding for the proposed LCR Project (P-14994).

On October 2, 2019, the Federal Energy Regulatory Commission (FERC) issued a NOTICE OF PRELIMINARY PERMIT APPLICATION ACCEPTED FOR FILING AND SOLICITING COMMENTS, MOTIONS TO INTERVENE, AND COMPETING APPLICATIONS ("STC Notice")[2] regarding an application from Pumped Hydro Storage, LLC for a proposed project called the Navajo

[1] eLibrary, 20190917-3015 (09/17/2019)
[2] eLibrary, 20191002-4001 (10/02/2019)

Nation Salt Trail Canyon Pumped Storage Project ("proposed STC Project").

In accordance with the Notice and Rule 214 of the Commission's Rules of Practice and Procedure, 18 CFR § 385.214, the Center for Biological Diversity (the "Center") hereby timely moves to intervene and become a party in the proceeding for the proposed STC Project (P-14992).

II. COMMUNICATIONS

All correspondence, communications, pleadings and other documents relating to this proceeding should be served upon the following persons:

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III. IDENTIFICATION OF PARTY

The Center for Biological Diversity is a national, nonprofit conservation organization with more than 1.6 million members and online activists dedicated to the protection of endangered species and wild places. Among the species we work to protect are many that may be affected by the proposed LCR Project including the endangered humpback chub and its critical habitat in the Little Colorado River.

The Center supports the development of clean and renewable energy and needed energy storage to support such development, which is a critical component of efforts to reduce greenhouse gas emissions, avoid the worst consequences of climate change, and assist the nation in meeting critical emission reduction goals. However, like any energy project, proposed energy storage projects must be thoughtfully planned to minimize impacts to the environment and, in particular, avoid harming sensitive species and habitats. While the Center strongly supports the rapid development of renewable energy production and needed energy storage to address the climate

crisis, we do not support projects, such as this proposed LCR and STC Projects, which are poorly sited in remote areas with highly sensitive environmental resources and that would also increase the need for new long-distance transmission lines and result in associated energy losses and waste. Moreover, because pump storage projects are net energy users when they utilize fossil fuel generation to pump the water up-hill, the net effect can undermine efforts to reduce greenhouse gas emissions overall. Further, large pump storage projects are difficult to integrate into the grid due to their high energy needs during pumping. In contrast, other alternatives such as smaller energy storage projects near high-demand centers and distributed storage options serve to minimize impacts to the environment, increase climate resilience, do not require the fossil-fuel combustion to operate, and provide significant flexibility and additional grid support services—all benefits that larger energy storage projects, such as the proposed LCR and STC Project here, fail to provide. Only by maintaining the highest environmental standards with regard to local impacts, effects on species and habitat, and eliminating fossil-fuel energy usage can renewable energy production or energy storage projects be truly sustainable.

IV. INTERESTS OF PARTY

The proposed LCR Project that is the subject of a revised application for a preliminary permit,[3] would be situated on the Little Colorado River near the confluence with the Colorado River adjacent to Grand Canyon National Park. The proposed STC Project is the subject of a revised application for a preliminary permit[4] situated somewhat further upstream on the Little Colorado River. The Little Colorado River at and upstream of the Colorado River confluence harbors the largest remaining population of endangered humpback chub in the Colorado River basin, and the most important remaining habitat for the species' survival and recovery. If either or both the proposed LCR Project or the proposed STC Project are constructed and operated they would decimate this population of humpback chub and also impact the surrounding intact wildlands that provide habitat for a suite of

[3] LCR Revised Application 20190801-5037 FERC elibrary (7/31/2019)
[4] STC Revised Application 20190801-5039 FERC elibrary (7/31//2019)

species including the endangered southwestern willow flycatcher and the threatened Mexican spotted owl.

The Center for Biological Diversity has been intimately involved in the preservation of species and habitats in this area for decades including the endangered humpback chub, the endangered southwestern willow flycatcher, and the threatened Mexican spotted owl. The Center has worked to protect species that may be affected by the proposed LCR Project including, for example, by petitioning to list the southwestern willow flycatcher and Mexican spotted owl, and through legal action to secure adequate flows for the humpback chub in the Colorado River system. No other entity represents the Center's interests in these proceedings and the Center's participation would be in the public interest.

The LCR Notice describes the proposed LCR Project facilities and components as consisting of: "(1) a new 200-foot-high, 3,200-foot-long upper dam and reservoir; (2) a new 150-foot-high, 1,000-foot-long lower dam and reservoir; (3) eight 400-megawatt, turbine-generator units, for a total installed capacity of 3,200 megawatts; (4) two new 22-mile-long, 500-kilovolt transmission lines from the powerhouse to an existing grid interconnection point; and (5) appurtenant facilities." LCR Notice at 1. The LCR Notice also states: "The proposed project would have an average annual generation of 8,500 gigawatt-hours." LCR Notice at 1.

The STC Notice describes the proposed STC Project facilities and components as consisting of: "(1) a new 240-foot-high, 500-foot-long upper dam and reservoir; (2) a new 140-foot-high, 1,000-foot-long lower dam and reservoir; (3) six 250- megawatt, turbine-generator units, for a total installed capacity of 1,500 megawatts; (4) a new 20-mile-long, 500-kilovolt transmission line from the powerhouse to the existing Moenkopi switchyard; and (5) appurtenant facilities." STC Notice at 1. The STC Notice also states: "The proposed project would have an average annual generation of 3,300 gigawatt-hours." STC Notice 1.

As detailed below, neither the LCR Revised Application nor the STC Revised Application provides sufficient meaningful information regarding the proposed site and facilities or energy use and generation to inform the public or the Commission for the purposes of considering a preliminary permit.

Therefore, the preliminary applications are incomplete and inaccurate and should be denied.

In addition to being concerned with the local environmental impacts of the construction and operation of the proposed LCR and STC Projects facilities, the Center is concerned that the proposed LCR and STC Projects are being presented as needed to support renewable energy generation but may actually undermine greenhouse gas emission reduction goals. The LCR Revised Application states that the project's use of water resources would benefit the public for a variety of reasons. (LCR Rev. App. at 8.) For example, it asserts that the proposed LCR Project could promote "green, renewable power" or reduce "our carbon footprint." (*Id*.) The STC Revised Application contains identical statements. However, the Revised Applications do not explain that as pump storage energy facilities, the proposed LCR and STC Projects would use more energy than they generate – they would be net users of electricity. The Revised Applications also do not explain that the proposed LCR and STC Project would likely increase greenhouse gas emissions overall because the energy for pumping could come from any energy source on the grid— including fossil fuel generation— and there would be no requirement that the proposed LCR and STC Projects use only renewable energy while pumping. As such, the proposed LCR and STC Projects would most likely result in a net generation of greenhouse gases by utilizing fossil fuel energy during low cost hours for pump-back and generating energy during high cost hours at a profit.[5] Even if some excess renewable energy is available for pumping at some times, the net effect

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[5] *See, e.g.,* CAISO 2016-2017 Transmission Planning Process, Supplemental Sensitivity Analysis: Benefits Analysis of Large Energy Storage, at 7 (available at http://www.caiso.com/Documents/SupplementalSensitivityAnalysis-BenefitsAnalysisofLargeEnergyStorage.pdf) where the CAISO study looked at a variety of assumptions and found that new pumped storage projects within California would result in a net increase in CO2. *See also* Hittinger and Azevedo, "Bulk Energy Storage Increases United States Electricity System Emissions," in *Environmental Science and Technology*, 2015 (available online from https://pubs.acs.org/doi/full/10.1021/es505027p); Arciniegas and Hittinger, "Tradeoffs between revenue and emissions in energy storage operations," in *Energy*, Volume 143, 15 January 2018, Pages 1-11 (available online at https://www.sciencedirect.com/science/article/pii/S0360544217318145), explaining that "it has been established that revenue-maximizing grid-level energy storage tends to increase system emissions in current US electricity grids," and that "in most cases, bulk energy storage

of the proposed LCR and STC Projects, alone or together, would most likely be to increase greenhouse gas emissions overall.

The Center for Biological Diversity has a long history of advocating for the protection of the species and habitats that may be affected by the proposed LCR and STC Projects and for reduction in fossil fuel generated energy to reduce greenhouse gas emissions; no other party represents the Center's interests in this matter.

V. STATEMENT OF POSITION

A. The Commission Should Deny PHS's Preliminary Permit Applications Because the Applications are Incomplete and Misleading

1. The Applications are incomplete.

The Commission's regulations (18 C.F.R. § 4.81(b)(1) & (d)), require that all preliminary permit applications provide the physical composition, dimensions, general configuration, and, where applicable, age and condition, of any dams, spillways, penstocks, powerhouses, tailraces, or other structures, whether existing or proposed, that would be part of the project and maps of the proposed project. The description of the proposed LCR Project and facilities in the application does not provide sufficient information to the Commission or the public to understand what is actually being proposed and some of the information is contradictory. For example, the LCR Revised Application does not mention or provide a map showing the conflicts between the proposed LCR Project and the proposed STC Project upstream on the same river system. The maps provided with the proposed STC Project show the proposed lower dam site for the STC Project would likely be in the flood pool from the lower reservoir proposed in the LCR Project[6] —in other words the applicant appears to be proposing to put the

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would make little (or negative) revenue by charging with cleaner energy and displacing dirty generation." The study found that location of faster-charging storage in most grid sub-regions along with requirements to manage storage to consider CO2 emissions could reduce this effect.

[6] *Compare* STC application, Ex. 3-2 (showing the powerhouse between Salt Trail Canyon and Big Canyon, and the lower dam just downstream of Big Canyon) *with* LCR application, Ex. 3-1 (showing the lower reservoir extending upstream beyond Salt Trail Canyon and Big Canyon). Note that the Ex. 3-

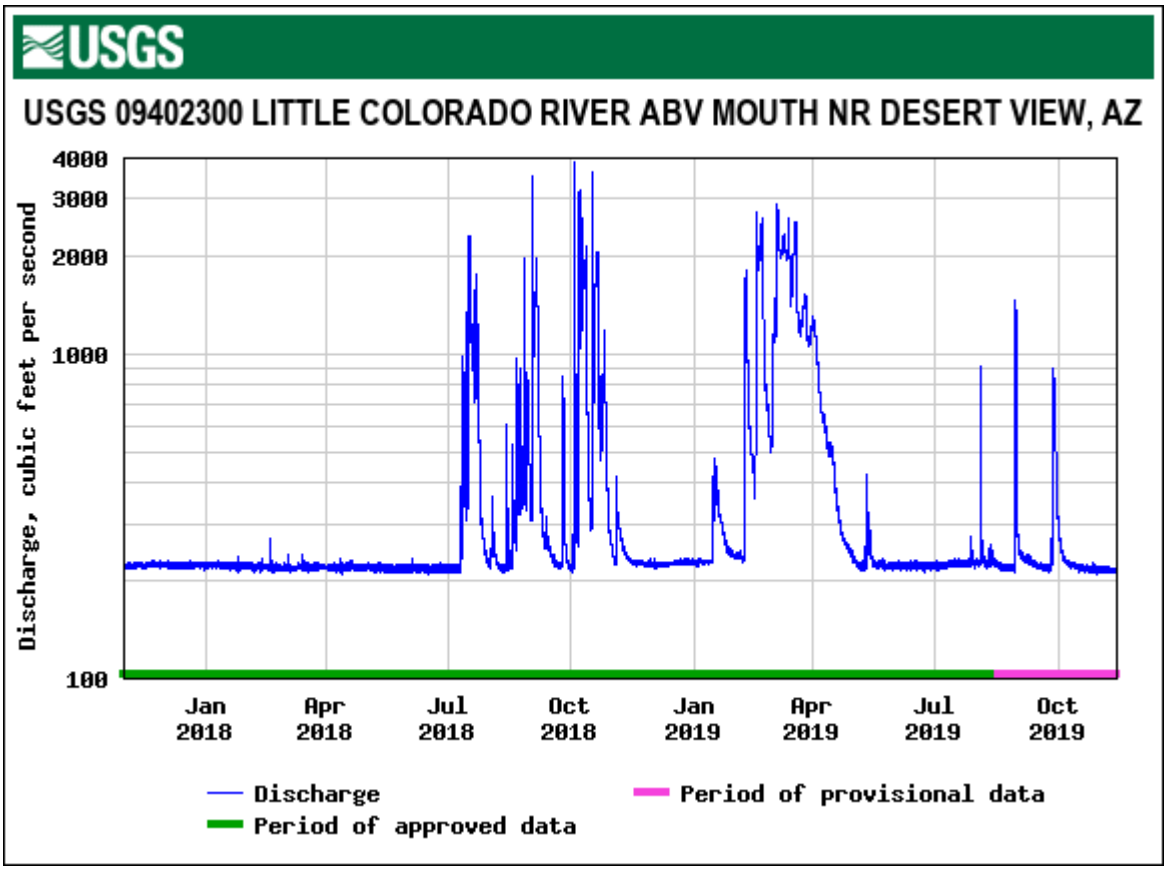
dam and powerhouse for the lower reservoir for the STC Project in the pool of the LCR Project. This contradiction between the two proposals from the same applicant should have been disclosed and renders both applications incomplete and inaccurate.

2. Applications 'Discussion of Water Resources in LCR is Incomplete and Misleading

The LCR Revised Application states that the lower dam would be on the Little Colorado River, "where the river has an approximate mean flow of 228 cfs." LCR Rev. App. at 6. The STC Revised Application includes an identical statement. In each case, the statement appears to be inaccurate. Data from the USGS gage for the Little Colorado near its mouth shows **minimum** (not mean) flows of approximately 200 cfs, with intermittent flows (and thus mean flows) far higher. In addition, providing only mean flow fails to account for the large variation in flows across the year—like many western rivers the Little Colorado River flows can vary widely in a very short time. A simple search of the data from the USGS gauge for the Little Colorado River above the mouth (or confluence) near Desert View, Arizona shows significant periodic high flows over the last 24 months with flows as high as 4000 cfs. The figure below shows the past 24 months of data.[7]

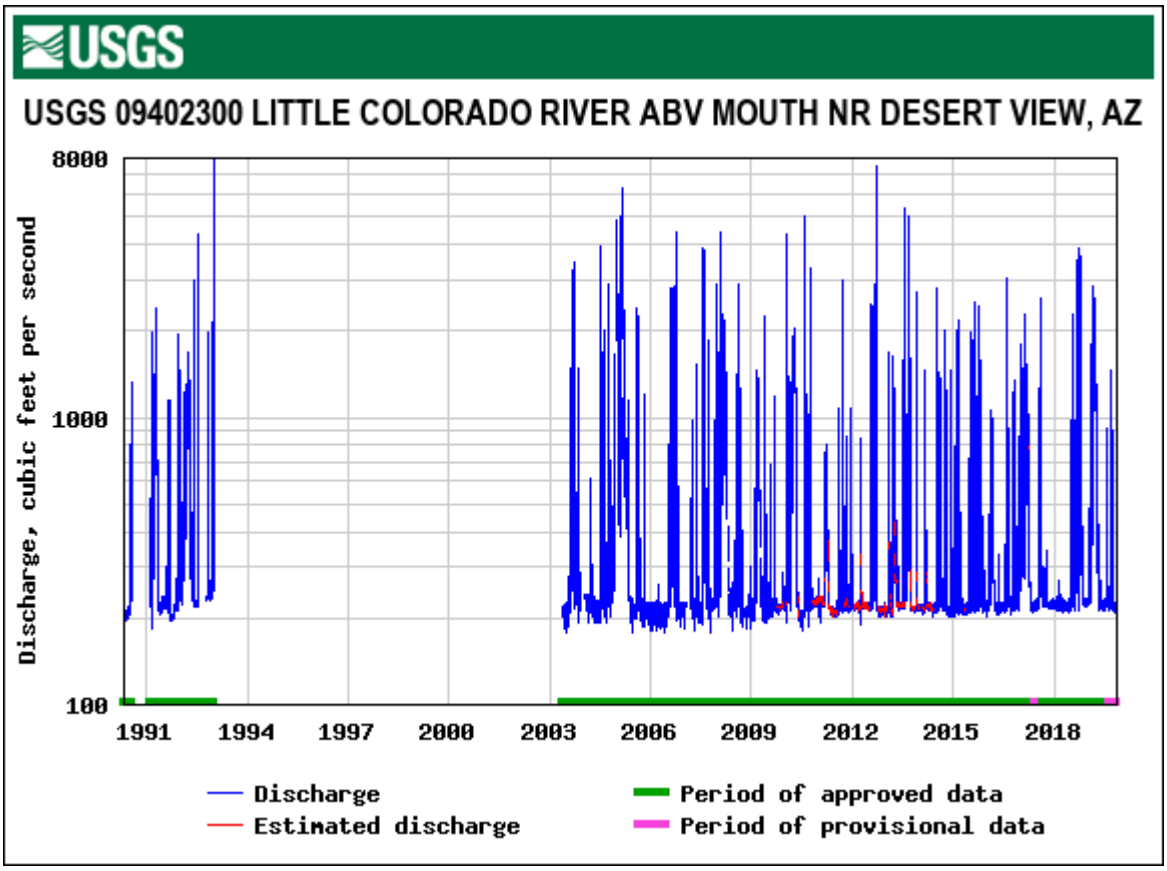
2 in the LCR application does not show the full lower reservoir, so the LCR application is inadequate in that respect, even compared to the STC application.

[7] Figure retrieved from https://nwis.waterdata.usgs.gov/az/nwis/uv/?cb_00060=on&format=gif_default&site_no=09402300&period=&begin_date=2017-11-01&end_date=2019-11-13 visited on 11/13/2019



The full data set from the gage from 1990 to present (has a significant data gap from 1993 to 2003) shows periodic flows as high at 8000 cfs as shown on the figure below.[8]

[8]Figure retrieved from https://nwis.waterdata.usgs.gov/az/nwis/uv?cb_00060=on&format=gif_default&site_no=09402300&period=&begin_date=1990-05-05&end_date=2019-11-13 visited 11/13/19



The Revised Applications also fail to note the scale of significant past floods and potential future floods on the Little Colorado River. For example, on September 19, 1923 there was a documented flood upstream on Little Colorado River at Grand Falls, Arizona with flows of 120,000 cfs.[9] It is likely that comparable or even higher flood flows would be seen in this area of the Little Colorado River. Floods of a similar magnitude could overtop the proposed dams and/or cause catastrophic failure of the proposed facilities.

3. Applications' Claims of Public Interest are Misleading

The Revised Application states that the proposed LCR Project would benefit the public for a variety of reasons:

[9] U.S. Dept. of Interior, Bureau of Reclamation, COLORADO RIVER BASIN PROBABLE MAXIMUM FLOODS HOOVER AND GLEN CANYON DAMS, Sept. 1990 Table 1.2 available at http://www.riversimulator.org/Resources/USBR/MaxProbableFloods.pdf

The proposed project will develop, conserve, and utilize water resources to benefit the public by-

- Reducing the "duck curve" that is developing for energy demand due to renewable energy sources
- Promoting green, renewable power by providing a means to store energy
- Reducing our carbon footprint by providing a means to store excess energy or energy produced by nuclear power
- Providing approximately $5 B in investment to create jobs and stimulate the Navajo Nation and Arizona economy
- Increasing electrical distribution system reliability and resiliency
- Adding peaking capacity available in 15 minutes for emergencies
- Reducing thermal generation reserve requirements
- Reducing electrical pricing volatility by balancing energy consumption
- Providing a paved road from Highway 89 to the project, promoting the Navajo Nation resources by making this area more accessible to the community
- Providing an access tunnel to the Little Colorado River that can be used for tourism
- Providing potable water and electric to a remote location on the Navajo Nation lands
- The project location is remote and cannot be seen by the public from any roads

(LCR Rev. App. at 8; STC Rev. App. at 8 (same).) However, in asserting that the proposed LCR and STC Projects could promote "green, renewable power" or reduce "our carbon footprint", the Revised Applications do not explain that as a pump storage energy facility, the proposed LCR and STC Projects would be net users of electricity or that the proposed LCR and STC Projects may increase greenhouse gas emissions overall because the energy for pumping could come from any energy source on the grid, including fossil fuel generation, as there would be no requirement that the pump storage project use only renewable energy while pumping.

The statement that the proposed LCR and STC Project could provide a benefit by "Reducing the 'duck curve' that is developing for energy demand due to renewable energy sources" lacks specificity and fails to explain or acknowledge the complexities of the grid balancing during the times when there may be excess renewable energy in the grid[10] or other types of projects and efforts

[10] Renewable energy generation curtailment is highest mid-day in spring when solar generation is high and demand is relatively low. *See* CAISO Wind and Solar Curtailment November 13, 2019 (available at http://www.caiso.com/PublishedDocuments/WindSolarCurtailmentReport.pdf#search=solar%20curtailment). A majority of the curtailment is due to local congestion which "occurs when available, least-cost energy cannot be delivered to some loads because transmission facilities do not have sufficient

underway that are also aimed at integrating renewable resources and balancing the supply and demand on an hourly, daily, weekly, seasonal and annual basis.[11] As such, the Revised Applications fail to provide any support for the assertions of the benefits that the proposed LCR and STC Projects could provide regarding promotion of renewable energy resources, or reduction of carbon footprints.

Moreover, in California, the California Independent System Operator ("CAISO" or "ISO") has addressed similar claims and found that, even if additional energy storage is needed during the times when there is excess renewable energy on the grid, pump storage is not a cost effective solution.[12] Moreover, because pump storage projects would also utilize fossil fuel energy during low cost hours for pump-back they will result in a net generation of greenhouse gases.[13] Further, because pumped storage is *at best* about 80% efficient, it requires *at least* 1.25 Mwh of pumping energy for each Mwh it generates. So to avoid net greenhouse gas emissions, it would need to have access to pumping energy sources that have emission rates for greenhouse gases per Mwh that are 20% lower than the emissions rates of any generation it displaces. As a result, even if some excess renewable energy is available for pumping at some times, and no other storage opportunities would be available in closer

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capacity to deliver the energy." *Id*. at 1 n. 3 (defining local economic curtailment), 3 (in 2019 to date, 508,744 MWH of curtailment out of 839,782 Mwh total).
Large remote storage projects such as the proposed LCR would do nothing to mitigate the lack of local transmission facilities.

[11] *See* CAISO webpage "Managing Oversupply" (at http://www.caiso.com/informed/Pages/ManagingOversupply.aspx) listing solutions beyond storage including demand response, time-of-use rates, minimizing generation from other sources to make room for more renewable energy production, incorporating electric vehicle charging systems that are responsive to changing grid conditions, investing in modern, fast-responding resources that can follow sudden increases and decreases in demand as well as regional coordination and expansion of the western Energy Imbalance Market.

[12] In the 2018-2019 Transmission Plan (available at http://www.caiso.com/Documents/ISO_BoardApproved-2018-2019_Transmission_Plan.pdf), the CAISO found that providing additional transmission for existing pumped storage within the State that is underutilized due to lack of transmission capacity needed for pumping, would result in increased CO2 emissions and not be cost effective. Id. at 131 ("the economic benefit of the avoided curtailment is not enough to justify the Gates-Gregg 230 kV Line project and accordingly the recommendation is to cancel the project.")

[13] *See* CAISO 2016-2017 Transmission Planning Process, Supplemental Sensitivity Analysis, and others as well (footnote 5, supra).

proximity to generation and load, the proposed LCR and STC Projects would still result in a net increase greenhouse gas emissions from operations.[14]

B. The Commission Should Deny PHS's Preliminary Permit Applications Because the Proposed LCR and STC Projects Would Jeopardize the Federally Endangered Humpback Chub, in Violation of the Endangered Species Act

Construction and operation of PHS's two proposed projects (LCR and STC) would destroy or adversely modify 100% of the federally endangered humpback chub's (*Gila cypha*) designated critical habitat and 83% of its occupied habitat on the Little Colorado River upstream of the Colorado River confluence. Construction and operation of either project individually would destroy or adversely modify all (STC) or a majority (87%, LCR) of designated critical habitat, and a majority of occupied habitat (83% for STC, 63% for LCR). Because the overall survival and recovery of the humpback chub largely depends upon the conservation of the source population that persists in this portion of the Little Colorado River, the Commission cannot license either or both projects without jeopardizing the endangered humpback chub and violating the Endangered Species Act. The Commission should therefore deny the PHS's preliminary permit application(s).

1. Status of the Humpback Chub

` The five remaining wild populations of humpback chub in the Colorado River basin include four populations in the upper Colorado River basin (Black Rocks, Westwater Canyon, Desolation and Gray canyons, and Cataract Canyon) and one lower basin population in the Grand Canyon, comprised primarily of fish in the Little Colorado River.[15] The U.S. Fish and Wildlife Service now considers a sixth upper basin population in Dinosaur National Monument to be functionally extirpated.[16] The Little

[14] Additional greenhouse gas emissions from fabrication (e.g. steel for pumps, powerhouse, and transmission towers), construction (including loss of carbon sequestration from soil disturbance) and growth inducing impacts, such as drawing additional tourism and other development to the area, would also need to be considered and calculated and would likely result in a net increase of greenhouse gases attributable to this proposed LCR Project.

[15] Humpback Chub (*Gila cypha*) 5-Year Review: Summary and Evaluation. 2017. U.S. Fish and Wildlife Service Mountain-Prairie Region Lakewood, Colorado. At 3.

[16] *Id*.

Colorado River at and upstream of the Colorado River confluence harbors the largest remaining population of humpback chub in the Colorado River basin, and the most important remaining habitat its survival and recovery. This reach of the Little Colorado River provides eight miles of designated critical habitat[17] and 11 miles of occupied habitat (inclusive of critical habitat).[18] The humpback chub in this river reach is considered to be the "core" population of humpback chub in the Grand Canyon;[19] this population reproduces successfully and is stable and self-sustaining with 11,500 to 12,000 individuals.[20]

The importance of the Little Colorado River population to the humpback chub's overall survival and recovery is heightened by the comparatively tenuous and uncertain status of the four remaining upper basin populations. For example, the U.S. Fish and Wildlife notes that the Black Rocks and Westwater Canyon populations "declined through 2007," that "declines have potentially been arrested," but that "there is uncertainty about this hypothesis."[21] It says that "abundance estimate data is insufficient to reach any reliable conclusion about the trajectory of the Desolation/Gray canyons population" and that "the Cataract Canyon population is small and the trajectory of adult numbers is unclear."[22]

In addition to being the largest remaining population of humpback chub in the Colorado River Basin, the Little Colorado River population is a source population that supports dispersal into the mainstem Colorado River and translocations establishing new populations in service of survival and

[17] U.S. Fish and Wildlife Service. 2017. Species status assessment for the Humpback Chub (*Gila cypha*). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, CO. At 64.
[18] Van Haverbeke, David, Kirk Young, Dennis Stone and Michael Pillow. 2017. Mark-Recapture and Fish Monitoring Activities in the Little Colorado River in Grand Canyon from 2000 to 2016. U.S. Fish and Wildlife Document: USFWS-AZFWCO-FL-16-02. At 11. Accessed 12 Nov 2019: http://gcdamp.com/images_gcdamp_com/7/7a/VanHaverbeke_et_al_2017_USFWS_Mark_recapture_and_fish_monitoring_activies_in_the_LCR_2000-2016.pdf
[19] U.S. Fish and Wildlife Service. 2017. Species status assessment for the Humpback Chub (*Gila cypha*). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, CO. At ix.
[20] *Id.*
[21] *Id.*
[22] *Id.*

recovery.[23] Humpback chub in Grand Canyon are potadromous (fish that do not migrate to the ocean at any time during their life cycle); adults migrate from the Colorado to the Little Colorado River in the spring to spawn; young humpback chub then rear in the Little Colorado River and emigrate out of the Little Colorado River by seasonal flood events, likely thereby populating several small aggregations of humpback chub in the mainstem Colorado River where reproduction is for the most part absent.[24] In addition to dispersal, the Little Colorado River population is the source population for translocation efforts in Grand Canyon. The U.S. Fish and Wildlife Service's 2017 Species Status Assessment for the Humpback Chub (*Gila cypha*) states:

> A total of 2,971 juvenile Humpback Chub were translocated from the lower LCR[Little Colorado River] to above Chute Falls (RK 16.2) during 2003–2015 (citation omitted); many have survived and remained in the reach, and ripe and spent fish indicate that spawning is taking place (Stone 2016). A total of 1,650 juvenile Humpback Chub were translocated from the LCR [Little Colorado River] to lower Havasu Creek during 2011–2015 (see section 4.5, Table 15); many have survived and remained in the tributary, and young unmarked fish found in 2014, 2015, and 2016 indicate that successful reproduction has taken place (citation omitted).[25]

Taken together, the health and stability of the Little Colorado River population and success of translocations have yielded an expansion of humpback chub populations over the past decade in the Lower Basin sufficient to compel federal officials to recommend downlisting the chub from endangered to threatened status.[26] The proposed LCR and STC Projects, singly or together, would undermine decades of efforts to protect the humpback chub and result in a waste of immense public investments in recovery planning and implementation. PHS's two projects jeopardize the overall survival and recovery

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[23] Van Haverbeke, David, Kirk Young, Dennis Stone and Michael Pillow. 2017. Mark-Recapture and Fish Monitoring Activities in the Little Colorado River in Grand Canyon from 2000 to 2016. U.S. Fish and Wildlife Document: USFWS-AZFWCO-FL-16-02. At 10. Accessed 12 Nov 2019: http://gcdamp.com/images_gcdamp_com/7/7a/VanHaverbeke_et_al_2017_USFWS_Mark_recapture_and_fish_monitoring_activies_in_the_LCR_2000-2016.pdf

[24] *Id.*

[25] U.S. Fish and Wildlife Service. 2017. Species status assessment for the Humpback Chub (*Gila cypha*). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, CO.

[26] Humpback Chub (Gila cypha) 5-Year Review: Summary and Evaluation. 2017. U.S. Fish and Wildlife Service Mountain-Prairie Region Lakewood, Colorado. At 13, 15.

of the federally endangered humpback chub throughout its range, in violation of the Endangered Species Act.

2. Impacts of the Proposed Projects on Designated Critical and Occupied Habitat

Section 7(a)(2) of the Endangered Species Act requires Federal agencies, in consultation with and with the assistance of the Secretaries of the Interior and Commerce, to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species (16 U.S.C. § 1536(a)(2)). The Act defines critical habitat as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Act, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection, as well as specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Act, upon a determination by the Secretary that such areas are essential for the conservation of the species (16 U.S.C. §1532(5)(A)). Conservation means to use and the use of all methods and procedures that are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary (16 U.S.C. §1532(3)).

Using a geographic information system (GIS), the Center for Biological Diversity analyzed the extent to which the PHS's proposed projects individually and together would destroy or adversely modify the humpback chub's designated critical habitat and occupied habitat within the Little Colorado River by ((1) converting riverine habitat to still-water reservoirs, and (2) altering the temperature, volume, timing, flood dynamics and sediment load of natural instream flows within riverine habitat downstream of dams and other infrastructure. Both impacts—converting riverine habitat to reservoir, and altering river flows downstream of new dams and infrastructure—would harm resource conditions,

discussed below, that the U.S. Fish and Wildlife Service considers important to the humpback chub's success.[27]

By converting river habitat to reservoir and altering natural river flows downstream of dams and infrastructure, the project(s) would (1) eliminate diverse rocky canyon river habitat for spawning, nursery, feeding, and shelter, (2) eliminate suitable river flow and temperature regimes for spawning, egg incubation, larval development, and growth, (3) alter adequate and reliable food supply, including aquatic and terrestrial insects, crustaceans, and plant material, (4) eliminate and fragment unimpeded range and connectivity that allow free movement and access to habitats necessary for all life stages, (5) fragment persistent populations with reproductive potential, recruitment, and adult survival, to ensure redundancy, and (6) threaten the ability of existing populations to maintain and ensure adaptive traits..[28] The U.S. Fish and Wildlife Service has identified each of these resource conditions as important to humpback chub survival and recovery;[29] harm to these resource conditions within designated critical and occupied habitat of the Little Colorado River, as the proposed LCR and STC Projects would do, would jeopardize the humpback chub.

a. Extent of Reservoir Flooding and Altered River Flow Impacts to Designated Critical Habitat

Our analysis shows that the proposed LCR Project would flood 3.8 of the 7.9 miles, or 48%, of designated critical habitat in the Little Colorado River. The proposed STC Project would flood 1 mile, or 12%, of that designated critical habitat. Together, both projects would flood 4.8 miles, or 60%, of designated critical habitat. The proposed LCR Project dam would alter river flows across 3.1 downstream river miles, or 39%, of designated critical habitat. The proposed STC Project dam would alter river flows across 6.9 downstream river miles, or 88%, of designated critical habitat. The proposed LCR Project would flood and alter natural river flows across a total of 6.9 river miles, or 87% of

[27] U.S. Fish and Wildlife Service. 2017. Species status assessment for the Humpback Chub (*Gila cypha*). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, CO. At vii.
[28] *Id*.
[29] *Id*.

designated critical habitat. The proposed STC Project, and both projects combined, would flood and alter natural river flows across all 7.9 river miles, or 100% of designated critical habitat. Results are shown below in Table 1. Maps depicting the spatial extent of these impacts are included in Appendix 1.

Table 1. Humpback Chub Critical Habitat in the Little Colorado River			
	Little Colorado Project No. 14994-000	**Salt Trail Canyon Project No. 14992-000**	**Both Projects**
Total River Miles of Critical Habitat in the Little Colorado River	**7.9**	**7.9**	**7.9**
River Miles of Critical Habitat Flooded by Reservoir	3.8	1.0	4.8
% of All Critical Habitat Flooded by Reservoir	48%	12%	60%
River Miles of Critical Habitat with Altered Flows Downstream of Dams	3.1	6.9	6.9
Miles of Critical Habitat w/ Altered Flows Downstream of Dams Excluding Little Colorado River Project Reservoir		3.1	3.1
% of All Critical Habitat with Altered Flows Downstream of Dam	39%	88%	88%
% of All Critical Habitat with Altered Flows Downstream of Dam Excluding Little Colorado River Project Reservoir		40%	40%
River Miles of Critical Habitat with Altered Flows and Flooded by Reseroir	**6.9**	**7.9**	**7.9**
% of All Critical Habitat with Altered Flows and Flooded by Reseroir	**87%**	**100%**	**100%**

b. Extent of Reservoir Flooding and Altered River Flow Impacts to Occupied Habitat

Our analysis shows that the proposed LCR Project would flood 3.8 of the 11 river miles, or 35%, of occupied habitat in the Little Colorado River. The proposed STC Project would flood 2.2 miles, or 20%, of that occupied habitat. Together, both projects would flood 6 miles, or 54%, of occupied habitat. The proposed LCR Project dam would alter river flows across 3.1 downstream river miles, or 28%, of occupied habitat. The proposed STC Project dam would alter river flows across 6.9 downstream river miles, or 63%, of occupied habitat. Those alterations would also appear to include complete dewatering of 0.5-1 kilometers of the Little Colorado River.[30] The proposed LCR Project would flood and alter natural river flows across a total of 6.9 river miles, or 63% of occupied habitat. The proposed STC Project, and both projects combined, would flood and alter natural river flows across

[30] *See* LCR Application, Ex. 3-2 and STC application, Ex. 3-2. In each case the map shows the powerhouse directly downstream of the dam athwart the Little Colorado River, shows no stream downstream of the dam proper, and shows a bypass tunnel conveying water from the reservoir to a re-entry point 0.5 km (LCR project) to 1.0 km (STC project) below the dam.

9.1 river miles, or 83% of occupied habitat. Results are shown below in Table 2. Maps depicting the spatial extent of these impacts are included in Appendix 1.

Table 2. Humpback Chub Occupied Habitat in the Little Colorado River			
	Little Colorado Project No. 14994-000	**Salt Trail Canyon Project No. 14992-000**	**Both Projects**
Total River Miles of Occupied Habitat in the Little Colorado River	**11**	**11**	**11**
River Miles of Occupied Habitat Flooded by Reservoir	3.8	2.2	6.0
% of All Occupied Habitat Flooded by Reservoir	35%	20%	54%
River Miles of Occupied Habitat with Altered Flows Downstream of Dams	3.1	6.9	6.9
Miles of Occupied Habitat with Altered Flows Downstream of Dams Excluding Little Colorado River Project Reservoir		3.1	3.1
% of All Occupied Habitat, Altered Flows Downstream of Dam	28%	63%	63%
% of All Occupied Habitat with Altered Flows Downstream of Dam Excluding Little Colorado River Project Reservoir		29%	29%
River Miles of Occupied Habitat with Altered Flows and Flooded by Reseroir	**6.9**	**9.1**	**9.1**
% of All Occupied Habitat with Altered Flows and Flooded by Reseroir	**63%**	**83%**	**83%**

C. The Commission Should Deny PHS's Preliminary Permit Applications Because the Proposed Projects Would Undermine and Preclude Achievement of Management Objectives For Grand Canyon National Park

Both proposed projects, located immediately upstream of Grand Canyon National Park, would undermine and preclude achievement of management objectives and desired conditions for Grand Canyon National Park by altering flows and sedimentation processes in the Little Colorado River, and by destroying and adversely modifying most or the entire designated critical habitat for the federally endangered humpback chub therein. Because the Little Colorado River population supports dispersal and translocation of fish to other locations in the Grand Canyon, the projects would undermine Grand Canyon National Park management objectives park-wide, not just in the Little Colorado River. The projects would undermine management objectives (1) to preserve, protect, and interpret the park's natural and scenic resources and values, and its ecological processes; (2) to preserve processes and protect the genetic integrity and species composition within the park, consistent with natural ecosystem; (3) to the maximum extent possible, restore altered ecosystems to their natural conditions; (4) in managing naturalized ecosystems, ensure the preservation of native components through the active

management of nonnative components and processes; (5) to manage ecosystems to preserve critical processes and linkages that ensure the preservation of rare, endemic, and specially protected (threatened/endangered) plant and animal species; and (6) to preserve natural spring and stream flows and water quality. Because these management objectives are based on the park visions and establish direction for future park management and describe desired conditions to be achieved, the proposed projects would fundamentally undermine critical natural resource goals for the crown jewel of the National Park System.

D. The Commission Should Deny PHS's Preliminary Permit Applications Because the Projects Are Infeasible In Light of the Little Colorado River's 4270 AF Average Annual Sediment Load, Which Would Overwhelm the 15,000 AF Capacity of Lower Reservoir in 3.5 Years

Both projects are infeasible in light of the Little Colorado River's high sediment loads. Sediment loads would quickly overwhelm the project's lower reservoir, rendering it inoperable or requiring an ongoing dredging and sediment disposal at volumes similar or equivalent to annual deposition. The Little Colorado River's 4270 AF average annual sediment load would overwhelm the 15,000 AF storage capacity of the proposed LCR Project lower reservoir in 3.5 years and the 6,750 AF storage capacity of the proposed STC Project lower reservoir in 1.6 years. This scenario assumes a 9.3 million ton annual sediment load to the Colorado River,[31] which is low among published estimates, and a volume of 20 cubic feet per ton. A high volume, high-sediment flood event, for which there is precedent in the Little Colorado River, could overwhelm reservoir storage capacity even more quickly. Further, sedimentation in the lower reservoir would (1) have the effect of creating a sediment delta, and by slowing flows and causing deposition, that delta could set in motion a self-perpetuating process of upstream sedimentation in the Little Colorado River gorge for the foreseeable future, and (2) sedimentation within and upstream

[31] *See* meta-analysis of average LCR sediment loads Table 2 on Page 28: Schmidt, J. C., and Grams, P. E. 2011. Understanding physical processes of the Colorado River, in effects of three high-flow experiments on the Colorado River ecosystem downstream from Glen Canyon Dam, Arizona (edited by T. S. Melis). U.S. Geological Survey Circular 1366, p. 17-51, 53-91. Accessed 13 Nov. 2019: http://pubs.usgs.gov/circ/1366/c1366.pdf

of the lower reservoir would further starve the Colorado River in Grand Canyon of sediment, further upsetting its sediment budget in the wake of Glen Canyon Dam and exacerbating resulting problems to the river's ecology and its endangered fish. The implication in the Applications that sediment would be transported out of the reservoir(s) and sent on downstream via bypass tunnel(s) is unsupported, and the Application(s) provide no analysis or information that would show that the bypass tunnel(s) could transport such large sediment loads without being themselves quickly eroded during flood events, as happened at Glen Canyon dam in 1983.[32]

E. The Commission Should Deny PHS's Preliminary Permit Applications Because the Proposed Projects Would Cause Unmitigable Harm to Cultural Resources

The Commission should deny both permit applications because both projects would cause irretrievable and unmitigable harm to cultural resources in the Grand Canyon and Little Colorado River gorge as a result of industrialization, flooding, increased visitation, and other impacts. As described in their letter to FERC, the Grand Canyon, *Ongrupqa*, Salt Canyon, Salt Trail, *Sipapuni*, Colorado River, *Pisisvayu*, and Little Colorado River, *Palavayri*, are Traditional Cultural Properties of the Hopi Tribe[33]. The Hopi Tribe states:

> This proposed development and location is simply unacceptable to Hopi religious leaders, practitioners and the Hopi people as it will significantly and forever adversely impact Hopi sacred places to which Hopis have aboriginal title and use, and title and use through the Intergovernmental Compact between the Navajo Nation and the Hopi Tribe. Hopi religious leaders and the Hopi people in general strongly oppose this proposal.[34]

The Center for Biological Diversity hereby incorporates the Hopi Tribe's letter into our comments, and urges the Commission in the strongest possible terms to deny the permit applications to prevent irretrievable and unmitigable harm to cultural resources and values in and near the Little Colorado River and Grand Canyon.

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[32] https://www.latimes.com/archives/la-xpm-1995-10-29-tm-62672-story.html
[33] Hopi Tribe. 23 Oct 2019. Letter to FERC Re: Project Nos. 14992-000 and 14994-000 Pumped Hydro Storage LLC Notice of Preliminary Permit Application Accepted for Filing and Soliciting Comments, Motions to Intervene and Competing Applications.
[34] *Id.*

F. Alternatively, The Commission Should Require PHS To Conduct Additional Studies On The Proposed Projects And Allow The Center To Participate In Study Development

The scope of the proposed studies is inadequate to provide needed information for NEPA review of the proposed LCR and STC Projects or ESA compliance as well as for compliance with other laws; additional studies are needed. If the preliminary permit is granted, the Center requests that it and all other parties and stakeholders be allowed to actively participate in the design and review of all studies.

1. The scope of the proposed studies are inadequate.

The studies the Applicant proposed to initiate include only:

> 1) Engineering feasibility and economic studies – to confirm the feasibility of the project.
> 2) Water supply studies – to confirm water is available to fill the reservoir and to maintain the water lost thru evaporation.
> 3) Geotechnical studies – to confirm the geology and sub-surface conditions at the upper reservoir, lower reservoir, and powerhouse.
> 4) Environmental studies – to identify if any rare, endangered, or threatened species are affected by the project implementation.
> 5) Cultural and tribal studies – to confirm if the project would impact cultural or tribal resources.

LCR Rev. App. at 9; STC Rev. App at 9 (same).

These extremely general categories are inadequate to show that the studies will address all relevant issues. For example, regarding "engineering feasibility" the studies must also include the dam failure risk due to flooding on the Little Colorado River at various time frames. A flood similar to the one in 1923 would fill the instream proposed STC lower reservoir in 41 minutes without a bypass,[35] Studies are needed to show how both the proposed LCR and STC Project designs would react in similar, highly likely, flood conditions as well as in other flood conditions. In addition to stream gage data discussed above, the USGS has compiled data regarding the flows and sediment transport for the Little Colorado River above the mouth/confluence.[36] This data is highly relevant to the needed engineering

[35] 120,000 cfs (fn. 9, supra) x 1 af/43,560 cf x 60 seconds/minute = 165.3 af/minute. Proposed STC lower reservoir capacity is 6750 af. 6750 af / 165.3 af/minute = 40.8 minutes.

[36] Geomorphic Change-Sediment Transport Data for the Little Colorado River, Arizona, USA "The data include topographic data collected by LIDAR and total station in June 2017, high water marks from nine historic floods, and control points and gage structures. Topographic data include ground topography collected by LIDAR and channel bathymetry collected by total station survey of a 2500 meter reach of

and environmental studies for the proposed LCR and STC Projects.

The engineering feasibility studies must also consider how the high calcium carbonate content of the Little Colorado River waters would interact with and potentially damage dam facilities and shorten the useful life of any components that are in contact with the water due to calcium carbonate deposition.

The "water supply studies" need to do more than confirm that water is "available" to fill the reservoirs and replenish water lost to evaporation: the studies must also consider seepage losses from the upper and lower reservoirs, with resultant reductions in downstream flows. In addition, the water supply studies must consider all water rights holders interests (which are subject to an ongoing adjudication) as well as instream beneficial uses for fish and other aquatic resources, recreation, and other uses.

The "environmental studies" certainly need to address "rare, endangered and threatened species" including flooding and dewatering impacts and changes flows within the Little Colorado River and impacts of all of the proposed LCR and STC Project facilities in uplands on species and habitats as well. Further, the environmental studies must also address impacts to other plant and wildlife communities, soils, air and water quality, cultural resources, human health and safety, economic impacts to local communities and other impacts.

The studies must consider upstream reservoir pool impacts from the proposed dam on the Little Colorado River to the end of the lower reservoir for both proposed projects. For example, the proposed LCR Project the flooding would directly impact resources on the Little Colorado River, Salt Trail Canyon (Bekihatso Wash), and in Big Canyon. Studies must also consider any impacts upstream of the lower reservoirs due to siltation as the Little Colorado enters the lower reservoirs. Similarly studies must be done on the impacts of the reservoir pool from the upper reservoir dams.

As another example, because the proposed LCR and STC Projects would be net users of energy and some of that energy will likely be generated by fossil fuels, the greenhouse gas generation

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the Little Colorado River ending near the confluence with the Colorado River." Available at https://www.sciencebase.gov/catalog/item/5b85d905e4b0702d0e77a47a

attributable to the proposed LCR and STC Projects and impacts of those GHG must also be disclosed and addressed in the environmental review regarding air quality.

Each of the environmental studies also need to include direct, indirect, and growth inducing impacts from increased access roads and other infrastructure that will occur and impact each of the environmental resources in the area.

2. Additional studies are needed and environmental review before studies begin:

a. Sediment Transport Study

The Commission should require a sediment transport study that addresses the sediment load and needs in the Little Colorado River and Colorado River and how that sediment transport would be affected by the proposed LCR and STC Projects. In addition, the Commission should require a specific study for the proposed LCR and STC Projects related to the bypass tunnel. The study should look at sediment passage under normal spring runoff and sediment passage under a variety of flood conditions. This is critical because a flood similar to the 1923 flood could require water velocities of more than 40 mph in proposed bypass tunnel (assuming tunnel is completely full of water and there are no obstructions).[37] The study must address scenarios in which the bypass tunnel is free of sediment and debris and the effects on both tunnel integrity and sediment passage rates if it were blocked partially or wholly by sediment and/or debris. The study must also address scour and erosion of the river bed and banks at end of bypass tunnel from normal runoff and under a variety of flood conditions, as well as scour of the tunnel itself. The end of the bypass tunnels if they face downstream, towards the nearby Grand Canyon National Park boundary,[38] would potentially increase impacts to the park during floods, while if they face across the river they would affect the river bed and opposite bank significantly.

[37] 120,000 cfs flood (fn. 9, supra) x 60 seconds/minute x 60 minutes/hr = 432 million cubic feet/hour. Tunnel diameter = 50 feet per application. Tunnel cross-section = 50*50*pi/4 = 1963.5 square ft. Required flow rate = 432,000,000 cubic feet/hr / 1963.5 square feet = 220,016 feet/hour. 220,016 feet/hr / 5280 feet/mile = 41.67 miles per hour.

[38] Per LCR Rev. Application, Ex. 3-2, the National Park boundary is approximately 100 yards downstream of the bypass tunnel outlet.

b. Dewatering Study

The proposal includes dewatering a portion of the Little Colorado River below the dam during construction, which could last many years, and dewatering would apparently continue during dam operations as well.[39] A study must be conducted regarding impacts to the river habitat for humpback chub, to the river bed itself, springs, and underground flows as well as to recreation and other resources of this area from the dewatering looking at various time frames.

c. Helicopter Access For Studies May Have Impacts that Must Be Addressed and Limited to Protect Resources

The Revised Applications state: "No new roads will be built to conduct any of the proposed studies - access to the lower reservoir for studies will be by helicopter." LCR Rev. App. at 9; STC Rev. App at 9 (same). Because helicopter access itself may impact many of the resources in this area including recreation, cultural, species and habitats due to noise, vibration, risk of spills and accidents, and surface disturbance at landing sites, the access should be studied by the Commission under NEPA before it is undertaken as part of the preliminary permit. Permits for access from the local jurisdiction may also be needed. In addition, the use of helicopters over GCNP is regulated and therefore use of helicopters in this area adjacent to the park may need additional permits.

It is our understanding that there is only one existing helipad in the Gorge by Salt Trail Canyon (approximately 2 miles from Sipapu, the revered Hopi cultural site), the Revised Applications do not explain if additional landing sites would be constructed. For example, would helicopters be landing further downstream by the dam site for the proposed LCR Project lower reservoir? Or closer to the proposed STC Project lower reservoir? If multiple landing sites are intended the sites, number of trips, and impacts must be fully addressed.

d. Geotechnical Studies May Have Impacts that Adversely Affect The Environment

The Revised Applications state: "Geotechnical studies at the dams, reservoirs, and tunnel locations will be conducted by borehole drilling samples and test pits. Measures will be taken to avoid

[39] *See* fn. 25, supra.

or minimize disturbance at the drilling locations, and test pits will be backfilled to return the site as much as possible to natural. The methods to mitigate disturbances will be coordinated with the Navajo Nation Council." LCR Rev. App. at 9; STC Rev. App at 9 (same). More information is needed regarding the size of the boreholes and test pits, the equipment needed to undertake these studies. The environmental impacts of the geotechnical studies themselves may be significant and require NEPA before they are undertaken.

In addition, given that one of the intended uses of the proposed vehicle tunnel access is for tourism, the geotechnical studies must include reinforcement needed to ensure the safety of passenger cars at the proposed length and grade.

e. Study of Growth Induced by Tunnel Access, Transmission, and other Facilities:

A study of the growth that could be induced by the new access tunnel into the Little Colorado River gorge, new road, and transmission as part of the proposed LCR and STC projects must also be undertaken. For example, if the tunnel provides motorized access to the gorge, where would those cars go in an area with no roads? It is likely that new roads and parking areas would be required for the tourism that is contemplated. *See* LCR Rev. App. at 8 ("Providing an access tunnel to the Little Colorado River that can be used for tourism"); STC Rev. App. at 8 (same). If the tunnel is intended to provide non-motorized access for tourism, that would still raise major issues regarding safety inside the tunnel and environmental impacts at its base. The environmental impacts of that growth in tourism would need to be addressed in any NEPA review and must be studied; this would include a suite of impacts to aquatic and riparian resources, water and air quality, cultural resources, recreation, visual and other resources. Similarly, new roads and transmission could induce growth in a large area that would affect many environmental resources in the uplands as well as air and water quality. All of these impacts must be studied.

f. Dispatch Impacts Study

A dispatch impacts study would analyze the likely marginal sources of generation that would be used to provide pumping energy for the proposed LCR and STC Projects, and the likely marginal

sources of generation that would be displaced when the project was generating electricity.

The purpose of this study is to quantify the extent to which the proposed LCR and STC Projects would increase or decrease emissions of greenhouse gases and other pollutants. While a potential environmental benefit of the proposed LCR and STC Projects could be displacement of emissions from natural gas-fired generation that is the primary marginal source of generation for the Western U.S. grid during high-load hours, this potential benefit could be offset by the environmental cost of the projects including both construction impacts and emissions from the generation used to supply pumping energy. There would certainly be emissions increases in some locations, even if there are decreases in others. The net effect of these partially offsetting impacts is likely to be an increase in emissions, which needs to be studied and quantified for NEPA compliance.

Even if some of the marginal sources of pumping energy are the similar in terms of emissions, the fact that more than one kwh of pumping energy is required for each kwh of project generation means that the emissions associated with pumping energy would be greater than any saved emissions from project generation. If the marginal sources of pumping energy include off-peak coal generation, but the marginal generation displaced by project generation is on-peak natural gas generation, then the net emissions could be strongly negative in quantity. In addition, it is likely that the sources of pumping energy and the generation displaced by project generation would be in geographically distinct locations, further increasing local project environmental impacts in the areas supplying the pumping energy.

The goal of the dispatch impacts study would be to quantify the amount and location of emissions changes due to operation of the proposed project, so that the Commission's NEPA analysis can properly account for the emissions impacts of the project.

This study should use a Western Electricity Coordinating Council ("WECC")-wide hourly annual dispatch model, run with and without the proposed LCR and STC Projects included (individually and together), to identify changes in the location and quantity of annual generation attributable to the project. The output of that model, showing generation changes in Mwh terms, would then be coupled to known power plant-specific emissions factors (from EPA data) to calculate the emissions changes for

CO2, NOx, SO2, and particulates attributable to the proposed LCR Project.

The Bonneville Power Authority ("BPA") modelled emission changes throughout the WECC as part of its NEPA analysis of changed electricity marketing as long ago as 1988.[40] NRDC modelled emission changes throughout the WECC as part of its analysis of potential closure of large hydroelectric generators on the BPA system.[41] More recently, Energy + Environmental Economics ("E3") analyzed CO2 emissions impacts of integrating the PacifiCorp and CAISO systems, albeit without using dispatch modelling,[42] and the CAISO used dispatch modeling of the Western U.S. grid to analyze regional impacts include emissions from grid regionalization.[43] More generally, dispatch modeling of the WECC to quantify the locations and amounts of generation changes due to changes in the grid has been done extensively by both electric utilities and developers, as well as their regulators.

Such a study would benefit the public by determining the location and magnitude of the emissions impacts of the proposed LCR Project and documenting its net greenhouse gas and other emissions.

g. Economic Viability Study:

An economic viability study is needed to address whether and why any additional pump storage would be prudent or needed when existing pump storage projects are not currently fully utilized. For example, there are two pumped storage hydroelectric projects larger than 1000 Mw, each operating in California, that are in relatively close proximity to the high-demand/load centers and renewable generation. These are PG&E's Helms Project in Fresno County in the Sierra Nevada and the Castaic power plant in northern Los Angeles County operated by the Los Angeles Department of Water and Power ("LADWP") in cooperation with the California Dept. of Water Resources.

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[40] *See* BPA, 4/88, Intertie Development and Use FEIS, DOE/EIS-0125-F

[41] NRDC, Going With the Flow: Replacing Energy from Four Snake River Dams, April 2000, by David Marcus and Karen Garrison. (Executive Summary available at http://www.bluefish.org/goingwth.htm)

[42] E3, October 2015, Regional Coordination in the West: Benefits of PacifiCorp and California ISO Integration, Technical Appendix, pp. 39-42

[43] *See* http://www.caiso.com/Documents/Presentation-SB350RatepayerImpactsAnalysis-BrattleGroup.pdf#search=SB350, pp. 9-10. Note particularly the last bullet item on p. 9: "Simulations will also yield emissions (GHG, NOx, SOx) for environmental analysis."

The Helms Project was specifically built as a pumped storage project and includes the 123,000 acre-foot Courtright Reservoir and the 129,000 acre-foot Wishon Reservoir, with an installed capacity of 1,212 MW.[44] With a nominal installed capacity of more than 1,500 MW, the Castaic project uses the State Water Project's Pyramid Reservoir and Castaic Reservoir to generate hydroelectricity via pumped storage, but the primary purpose of the reservoirs is to store water from the State Water Project for export to southern California cities.[45]

Both the Helms and Castaic projects were designed primarily to generate electricity during periods of high demand (summer afternoons in particular) and to pump water back into the upper reservoirs at night when electricity demand and costs were low. During California's energy crisis of 2000-2001, the Helms project was unable to operate because of the round-the-clock demand and high electricity costs caused by the crisis. [46]

The cost of construction of the Helms project ballooned from an initial estimate of $200 million to $600 million.[47] More recently, the increase in electric demand in Central California has consumed transmission capacity prompting PG&E to plan to construct a new 150 mile-long 500 kV transmission line to restore the flexibility of Helms operations.[48]

The CAISO has repeatedly studied the economics of adding new pumped storage capacity to serve California loads, and has repeatedly found negative economic impacts. For example, a 2017 update to earlier studies found that a 1,400 Mw pumped storage project would have revenue requirements well in excess of its benefits under numerous different planning assumptions.[49]

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[44] https://en.wikipedia.org/wiki/Helms_Pumped_Storage_Plant
[45] https://en.wikipedia.org/wiki/Castaic_Power_Plant
[46] https://www.latimes.com/archives/la-xpm-2001-jan-24-mn-16302-story.html
[47] http://large.stanford.edu/courses/2014/ph240/galvan-lopez2/
[48] https://www.nwcouncil.org/sites/default/files/ManhoYeung_1.pdf
[49] CAISO, Economic Planning-Production cost model development, 2017-2018, pages 51-116 (available at http://www.caiso.com/Documents/Day2_ISO-Presentation_2017-2018TransmissionPlanningProcess_PreliminaryReliabilityResults.pdf#search=pumped%20storage, pdf) . Those pages consist of a 66 page presentation entitled: Bulk Energy Storage Resource Case Study-Update to the 2016-2017 Transmission Plan Studies, *Shucheng Liu, Principal, Market Development, 2017-2018 Transmission Planning Process Stakeholder Meeting, September 21, 2017* . The charts on

To avoid waste of economic resources, the applicant needs to do an economic study analogous to that done for the CAISO, but with costs and benefits specific to the proposed LCR and STC Projects individually and together.

h. Interconnection Study:

The proposed LCR and STC Projects both state that they would interconnect to the existing grid at the Moenkopi substation, just south of Cameron, Arizona. There are currently two 500 KV lines that cross at Moenkopi, resulting in 4 - 500 kV transmission segments that tie together at Moenkopi. Those lines are all within the Arizona Public Service Company (APS) balancing area. APS typically performs interconnection studies for all new generation proposed to interconnect to its transmission system.[50] Because of the large size of the proposed LCR and STC Projects, and the very limited nature of the Moenkopi substation (which is technically just a switching station, since it contains no transformers), it is not at all clear that the proposed LCR and STC Projects (individually or together) could interconnect two new 500 kV lines at Moenkopi without substantial new facilities and an expanded substation footprint. An interconnection study should be performed to analyze what land and facilities would be required to be added at Moenkopi substation.

Perhaps more important, an interconnection study needs to be performed to consider downstream impacts beyond the Moenkopi substation, the required facilities needed to cope with those downstream impacts, and the impacts (environmental, economic, and electrical) of those facilities. The potential swing of thousands of Mw in flows at Moenkopi as the proposed LCR and/or STC Projects switch from pumping to generating, or vice versa, would affect electricity flows throughout the Western U.S. grid. In

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pp. 23, 38, 47, 56, and 65 each show, for different planning assumptions, that the revenue requirements for a new pumped storage plant (in green) would exceed the revenues and values that such a plant could produce.

[50] See, e.g., http://www.oasis.oati.com/AZPS/AZPSdocs/Q196_FaS_Final_20150422.pdf, an APS interconnection study for a 160 Mw wind and solar generator proposed to interconnect to the Moenkopi-Cedar Mesa 500 kV line approximately 26 miles south of the Moenkopi substation.

particular, the interconnection studies will need to consider downstream impacts on Path 49 flows and grid stability.

VI. MOTION TO INTERVENE

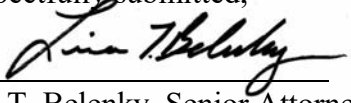
As detailed above, the Center has unique interests in the endangered and imperiled species, habitats, and other resources that may be impacted by the proposed LCR Project and the proposed STC Project and has interests in supporting renewable energy production and storage projects that provide a net reduction in greenhouse gas emissions while avoiding and minimizing direct, indirect, and cumulative impacts to the environment. For these reason, the Center's interests cannot be represented by any other party in these matters. The Center's involvement in these proceedings would promote the public interest and would assure protection of the affected habitats, endangered and imperiled species, waters, and other resources. Accordingly, the Center respectfully moves to intervene in these two proceedings in the public interest pursuant to 18 C.F.R. § 385.214(b)(2)(iii).

VI. CONCLUSION

WHEREFORE, Center for Biological Diversity requests that the Commission grant the Motions to Intervene in both of the proposed LCR Project (P-14994-000) and the proposed STC Project (P-14992-000) proceedings.

Dated: November 18, 2019

Respectfully submitted,



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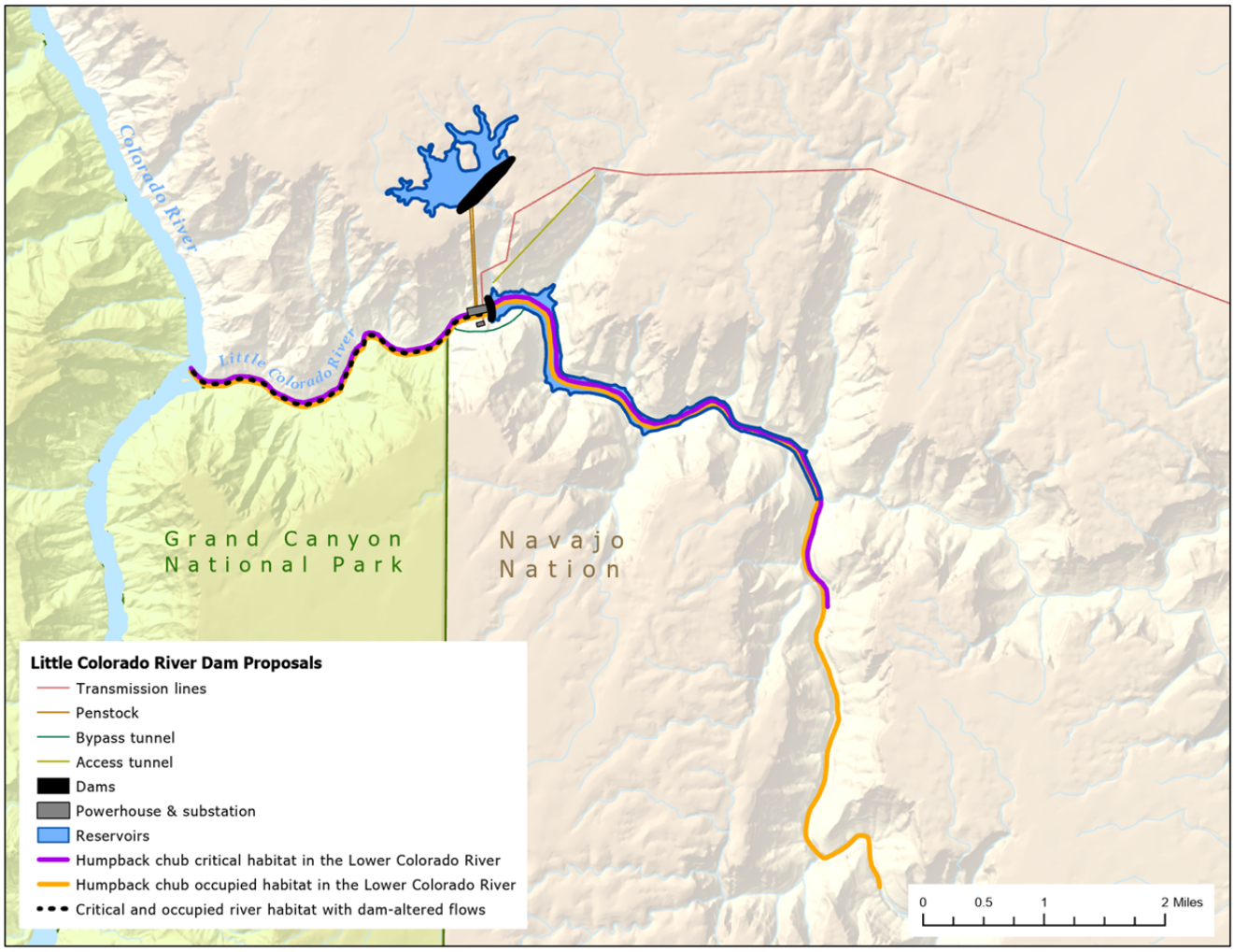
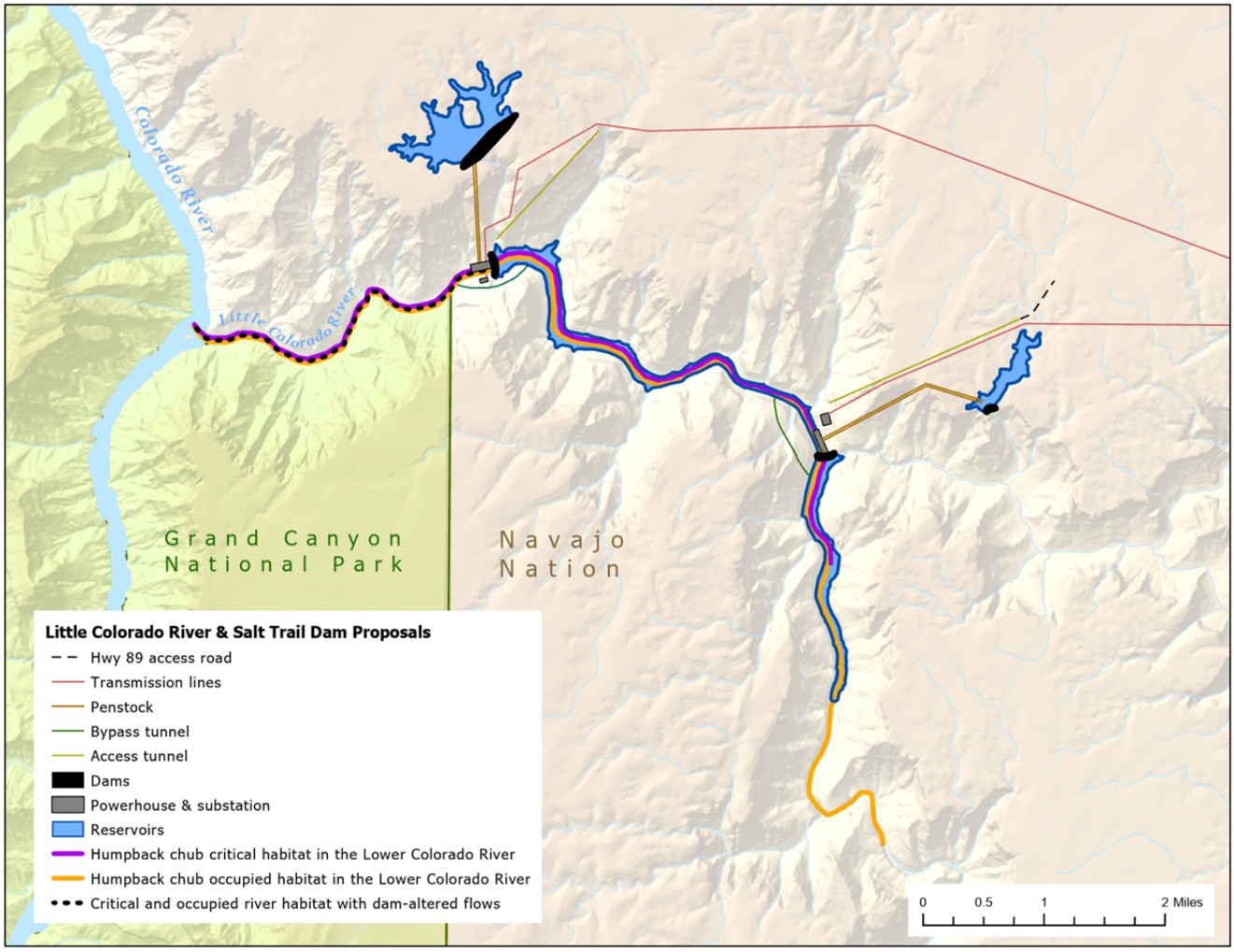
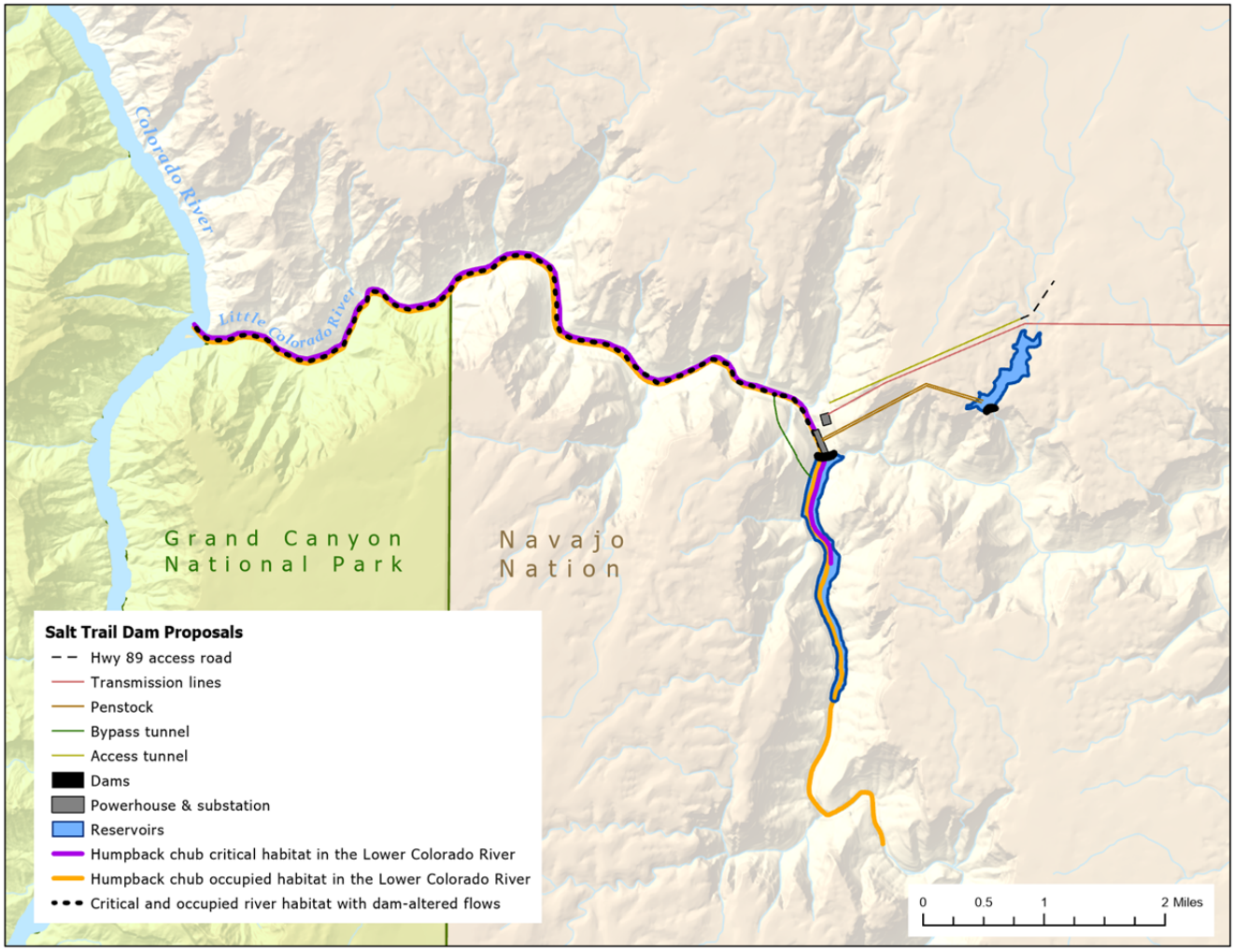
Appendix 1:



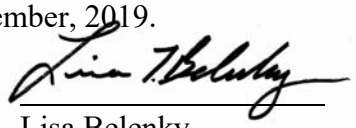




CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing upon each person designated on the official service list in the proceedings P-14992 and P-14994 as compiled by the Secretary of the Federal Energy Regulatory Commission by electronic mail or by first-class mail if no e-mail address is provided.

Dated at Oakland, California this 18th day of November, 2019.



Lisa Belenky

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