Date: December 16, 2016

Jim Ahlgrimm
Acting Director, Water Power Technologies Office
Department of Energy–Office of Energy Efficiency and Renewable Energy
1000 Independence Avenue S.W.
Washington, DC 20585

Re: Comments of Undersigned Groups on RFI–Challenges and Opportunities for Sustainable Development of Hydropower in Undeveloped Stream Reaches of the U.S.

Dear Mr. Ahlgrimm,

The undersigned organizations provide the following comments on the **"Challenges and Opportunities for Sustainable Development of Hydropower in Undeveloped Stream Reaches of the United States; Request for Information"** ("RFI") published in the Federal Register (81 FR 78795) on November 9, 2016. Our organizations work to protect and restore the environmental and social values that healthy, freely flowing rivers provide or have an interest in preserving the health of our nation's rivers. We represent millions of citizens across the country that support these values. The RFI seeks information about possible solutions to addressing the impacts of building new hydropower dams, and we provide answers to several of the questions presented in the RFI below. Please direct any questions to:

Rupak Thapaliya
Hydropower Reform Coalition/ American Rivers
1101 14th St. NW, Suite 1400
Washington, DC 20005
Email: rthapaliya@americanrivers.org
Phone: (202) 243-7076

General Comments

We acknowledge that hydropower plays an important role in our nation's energy portfolio, and understand that there is great potential to bring additional hydropower capacity into the mix. We should focus our resources and efforts on upgrading existing hydropower projects and adding hydropower capabilities to existing non-powered dams rather than on building new projects.

In July 2016, the Department of Energy released its *Hydropower Vision Report*[1] that evaluates the potential for increasing hydropower production in the U.S. through a variety of methods, including increasing efficiency at existing hydropower dams, adding power capacity to existing non-powered dams, and new stream reach development (building new dams). The report acknowledges that with existing technologies, new stream-reach development is "the most costly and environmentally challenging class of hydropower to develop."[2] The RFI notes these challenges stating, "The unique nature of new stream-reach development can also add cost, time, and uncertainty to the development process."[3]

The Report states that the U.S. has the potential to add 1.7 GW of new hydropower capacity by 2050[4] through constructing new dams under an "Advanced Technology, Low Cost Finance, Combined Environmental Considerations" scenario.[5] In contrast, we could add 11.1 GW of new capacity by upgrading existing projects and retrofitting non-powered dams with hydropower capabilities.[6] Focusing here will allow us to add new capacity with less capital and environmental costs. Hydropower is a 100+ year-old technology that has, and continues to significantly harm critical riparian functions. For reasons we outline below, we believe that it is uneconomical, inefficient and environmentally destructive to pursue new technology to develop new stream reaches for this comparatively small amount of power. Instead, we support investing in opportunities to add hydropower capability to existing non-powered dams and improving efficiency at dams that currently have hydropower infrastructure.

Responses to Specific Questions

A. Category 1: New Stream-Reach Development (NSD) Challenges and Opportunities

(1) How can advances in technology more readily address environmental challenges associated with hydropower development in undeveloped streams?

The RFI acknowledges, "Construction of barriers in a natural waterway can affect fish migration, channel geomorphology, sediment transport, habitat connectivity, water quality, and flow regimes." We note that most of these impacts are not just limited to construction, but also occur as a result of hydropower operations.

---

[1] U.S. Department of Energy, Wind and Water Power Technologies Office. *Hydropower Vision Report.* July 2016. Available at http://energy.gov/eere/water/articles/hydropower-vision-new-chapter-america-s-1st-renewable-electricity-source, last visited December 12, 2016.
[2] Hydropower Vision Report at p. 20.
[3] Challenges and Opportunities for Sustainable Development of Hydropower in Undeveloped Stream Reaches of the United States RFI#: DE-FOA-0001685, Fed. Reg. 81 FR 78795 (November 9, 2016).
[4] Hydropower Vision Report at p. 4.
[5] See generally, Hydropower Vision Report.
[6] *Id* at 18.

The impacts of hydropower dams are well documented throughout scientific literature. These impacts have resulted in the extinction and near-extinction[7] of a number of species, and are a major contributor to significant losses of aquatic biodiversity. In particular, dams block the migration pathways of fish, many of which are listed as threatened or endangered under the Endangered Species Act. Currently, we are investing a significant amount of resources to recover these species and their habitat while working to ensure that they will survive as the climate and hydrologic regimes change. It is unreasonable to develop projects that will further degrade these ecosystems. Scientists and legal scholars have also long acknowledged that hydropower dams cause pollution by altering the temperature[8] and chemical makeup[9] of water that is impounded behind and released through dams, harming the biological integrity of river ecosystems. Hydropower projects also harm or eliminate river-based recreation activities, which impacts regional recreation economies.

Advancements in technology for new hydropower projects must fully address all of the societal and environmental challenges associated with new hydropower development. Unless they do, it is likely that proposed projects will be denied because of their impacts.[10] Recently, the Federal Energy Regulatory Commission denied a proposed hydropower project that would have required construction of new dam on the Bear River in Idaho, citing environmental concerns. Future proposed dams are likely to meet similar fate. When the costs of developing new stream-reaches outweigh the benefits, such outcomes will be inevitable. We believe that our efforts are better placed with adding hydropower capabilities to existing non-powered dams and improving efficiencies at existing projects.

(2) What are the technical challenges associated with new stream-reach development? How can DOE help address these challenges?

As we outline above, the primary challenge that we see in building new hydropower projects is that they have harmful environmental and social impacts. Another significant challenge to developing new hydropower projects is that the hydrology and hydrologic regimes of freely flowing streams are changing, and face an uncertain future as the climate changes. The Intergovernmental Panel on Climate Change (IPCC) discusses such impacts, which include changes in the spatial and temporal distribution of precipitation patterns, and their intensity and extremes; shifts in the amplitude and timing of melting snow and glaciers; increased rates of

[7] Poff NL, Allen JD, Bain MB, Karr JR, Prestegaard KL, Richter BD, Sparks RE, Stromberg JC. 1997. The natural flow paradigm. BioScience 47 769-784; and Pringle CM, Freeman MC, Freeman BJ. 2000. Regional effects of hydrologic alterations on riverine macrobiota in the new world: Tropical-temperate Comparison, BioScience 50(9) 807-823.

[8] Lessard, J. Hayes, D. 2003 Effects of Elevated Water Temperature on Fish and Macroinvertebrate Communities Below Small Dams. *River Res. Applic.* 19: 721-732.

[9] U.S. Environmental Protection Agency. 1989. Dam Water Quality Study: Report To Congress.

[10] Twin Lakes Canal Company. 155 FERC ¶ 61,261 (June 16, 2016) (Federal Energy Regulatory Commission Order Denying Application for License for the Bear River Narrows Hydropower Project No. 12486. FERC e-Library Accession No. 20160616-3018).

evaporation and transpiration; and changes to soil moisture and runoff fluxes.[11] For example, over the next 50-100 years California is expected to have reduced snowpack, earlier runoff, and reduced spring and summer flows.[12] On the other side of the country, the Northeast saw more than a 70% increase in the amount of rainfall measured during heavy precipitation events between 1958 and 2012.[13] The Environmental Protection Agency states, "Projections indicate continuing increases in precipitation, especially in winter and spring and in northern parts of the region. However, the timing of winter and spring precipitation could lead to drought conditions in summer as warmer temperatures increase evaporation and accelerate snowmelt."[14]

The Hydropower Vision Report sets forth the impact that these changes will have on hydropower operations. It states:

> *Climate change creates uncertainty for hydropower generation, with potential impacts that include increasing temperatures and evaporative losses that result in reductions in available water resources and changes in operations; changes in precipitation and decreasing snowpack that result in changes in seasonal availability of resources and changes in operations; and increased intensity and frequency of flooding that results in greater risk of physical damage and changes in operations.*[15]

Such uncertainties make new stream-reach development impractical and uneconomical. New hydropower projects will likely either require that additional mitigation measures be implemented to address changes in timing and volume of instream flows, or even be rendered unable to generate power after they are built.

Finally, we do not believe that developing new stream-reaches will address the growing need for adding flexibility to our nation's electrical grid. The *Hydropower Vision Report* estimates that there is potential to add 1.7 GW of hydropower through building new projects.[16] The Report acknowledges that new stream-reach development is presumed to be less flexible than the existing fleet.[17] Projects that are "run-of-river" and those with limited storage capacity are inflexible, providing little value in a changing renewable energy landscape.

---

[11] Intergovernmental Panel on Climate Change Working Group II. 2008. Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change. Intergovernmental Panel on Climate Change, Geneva. Available at: https://www.ipcc.ch/publications_and_data/publications_and_data_technical_papers.shtml; last visited December 12, 2016.

[12] Hidalgo HG, Das T, Dettinger MD, Cayan DR et. al. 2009. Detection and Attribution of Streamflow Timing Changes to Climate Change in the Western United States. Journal of Climate 22:3838-3855.

[13] Walsh J, Wuebbles D, Hayhoe K. et. al. 2014. Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment. 19-67.

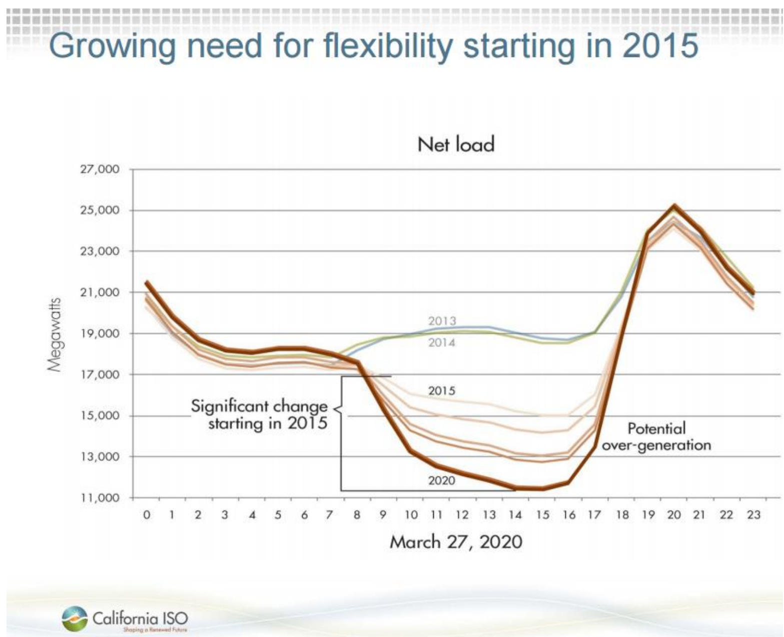
[14] U.S. Environmental Protection Agency. Climate Change Impacts in the Northeast. 2016. https://www.epa.gov/climate-impacts/climate-impacts-northeast#Reference 2, last visited December 12, 2016.

[15] Hydropower Vision Report at p. 242.

[16] *Id.*

[17] *Id*. at 253

In 2013, California Independent System Operator (CAISO), California’s grid operator, found that electricity generation sources need to have the ability to come online or be shut down rather quickly to address changes in variable supply from renewable energy resources (primarily wind and solar). As more renewable energy, particularly solar, is integrated into the grid, the need for midday base load generation is decreasing. However, when the sun goes down, the power from these resources taper off at the same time that late afternoon/evening demand is increasing. This shift in generation demand has become known as the “Duck Curve.”



Source: Scott Madden, 2016.

CAISO anticipates that in 2020 an additional 13,000 MW of capacity will need to be brought online within 3 hours to meet the electricity demand in the evening.[18] Small hydroelectric projects, such as the ones that are likely to be developed in new stream-reaches, cannot meet that need and will likely be uneconomical if constructed. We urge DOE to focus on improving existing projects that help bring more flexible capacity to the grid, which will in turn help with integrating additional renewable resources.

(5) What other challenges is the hydropower community facing with regards to new stream-reach development? How can DOE help to address those challenges?

All of the sites in this country that are viable for hydropower development have already been developed, and all of these projects have come at a great cost to the environment and local communities. Additionally, many of those projects that made economic sense at the time they were constructed are now not economically viable to maintain. Developing additional new

[18] *Id.*

stream reaches does not make economic sense. The Hydropower Vision Report states that the 1.7 GW potential in new stream-reach development can be achieved only under the "Advanced Technology, Low Cost Finance and Combined Environmental Considerations" scenario, meaning that we need technologies much more advanced that we currently have, financing these projects will require lower interest rates and risk levels, and we need to avoid building projects that have environmental concerns.[19] It is unlikely that we will be able to achieve the 1.7 GW potential due to challenges in meeting these criteria.

Furthermore, new stream-reach development does not make economic sense. For example, the Susitna-Watana hydropower project, which was recently considered by the State of Alaska, started out as a $4.3 billion project in 2012, and the most recent mean cost estimates were $5.7 billion. These costs do not consider the cost for environmental mitigation that would be required for the project.

We have also seen that in many cases power companies are starting to take down dams instead of building new ones. Condit Dam on the White Salmon River in Washington, Edwards Dam on the Kennebec River in Maine and Harvell Dam on the Appomattox River in Virginia are just a few examples of former hydropower dams that were removed because the benefits of removing them outweighed the costs of keeping them operating. In the United States, 62 dams were removed in 2015 alone,[20] and communities across the nation are moving forward with removing many more hydroelectric dams. These include the Saccarappa Dam on the Presumpscot River in Maine, the Hogansburg Dam on the St. Regis River in New York, and four dams on the Klamath River in Oregon and California. In an age where removing dams is becoming more common for economic and environmental reasons, we should not be focusing on constructing new ones.

Conclusion

When it comes to adding new hydropower capacity to our nation's energy portfolio, new development should be limited to projects that use existing water and infrastructure and do not place additional stress on river ecosystems. As a nation, our priority should be to develop hydropower at existing non-powered dams and to increase the efficiency of our current fleet.

Thank you for the opportunity to provide comments.

Sincerely,

---

[19] *See* generally Department of Energy *Hydropower Vision Report*. The Combined Environmental Considerations scenario avoids new stream-reach development (NSD) resource overlapping with seven environmental considerations and services (critical habitats, ocean connectivity, migratory fish habitat, species of concern, protected lands, national rivers inventory, and low disturbance rivers).

[20] American Rivers. 2016. https://www.americanrivers.org/threats-solutions/restoring-damaged-rivers/

Alaska Hydro Project

Alaska Survival

Alpine Lakes Protection Society

Altamaha Riverkeeper

American Canoe Association

American Packrafting Association

American Rivers

American Whitewater

Anacostia Watershed Society

Appalachian Mountain Club

Atlantic Salmon Federation

California Sportfishing Protection Alliance

California Trout

Catawba-Wateree Relicensing Coalition

Congaree Riverkeeper

Copper Country Alliance

Crab Apple Whitewater

DownEast Salmon Federation

Endangered Habitats League

Environmental Protection Information Center

Federation of Fly Fishers

Float Fishermen of Virginia

Foothill Conservancy

Foothills Paddling Club

Friends of Butte Creek

Friends of Cooper Landing

Friends of Grays Harbor

Friends of Kenai National Wildlife Refuge

Friends of the Eel River

Friends of the Kinni

Friends of the Rivers of Virginia

Friends of the White Salmon

Great Old Broads for Wilderness

Hells Canyon Preservation Council

High Country Conservation Advocates

Holy Spirit Missionary Sisters USA-JPIC

Hoosier Environmental Council

Hydropower Reform Coalition

Idaho Rivers United

Kalamazoo River Sturgeon for Tomorrow

Kenai River Watershed Foundation

Klamath Forest Alliance

Lower Columbia Canoe Club

Maine Rivers

Michigan Hydro Relicensing Coalition

Michigan Wildlife Conservancy

Milwaukee Riverkeeper

Mousam and Kennebunk Rivers Alliance

Natural Heritage Institute

Natural Resources Council of Maine

Naturaland Trust

Nature Abounds

Naugatuck River Revival Group

New England FLOW

North Cascades Conservation Council

Northwest Resources Information Center

Ohio River Foundation

Oregon Kayak and Canoe Club

Oregon Wild

Pennsylvania Council of Churches

Quartz Creek Homeowners' Association

Religious Coalition for the Great Lakes

River Guardian Foundation

Save Our Wild Salmon

Save the River

Selkirk Conservation Alliance

Sierra Foothills Audubon Society

Sleepy Creek Watershed Association

Smith River Alliance

Snake River Waterkeeper

South Carolina Coastal Conservation League

St. Mary's River Watershed Association

Tennessee Clean Water Network

The Lands Council

Tributary Whitewater Tours LLC

Upstate Forever

Washington Wild

WaterWatch of Oregon

WESPAC Foundation

Zoar Outdoor