American Rivers
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On the Prospects of Expanding Low-Impact and Affordable Hydropower Generation in the West

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By Andrew Fahlund
Senior Vice President for Conservation
American Rivers

1101 14th Street, NW, Suite 1400
Washington, DC 20005-5637
p 202.347.7550
f 202.347.9240
www.americanrivers.org

1 Introduction

Chairwoman Napolitano, Ranking Member McClintock, and Members of the Subcommittee, thank you for this opportunity to testify and share American Rivers' perspective on U.S. hydropower policy today.

American Rivers is the nation's leading voice for healthy rivers and the communities that depend on them. We believe rivers are vital to our health, safety and quality of life. American Rivers mobilizes an extensive network comprised of tens of thousands of members and activists located in every state across the county. We have been working to protect and restore the health of rivers that have been impacted by hydropower dams since we were founded in 1973. We also serve on the Steering Committee of the Hydropower Reform Coalition, a broad consortium of more than 150 national, regional, and local organizations with a combined membership of more than one million people. In doing so, we represent stakeholders – from canoeists to conservationists to lake homeowners – that seek to improve the water quality, fisheries, recreation, and general environmental health of rivers that have been damaged by antiquated hydropower dam operations. Coalition members are active in most of the hydropower licensing proceedings currently pending before the Federal Energy Regulatory Commission (FERC), the Bureau, and the Corps, and have constructively contributed to numerous hydropower-related policy discussions.

2 Towards a balanced Federal hydropower policy that encourages environmentally responsible hydropower development and operation

In March of this year, the Department of the Interior, the Department of Energy, and the U.S. Army Corps of Engineers signed a Memorandum of Understanding (MOU) for Hydropower, which states that it is "intended to represent a new approach to hydropower development that will harmonize the production of clean, renewable power generation with avoidance or reduction of environmental impacts and maintenance or enhancement of the viability of ecosystems." In our view, this MOU represents a real step forward in U.S. hydropower policy: it places the need for new hydropower capacity within the context of hydropower dams' "significant impacts on ecosystems and the fish and wildlife that inhabit them," and calls for a simultaneous increase in the generation *and* environmental stewardship of hydropower. As this subcommittee considers what actions it might take to promote the responsible development of hydropower, I would strongly encourage you to draw liberally from this approach and assign equal weight to each of these goals.

American Rivers is emphatically *not* anti-hydropower. Conventional hydropower is one of the oldest and most well-established among a growing number of technologies that provide low-emissions alternatives to fossil-fuel energy. Nationally, hydropower provides about 96,000 megawatts of capacity, representing nearly 7% of total generation. We expect that hydropower will continue to be a part of our nation's energy mix for years to come, and accordingly we have signed dozens of agreements supporting the operation of hydroelectric dams that together provide our nation with thousands of megawatts of generating capacity. Reasonable modifications have dramatically improved the performance of these dams, providing fish passage, improving flows, enhancing water quality, protecting riparian lands, and restoring recreational opportunities.

American Rivers supports the development of new hydropower resources that can be brought online while avoiding significant additional harm to local ecosystems. In recent years, we worked closely with the National Hydropower Association to craft renewable energy legislation that provides incentives for new hydropower development. In short, we support hydropower that is developed and operated in a responsible manner that avoids harm to America's precious river resources. Given the very real environmental and social impacts of global climate change – especially on vital freshwater systems –we understand the need to develop new sources of energy that can replace America's reliance on fossil fuels. Hydropower will be an important part of this mix.

However, we also know that the energy we receive from hydropower comes at an enormous cost to the health of our nation's rivers and communities. Hydropower is unique among renewable resources in the scale at which it can damage the environment. Hydropower's environmental and social impacts are serious and extremely well documented. Hydropower dam operations are responsible for the extinction and near-extinction of a number of species; in one basin, hydropower operations have wiped out not just single species, but an entire *family* of animals. Hydropower plants often divert water around entire sections of river, leaving them dry or constantly alternating between drought and flood-like conditions. Hydropower dams have flooded forests, destroyed fisheries, diminished recreational opportunities, and decimated the local – mostly rural – economies that depend on those resources.

The extent of this harm is much greater when combined with a whole host of other threats to rivers: poor water quality, a growing demand for scarce water, encroaching urbanization, and poor land-management decisions. It is in situations like these – where the environmental, social, and economic impacts of dams far outweigh their benefits – that American Rivers and others are compelled to advocate for the decommissioning of hydropower dams. We take this extraordinary step with great caution, and only rarely: out of 20,441 MW of capacity that has been relicensed by FERC since 1986, American Rivers' advocacy has led to roughly 222 MW of licensed capacity being identified as suitable for decommissioning, and only 38 MW has actually been removed to date. Our analysis indicates that this 222 MW is roughly equivalent to the capacity of existing FERC-regulated projects that are in non-compliance and not generating because their owners have failed to maintain them in proper working condition. It represents just 1% of the capacity relicensed by FERC since 1986, and only two-tenths of one percent of the nation's total hydropower capacity. Even this does not tell the whole story: during this period – in part due to our support for responsible hydropower development – the overall capacity licensed by FERC has actually *increased* by 4.1%.

The harm caused by most hydropower dams can be avoided if hydropower is sited, constructed, and operated in a responsible manner, particularly if management decisions are made at a basin-scale rather than at the individual project level. A few simple changes can make an enormous difference in the health of a river. Hydropower operators can change the timing of power generation to mimic a river's natural hydrologic conditions, stabilize lake levels and dam releases to protect riverside land from erosion, provide fish ladders and other measures that protect fish and allow them to pass safely upstream and downstream of dams, restore habitat for fish and wildlife, alter the design and operation of plants to maintain appropriate temperature and oxygen levels in rivers, and provide public access and release water back into rivers so that people can fish, boat, and swim. These types of changes have a miniscule impact on overall generation: when the Federal Energy Regulatory commission studied more

than 240 non-federal dams where such measures had been introduced, it found that such changes cost, on average, only 1.6% of power generation while actually *increasing* capacity by 4.1%. The benefits to human and natural communities have been immense.

In short, a truly balanced Federal hydropower policy must take seriously both the promise of hydropower and the risks of hydropower development. It must encourage responsible development while also continually holding developers and federal operators accountable for their environmental impacts and insisting on the strictest performance standards. It must remove obstacles to development while recognizing at the most basic level that a high level of environmental performance and the costs of achieving it are not an "obstacle" to development but a fundamental and necessary component of it. It must help new development to take place while also accepting that, as the administration's hydropower MOU acknowledges, "[N]ot every site is appropriate for new or increased hydropower production." It must address both sides of this equation equally, or it will fail.

3 Opportunities, incentives, and obstacles for new hydropower development

American Rivers supports incentives that encourage developers to add new capacity to existing water infrastructure in an environmentally responsible manner. As this Subcommittee considers how best to promote responsible hydropower development, we strongly encourage it to avoid policies that treat projects differently based on their size or generating capacity. There is absolutely no correlation between a project's generating capacity and its environmental or social impacts, and it is therefore inappropriate to use a project's capacity as an indicator of its impact or as a trigger for incentives or other special regulatory treatment. Rather, individual projects should be assessed based on their actual environmental impacts. While we approach each hydropower project on a case-by-case basis, American Rivers does believe that there are certain types of new hydroelectric development that, by virtue of their design, are unlikely to cause significant additional environmental harm, and while we may not support every project, we are generally supportive of public investments in such development.

3.1 Efficiency improvements

For years, American Rivers have been an advocate for policies that would encourage developers to upgrade their aging turbines and generating equipment with updated, modern equipment. These efficiency upgrades are the simplest, most cost-effective, and lowest-impact means of increasing hydropower generation, and the potential gains in generation are significant. In many cases, these upgrades can result in a 10-20% increase in generation from the same amount of water. There are substantial environmental benefits to these upgrades as well: modern turbines often feature designs which are less harmful to fish, and can operate efficiently across a different range of release levels, allowing for managed flow regimes which more closely mimic a natural river.

While I am not aware of any official estimate for the amount of new generation that could be gained, I have heard some in the industry talk about a potential that exceeds 10 GW or more, and I understand that the Department of Energy's "National Hydro Asset Assessment Project" is working on a better assessment of this potential. These types of projects are relatively low-cost, use turbines and equipment that is manufactured in the United States, and can often contribute to improved environmental outcomes. As you consider how to use scarce Federal resources to increase hydropower capacity, I strongly urge you to give first priority to efficiency improvements. Both the Federal Production Tax

Credits for Renewables and the proposed Federal Renewable Energy Standard that passed the House last summer provide incentives for efficiency upgrades. If we as a nation are truly serious about increasing hydropower production, then we should *require* that all Federal and non-Federal developers using public waters to generate power use the most efficient equipment possible to ensure that the public receives the full benefit of each drop of water that passes through a turbine.

Finally, we recommend that the Subcommittee consider the link between efficient energy production and efficient water use and direct Federal operators to do the same. With hydropower, water is energy. In western basins where reservoirs are used for multiple purposes, outdated operational guidelines, poor water management and conservation practices, and an alarming lack of coordination among multiple federal and non-federal projects are leaving megawatts on the table. The Bureau of Reclamation and the Army Corps of Engineers should improve their cooperation with FERC and its non-federal licensees to ensure that water control and hydropower systems are being operated efficiently on a basin scale. Additionally, any water that is diverted from storage reservoirs for consumptive use is water that is not available to generate power. Federal operators should, as they examine water delivery contracts, consider the relationship between end-user efficiency and hydropower production, and take steps to ensure that hydropower generation is not threatened by inefficient water use.

3.2 Capacity added to existing dams and diversions

Turbines can also be added to many existing hydropower and non-hydropower dams. While these retrofits are not appropriate in every case, they offer new capacity for minimal additional environmental impacts when done right. In some cases, retrofitting existing dams for hydropower can leverage additional environmental improvements to the affected river reach. For instance, a pending retrofit at the Holtwood project on the Susquehanna River in Pennsylvania will more than double that project's generating capacity while also providing for substantially improved fish passage. We worked closely with the hydropower industry and members of Congress to craft legislative language that would encourage such forward-thinking development. This language has since been incorporated into the federal law which provides a Production Tax Credit for Renewables, providing developers with an incentive to develop at existing dams that are currently operated for flood control, navigation, and water supply and that could be developed without harmful changes to river flows. The same language also appears in the Renewable Energy Standard that passed the House last summer. This is sound public policy: these types of hydropower projects are, relatively speaking, relatively inexpensive to develop, and are less likely to cause significant additional environmental harm.

In addition, an increasing number of developers – especially in the west – are exploring off-stream hydroelectric development. Some developers propose to place turbines in existing water conveyance pipes. Others are adding hydropower capacity to irrigation canals. Still others are placing turbines in municipal water treatment facilities. Many of these projects have the potential to create substantial environmental benefit. For instance, some irrigation districts are using the revenue from power sales to fund projects that will result in the more efficient use of water, leaving more water in the river to provide ecosystem services.

3.3 The Federal government should use solid numbers to prioritize its investments in new hydropower

While we are supportive of these opportunities, we also believe that any discussion of new hydropower development must be predicated on an accurate and balanced analysis of the feasible development potential. A number of resource assessments published since the mid-1990s have attempted to determine the extent of United States' untapped hydropower capacity, often with highly inflated estimates of potential capacity. In our view, while these resource assessments make for attention-grabbing headlines, they are neither accurate nor balanced and do not provide information that can be used to reliably inform policy decisions. We understand that the Department of Energy is, in part pursuant to the MOU, pursuing a new resource assessment that will address many of the shortcomings of previous assessments, and we encourage the members of this Subcommittee to facilitate the completion of that project.

Given the relatively high economic, environmental, and social costs associated with new dam construction, projects like the ones mentioned above that re-use existing dam infrastructure are the only form of conventional hydropower where public investment could reasonably be justified. Any investment of public dollars should be based on a sober assessment of the best available resources and the social, environmental, and economic cost of developing those resources. Any investment of tax dollars to subsidize hydropower development or production should be accompanied with a clear explanation of what that investment will buy the United States in terms of new low-emissions energy. Finally, such investments should be directed solely to projects that will produce the most new energy with the smallest environmental footprint.

4 Opportunities and incentives for improved environmental performance

When it comes to water, global warming changes everything – when, where and how much water is available, how water is used, and the ecosystems in which humans, fish and wildlife live. Warmer temperatures are increasing evaporation and lowering water levels in rivers and aquifers. Mountain snowpack, which acts as a natural reservoir that releases water throughout summer months, is shrinking and melting earlier in the year. Precipitation is also becoming more erratic and shifting towards winter months. As a result, droughts and floods alike are becoming more frequent and more intense. These changes may make our hydropower system less reliable in the coming decades. They also highlight the urgent need to improve the environmental performance of existing hydropower dams. Poorly operated hydropower plants radically alter the timing, magnitude, and duration of streamflows, change water temperature, and stress aquatic species. In other words, hydropower operations anticipate – and exacerbate – the impacts of climate change on our rivers and watersheds.

The threat of global warming demands urgent action on two major fronts. First, we must dramatically reduce greenhouse gas emissions. But even if we bring emissions under control, the carbon already in the atmosphere from historic emissions will cause inevitable changes to the climate. We must therefore also take immediate action to help both human and natural communities adapt to inevitable climate changes by making them more resilient. Resilient communities are able to withstand extreme events and recover quickly from disasters. By protecting and restoring healthy watersheds, increasing water efficiency and improving the quality of our infrastructure we can build resilient communities and ecosystems that stand a better chance of weathering the impacts of global warming.

Hydropower policy must play a role on both fronts. Developed responsibly, hydropower can increase our nation's portfolio of emissions-free energy. However, we must consider more than just increased megawatts. America is still blessed with many healthy, free-flowing watersheds, wetlands and floodplains that provide numerous services and values. We must preserve these intact systems and promote them as a vital part of our water supply and flood protection infrastructure. At the same time, we must rehabilitate rivers and streams that have been damaged by existing hydropower projects, and protect habitat from further degradation. A failure to improve the health of rivers now will doom more species to extinction as the world warms. Now and in the years to come, we need hydropower projects that are sited, built, and operated to produce power while minimizing impacts to the rivers that sustain America's human and natural communities. Federal agencies with a role in U.S. hydropower policy, including the Bureau of Reclamation, the U.S. Army Corps of Engineers, the Department of Energy, and the Federal Energy Regulatory Commission must make the enhancement of environmental quality – at existing and new sites alike – a top priority.

4.1 Low-Impact Certification for environmental performance

While the Federal government can theoretically require hydropower operators to meet strong environmental performance standards, it often falls far short of this goal. In the case of FERC-licensed hydropower facilities, this is because the legal standard is not one of environmental performance. Rather, the standard is based on FERC's subjective judgment of an appropriate balance between power production, profitability, and resource protection. As a result, FERC often issues licenses where a marginal improvement relative to the baseline conditions of past project operations is considered "good enough," even if the project in question is objectively causing significant ongoing environmental damage. Most federal projects fare even worse, lacking even the rudimentary concept of "balance" that the Federal Power Act provides. Mandated performance improvements have proven to be very unpopular with operators: the hydropower industry lobbied furiously in the late 1990s and early 2000s to weaken resource agencies' authority to prescribe fish passage, and several operators have unsuccessfully turned to the courts to challenge the States' ability to enforce water quality standards at hydropower facilities. While prescribed performance measures for individual dams have typically proven scientifically and legally defensible, operators continue to challenge mandated environmental mitigation measures at great cost to the taxpayer. In our experience, developers with a strong environmental ethic are willing to accept such conditions while other, less responsible operators will do nearly anything to avoid them.

There is a more effective way for the Federal government to allocate scarce resources in order to encourage better environmental performance: it should provide voluntary incentives – financial or otherwise – for operators to perform at a higher level than is required by the regulatory minimum. Our experience has shown that such a model can work. Ten years ago, a group of environmental NGOs founded the Low Impact Hydropower Institute (LIHI) (www.lowimpacthydro.org), an independent, market-based organization with a voluntary certification program for hydropower facilities. Any operator who applies and can demonstrate compliance with a strict-but-achievable set of published performance criteria may become certified.

LIHI is successful because it is able to provide real value to its customers. In some markets with voluntary green-power purchasing programs, LIHI's certificate-holders have been able to secure

premium rates. In other areas, state governments have successfully used LIHI to determine eligibility for various renewable energy programs. Massachusetts, Oregon, and Pennsylvania all feature some form of renewable energy credits for LIHI-certified hydropower. LIHI has now certified more than 2,000 megawatts of non-federal hydropower, and it is seeing a steady increase in the number of new applications. To date, no federal operators have applied for certification.

One of the challenges before this Subcommittee is how to encourage new hydropower generation with limited resources. The Federal government cannot afford to provide financial incentives to encourage hydropower development that would not be economically feasible on its own. Ensuring strong environmental performance poses an additional challenge. In order to achieve both goals, we encourage you to explore ways to direct incentives towards non-federal developers who have committed to achieving a higher level of environmental performance. We also recommend that you encourage the Federal operators subject to your jurisdiction to use low-impact criteria as a benchmark for examining their own environmental performance.

4.2 Federal project operations

American Rivers has worked on dozens of hydropower licensing proceedings before the FERC over the past two decades, and our experience has shown that the comprehensive review of hydropower projects operations with extensive stakeholder involvement results in significant improvements to environmental quality while retaining nearly all of those projects' capacity to generate electricity. While the concept of a periodic review that is open to all interested members of the public is a long-standing one in the realm of non-federal hydropower projects, a similar process is lacking – and needed – for hydropower facilities that are owned and operated by the federal government.

Each Federal project has a plan of operation, but many of these plans have not been revised in decades and are hopelessly out of date, despite laws that permit and/or require Federal operators to review the operational plans for their facilities. We recommend that this Subcommittee direct the Federal operators over which it has jurisdiction to examine changes to the design, configuration, or operation of their existing dams in order to improve upon existing operations, and to periodically repeat this analysis. Federal operators should consider efficiency upgrades, opportunities to install new physical capacity, and operational changes that could increase generation. Likewise, they should consider changes to existing operations that will enhance other beneficial public uses, including environmental protection, water supply, navigation, and recreation.

4.3 Basin-scale coordination of multiple projects

While individual hydropower dams have their own impacts, the cumulative effects of multiple hydropower dams are often much greater than the simple sum of their direct impacts. A single-dam may block fish passage and displace wildlife. A series of dams can harm an entire watershed or destroy a fishery, even if the effect of each of the individual dams seems relatively mild when considered in isolation. The impact of a single dam that kills only 5% of fish in its turbines may seem relatively small, but eight dams along the same river, each of which only kill 5% would reduce the river's fish population by more than a third, placing a cumulative burden on the population that is too great to be sustained over time.

The solution to such cumulative impacts is to address hydropower at a watershed or basin scale instead of at the individual project level. It is often possible to get an increase in generation *and* significant improvements in environmental quality when the operation and management of multiple facilities is addressed in a coordinated manner. For instance, consider Maine's Penobscot River basin. For decades, a series of dams in this basin blocked access to high-quality habitat and all but wiped out the river's valuable Alewife, Atlantic Salmon, and Shad fisheries. When these projects were relicensed, parties examined the entire basin and came up with a plan that would restore more than 1000 miles of habitat – and millions of fish – by removing two dams, bypassing a third with a nature-like fishway, and installing fishways at others. This plan also allows the remaining dams to generate more, concentrating environmental restoration measures where they are most needed and power production where it will have the least impact on the basin as a whole.

The Penobscot agreement demonstrates how the coordinated review and planning of hydropower in a basin can result in more power *and* better environmental outcomes. Unfortunately, the circumstances on the Penobscot – where all of the dams were owned by a single entity and subject to the jurisdiction of a single agency – are the exception rather than the rule. Consider, for instance, California's rapidly declining populations of Salmon and Steelhead. A combination of federal and non-federal dams in six watersheds in California (the American, the Feather, the Merced, the Stanislaus, the Tuolumne, and the Yuba) blocks these commercially valuable fish from accessing more than 2,200 miles of their highest-value historic habitat.[1] These dams are managed by a patchwork of federal and non-federal operators. The operators coordinate the management of these watersheds for water supply and power production. But when it comes to mitigating the effects of this environmental catastrophe, each operator points its fingers at the others. There is not one major river in the Central Valley that has even a single fish passage structure. All the major salmon runs are stuck on the valley floor, unable to ascend to the upper reaches of these watersheds where the best quality habitat is located. FERC, its licensees, and the federal operators in these basins have failed to end this avoidance of responsibility by coordinating effectively to find basin-wide solutions to restore fish passage to this valuable historic habitat. As a result, these species are at the brink and downstream users are stuck with a disproportionately higher burden for addressing their protection and restoration.

There is an urgent need for the type of basin-scale planning and coordination of hydropower projects that led to the Penobscot agreement. The "Integrated Basin Scale Opportunity Assessments" initiative in the DOE / DOI / Corps hydropower MOU, which will develop methods for such planning and test them in some pilot basins, is an excellent first step. We recommend that Congress direct the Bureau, the Corps, and FERC to cooperate to address multiple projects in a coordinated fashion to increase power generation and environmental outcomes at the basin – not project – scale. For instance, when FERC is relicensing a project in a basin where the Corps or the Bureau also operate hydropower projects, those agencies should participate as cooperating agencies in FERC's analysis and use that opportunity to review the operations of their own projects in coordination with the FERC-licensed projects.

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[1] Lindley, S.T. et al, "Historical Population Structure of Central Valley Steelhead and its Alteration by Dams," 2006.

5 Conclusion

A balanced U.S. energy policy must recognize that hydropower has impacts as well as promise, and it should address both. New hydropower development must be sited, operated, and mitigated responsibly, and it must simultaneously encourage increased generation *and* improved environmental stewardship at new and existing projects. American Rivers supports the development of new hydropower resources that can be brought online responsibly, avoiding significant additional harm to local ecosystems. We offer the following recommendations to this Committee as it considers how to encourage responsible hydropower development:

1. Make high environmental performance at existing and new facilities a top priority, and consider market-based incentives that will encourage and reward operators for investments in environmental stewardship.

2. Direct federal incentives towards those hydropower projects, like efficiency improvements, that can be brought online for the least cost and with the least additional impact to the environment.

3. Insist on better, more thorough information about undeveloped hydropower capacity and the costs associated with developing that capacity.

4. Direct the Bureau of Reclamation and the Army Corps of Engineers to periodically evaluate their facilities and operations to find opportunities to add power, improve efficiency, and improve environmental quality.

5. Direct FERC, the Corps, and the Bureau to coordinate with each other to take a basin-scale approach to hydropower development and reoperation rather than a myopic project-by-project view, and encourage multiple operators within a basin to find shared solutions that will increase generation, use water more efficiency, and restore environmental quality.

Thank you again for this opportunity to testify you today. I look forward to answering your questions.