1101 14th Street N.W. • Suite 1400
Washington, DC 20005
www.hydroreform.org

T: 202.347.7550
F: 202.347.9240
coordinator@hydroreform.org

HYDROPOWER REFORM COALITION
Putting water, wildlife, and people back in rivers.

Questions for the Record
Submitted by Rep. Frank Pallone
Hearing on: Modernizing Energy Infrastructure: Challenges and Opportunities to Expanding Hydropower Generation

Questions for Mr. David Steindorf:

1. **Hydropower reform proposals in the last Congress designated FERC as lead agency in the hydropower licensing process and provided FERC with greater authority to set the time table for the licensing process and to grant a license or a renewal within a specific time period. The assumption underlying these proposals is that federal resource agencies, state agencies, or tribal organizations are taking too much time to make decisions on one or more necessary permits to be issued under their conditioning authorities.**

   What are the implications for state, tribal, and private water rights within the watershed that hosts the hydropower project if FERC is given authority to control the schedule for the licensing process and has the authority to grant a license or license renewal without state, tribal and/or federal agencies providing formal approvals?

   Allowing FERC to control the schedule for the licensing process and grant a license or license renewal without state, tribal and/or federal agencies providing formal approval will place substantive limitations on these agencies' ability to carry out their mandates to address important environmental, water quality and quantity, and recreational issues. In effect, it will change natural resource policy and law on the ground without explicitly changing those laws.

   Ann Miles, former Director of the Office of Energy Projects at FERC, addressed the issue of this "enforceable schedule" language well in her testimony before the Committee on Energy and Commerce, Subcommittee on Energy and Power in the House committee on May 13, 2015. She stated

   > It is important to note that in many instances, it is applicants, federal and state agencies, and other stakeholders that determine project success, and control whether the regulatory process will be short or long, simple or complex. For example, where a developer picks a site that raises few environmental issues or

> works early to build a rapport with stakeholders, and where agencies and other stakeholders commit to fully and timely engage in the regulatory process, project review can move quickly. In these instances, licenses can be issued in two years or less. (Ann Miles' testimony before the Subcommittee on Energy and Power, committee on Energy and Commerce, U.S. House, May 15, 2015, p. 6)

Regarding prospective changes to law diminishing state and local controls over the areas surrounding projects, Ms. Miles continued

> [i]t is important to understand that, in enacting the FPA, Congress established a regime in which licensees and exemptees, in exchange for the use of waters belonging to the people of the United States, are required to satisfy the public interest in matters such as hydroelectric generation, recreation, irrigation, water supply, flood control, and environmental protection. Thus, the Commission must consider such issues as whether upstream or downstream residents may be flooded as a result of project operations or whether visitors to a lake have sufficient public access to boat, fish, hike, or swim. Congress determined that these matters sometimes are more than a local concern, and thus should be resolved by an entity that is required to consider the overall public interest. (Ann Miles' testimony before the Subcommittee on Energy and Power, committee on Energy and Commerce, U.S. House, May 15, 2015, p. 12-13.)

We agree strenuously with this characterization of the process and the importance balance between interests.

While some perceive the occasionally prolonged review of a license as being an issue of natural resource agencies taking too much time to make a decision, in our experience, there's a separate, underlying issue that needs to be addressed. FERC views its geographic and substantive scope narrowly when conducting a NEPA analysis or in making determinations about which studies are needed for a project, and this view influences their perspective of how long it takes to complete a study. Agencies that have directives different from FERC under the Federal Power Act, or derive their authorities from other statutes, such as the Clean Water Act and the Endangered Species Act, have different mandates that require analyses broader than what FERC considers necessary to fulfill its statutorily defined mission. Granting FERC the authority to control the schedule would allow it to make water management decisions under state and federal law, adjudicate water rights, and dictate the level of federal responsibility of treaty rights and trust obligations to American Indian nations. This will be done without the decades of experience or statutory charge the coordinate oversight agencies have Federalizing and centralizing such power in FERC will do little to solve the problem. A more effective solution to this issue is to improve communication and cooperation between all stakeholders earlier in the licensing process. We discuss solutions to this issue in more depth in our answers to Questions 2 and 4.

Allowing FERC to limit state or tribal review of projects would effectively federalize the application of state water law. From the McCarran Amendment to the Clean Water Act, Congress has insisted that the states' right to manage water should not be unduly limited by the federal government. Where the Clean Water Act could have directed the

Environmental Protection Agency (EPA) to centrally manage water usage and quality, it instead placed that responsibility with state and tribal water quality agencies. Federalizing water quality management would take an enduringly strong example of cooperative federalism and vest that local authority in a federal commission, running counter to what Chief Justice Rehnquist described as a "consistent thread of purposeful and continued deference to state water law by Congress" (*California v. U*.S., 428 U.S. 645, (1978)). States and tribes (including national tribal organizations) widely opposed the "enforceable schedule language" included in H.R. 8 last Congress because it would have limited their ability to manage their water quality and in-stream flows. In the words of the State of Oregon, it would have

> compromise[d] Oregon's ability to ensure that hydropower is compatible with environmental, recreational, and other public benefits by moving away from a balancing approach for development, to an approach where FERC is given exclusive authority to determine which measures are reasonable, economically feasible, and essential for fish and wildlife. (Letter from Gabriela Goldfarb, Natural Resource Policy Advisor to the Governor, May 28, 2015, submitted to the record of the May 15, 2015 hearing before the Subcommittee on Energy Power, Committee on Energy and Commerce, U.S. House.)

The State of Maryland opposed the enforceable schedule language because

> [i]n removing or impairing the states' primary role and responsibility under Section 401 to fashion conditions in FERC licenses, H.R. 8 relegate [sic] the states--the entities with the greatest interest and expertise in protecting state water quality--to bystander or second-class status. Maryland strenuously objects to the provisions in H.R. 8 that would strip states of their authority under Section 401 of the Clean Water Act. (Letter from Ben Grumbles, Secretary, Maryland Department of the Environment, and Mark Belton, Secretary, Maryland Department of Natural Resources, June 2, 2015, submitted to the record of the May 15, 2015 hearing before the Subcommittee on Energy and Power, Committee on Energy and Commerce, U.S. House.)

Centralizing state water management in FERC would also prevent state water boards from adjudicating and managing state and private water rights. This is one of the reasons the Western Governors' Association objected strenuously to the enforceable deadline language in H.R. 8, stating

> [i]t is crucial...that state water quality certifications and other necessary state procedures be undertaken in a careful, deliberate manner. Hydropower licenses may have a term in excess of 50 years, and those rights granted in a hydropower license directly affect the quality and quantity of state water, state wildlife and other resources." (Letter from Governor Steve Bullock of Montana, and Governor Dennis Daugaard of South Dakota, Vice Chair, Western Governor's Association, to Chairman Upton and Ranking Member Pallone of the Committee on Energy and Commerce, U.S. House of Representatives, July 18, 2016.)

The enforceable schedule language would grant FERC the ability to, in effect, waive federal, state and local laws pertaining to hydropower. This would directly impact water users of all kinds, from municipal drinking water authorities, agricultural producers, and irrigation districts to commercial and industrial users, recreational users, and flood control agencies. It would not only change the regulatory authority of the state to work with these users, but also upend their knowledge and invalidate the decades of experience they have garnered by working with the state water quality agency.

Federalizing water management would also implicate federal rights, such as those enshrined in treaties with American Indian nations. Many tribes have Congressionally ratified settlement agreements, the result of years-long, painstaking negotiation between tribes, states, local water users, and the federal government. These settlements dictate how much water tribes are entitled to for irrigation, fisheries, and other purposes, and how much water must be kept in the waterway for non-tribal use. These federally ratified rights are for the most part managed by the states. Preventing state and tribal governments from completing the evaluation of a hydropower project would prevent them from offering legally defensible requirements in a CWA certification, and would enable FERC to approve water usage and management that violated the terms of tribal water settlement agreements. Furthermore, Tribes tend to be awarded greater water allocations than they use as of the settlement date. As a result of this reservation surplus, tribes have the ability to lease their water rights within water markets. This is a new and emerging economic niche, yet to be fully explored by tribes, so fiscal returns are not yet determinable. However, changing climate conditions and decreased levels in groundwater aquifers may allow tribes to capitalize on the revenue-generating opportunity by leasing their water rights to non-tribal members (such as municipalities), creating a welcome source of revenue for some communities in Indian Country.

A number of Native American Tribes depend on waterways with hydropower facilities for not only sustenance, but for their religious and cultural practices. Centralizing in FERC water use and management decisions has the potential to negatively impact the free practice of these tribe's important ceremonies. For example, many waterfalls in the Pacific Northwest are considered sacred sites to tribes and a strong flow of water and mists from waterfalls are needed for a number of their cultural and religious practices (e.g. Puget Sound Energy, Inc. 107 FERC ¶ 61,331 2004). Giving FERC the ability to deny requests from the federal trustees who work the closest with Tribes—the Bureau of Indian Affairs and its sister agencies in the Department of the Interior—could be disastrous. Such a power could very well impinge on the ability of these American citizens to freely engage in their religious practices.

Many tribes entered into treaties with the United States that preserved off-reservation hunting and fishing rights (usufructuary rights). Those rights, though federal in nature, are by and large upheld by the states, which coordinate with tribal wildlife management agencies to ensure that tribes retain access to their historical fisheries and hunting grounds. Protecting these rights has afforded a benefit to non-tribal members as well, as robust fish and wildlife populations are required to uphold them. In a letter opposing decreased flexibility under sections 4(e) and 18 of the FPA, the National Congress of

American Indians (NCAI) and the Native American Rights Fund (NARF), wrote to Senators Murkowski and Cantwell that, "[Such language] provides a substantial burden on tribes and agencies to protect fish resources at a critical time when many fish populations are shrinking to dangerously low numbers. This in turns [sic] puts tribal trust resources and tribal treaty rights at risk." (Letter from Jacqueline Pata, Executive Director, NCAI, and John E. Echohawk, Executive Director, NARF, to the Committee on Energy and Commerce, U.S. Senate, July 27, 2015).

In summary, the impact of a FERC "enforceable schedule" language divesting states, tribes and federal resource agencies of their current authority to appropriately condition the use of public waters, such as was found in the provisions of H.R. 8 authored by Representatives McMorris-Rodgers and McNerney in the 114th Congress, is the creation of a *de facto* federal reserved water right for FERC to exercise on behalf of a license applicant. If enacted, a change in law allowing FERC to limit state, tribal, and federal resource mangers' authority would overturn more than half a century of federal water law and undermine legal concepts that, in the West, extend back at least to the Reclamation Act, and, in the East, to doctrines that find their genesis in colonial law. It would rob states and tribes of Congressionally recognized sovereign rights, federal agencies of their power to uphold their statutory authorities and trust responsibilites, and would allow dam owners to avoid compliance with bedrock environmental law. An enforceable schedule would place power generation ahead of all other uses of a river.

2. **In a hydropower licensing or re-licensing process, states must issue a water quality certification for the project and state and federal resource agencies must issue a variety of permits under existing laws and/or define a set of conditions to mitigate negative impacts of the hydropower project.**

   The agencies require information that is generated in studies performed by license applicants to support and defend their permitting decisions. It appears one source of delay in the licensing or relicensing process occurs during the process of defining the list of studies that are required to facilitate decision-making by state, tribal, and federal resource agencies.

   In your experience does FERC defer to the agencies' study requests?

   No. In evaluating study requests, FERC orders studies to fulfill its own responsibilities under the Federal Power Act. It is not only practice, but stated policy that FERC does not defer to what other agencies state they need to carry out their own authorities that are related to relicensing but are separate from FERC's responsibilities. See, for instance, a June 18, 2015 order in which FERC denied an agency's study request on the grounds that "[I]t is up to the Commission to determine whether a particular study is necessary for the Commission to fully understand the effects of licensing or relicensing a project, and we are not obligated to require a study to support another agency's decision making." (FERC Order Denying Rehearing. 151 FERC ¶ 61,240, p. 9.)

We believe that there should be the presumption that FERC will order studies needed by other resource agencies, with a review process to address exceptional cases where such study is not warranted. The U.S. Forest Service, Bureau of Land Management and U.S. Fish and Wildlife Service have a better understanding of the information that they require in order to make decisions regarding the rivers they manage on federally reserved lands. It is important that the rivers that reside within public lands are available for public uses, including hunting, fishing, hiking, boating and other recreational activities, and not solely for the development of hydropower.

In your view, is it possible based on the experience with project licensing and re-licensing that has occurred over the years to develop a list of studies that would define a core set of information that is necessary to evaluate every license or re-license?

[Please see answer below]

I recognize there may be individual circumstances or conditions that are unique to a specific project that might require additional studies or information that goes beyond the core set of information that would be included in the core study list I described above. However, it seems a set of defined core requirements and/or best practices developed based on the experience with license application evaluations over the years would provide more certainty to the license applicant as well as all other parties to the licensing process.

Based on your experience with the licensing process, do you believe the states, tribes, and federal resource agencies have sufficient experience to develop, in cooperation with FERC, a set of standard best practices that would assist hydropower license applicants in preparing the necessary studies to reduce delays in the licensing process?

Yes, it is possible to develop a core list of studies. Wide experience to do so exists within the oversight agencies and many licensees, We recommend that FERC develop a core list of study plans in collaboration with experienced stakeholders, starting with studies that such stakeholders have already collaboratively developed in relicensing. We suggest that FERC also establish a list of core operations models and water temperature models that are key tools in relicensing.Licensees have carried out many well-designed studies since the initiation of FERC's Integrated Licensing Process in 2003 and a commitment between all stakeholders to cooperate and communicate will continue to result in productive and efficient (re)licensings.

We are concerned, however, about the potential rigidity of any core list, based on the use that the concept of "nexus" has assumed in the existing Integrated Licensing Process (ILP). ILP Study Criterion 5 (18 CFR § 5.9(b)(5)) requires anyone proposing a study to "[e]xplain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied… ." When the ILP was enacted, this

requirement appeared to be a simple requirement for reasonableness. However, licensees, lawyers, and consultants have literally spent millions of dollars parsing the meaning of the concept of "nexus" to argue against multiple study requests. By claiming that a study has no "nexus" to a hydropower project, licensees keep legitimate study from going forward. Developing a core list of studies must not become this type of "gatekeeper." There must be clear and reasonable exceptions to any presumption that a core study is the only acceptable approach. A new tool to promote efficiency must not become an obstacle to best evidence.

Also, because science evolves and relicensing practitioners gain experience, we believe any core list of studies should undergo a prescribed review process by appropriate practitioners on a specified schedule.

What role can Memoranda of Understanding between FERC and the states or between FERC and the federal resource agencies play in developing a mutually agreed upon core set of required studies and/or best practices?
How could advocates and license applicants contribute to the development of such tools?

Memoranda of Understanding (MOU) are a positive, proactive means of coordinating related proceedings with other federal agencies, tribes, and states. They establish a framework of cooperation and collaboration from the beginning, and ensure that states/tribes in particular and FERC are sharing the information they need to in order to complete their reviews on a mutually agreed upon timeline. This is a concept that the National Hydropower Association (NHA) also supports. In comments on a draft MOU between FERC and the California State Water Resources Control Board (SWRCB) in 2013, NHA stated:

> Better coordination and communication up front in the hydropower licensing process is always encouraged and benefits all parties and stakeholders. The Draft MOU provides an excellent opportunity to more efficiently license projects while creating a template for other states. The successful implementation of the Draft MOU has the potential to accelerate not only the approvals of hydropower projects (existing and new), but also the environmental benefits resulting from the mitigation packages associated with the project proposals. (NHA Comments on FERC and SWRCB draft MOU, July 8, 2013.)

The purpose of the MOU between FERC and the SWRCB is to coordinate the procedures and schedules prior to the Commission's review of hydropower license applications and the State Water Board's review of water quality certification applications as each pertains to the Commission's authorization of non-federal hydropower projects in California. There is no need for an applicant to wait until FERC has completed its evaluation before it begins collecting information for one of the resource agencies. It is also possible, particularly in an ILP review, to use some data for more than one regulator.

FERC's MOU with the State of Colorado is another example that illustrates how MOU can be used to streamline the regulatory process for a class of hydropower projects. This MOU allows the state of Colorado to "prescreen" for small-scale hydropower projects to allow for expedited processing by FERC when the applicant seeks a FERC license (Memorandum of Understanding, FERC and the State of Colorado, through the Governor's Energy Office to streamline and simplify the authorization of small scale hydropower projects. August 2010). Additionally, FERC and the U.S. Army Corps of Engineers (USACE) executed an MOU in 2016, after the passage of the Hydropower Regulatory Efficiency Act of 2013, that facilitated the development of hydropower at the USACE's federal facilities by synchronizing each agency's permitting process. We believe that this MOU will go a long way in bringing new hydropower projects at existing non-powered dams online at a faster rate.

We recommend that MOUs address coordinated preparation of the NEPA document as the record basis for the decisions by the several agencies. As we have commented in other proceedings, such an arrangement may and should be structured to preserve each agency's independence of judgment on disputed factual and legal issues, while promoting efficiency in the analysis of environmental impacts and alternatives. Amending FERC's ex parte rule to allow agency participation in the FERC NEPA process will speed up consideration as well as provide greater communication between regulators, FERC, and applicants; however, for the integrity of the process to be maintained, agency findings must not be subject to alteration by FERC.

In developing the list of best practices by jurisdiction and watershed, and the 'core studies' to be presumptively included in FERC study plans, a review and comment period would allow contributions by advocates and applicants. Alternatively, front-end consultation could be beneficial. FERC, as the clearinghouse for coordination, would manage this process and must ensure sufficient input from state, tribal, and federal resource managers, as well as applicants and interested members of the public.

3. Please elaborate further on the benefits of delegating conditioning authority under Sections 4(e) and 18 of the Federal Power Act directly to tribes.

In the approximately 100 years since the Federal Power Act was enacted, the United States government has had varying degrees of success in fulfilling its obligations as trustee to tribal nations via sections 4(e) and 18. While the dedication of the federal government to upholding treaty rights and trust responsibilities has improved markedly in the past thirty years, so has the ability of tribal governments and inter-governmental organizations to manage their own resources. Devolving to qualified, technically capable tribes the responsibilities to maintain federal Indian reservations and ensure fish passage serves a two-fold purpose: it would ensure proper attention and expediency in reviewing the applications for hydropower development and it would promote self-determination and resource management in tribal governance. Reducing the intermediate layer of bureaucracy would empower local managers, free up agency staff to focus on other hydropower license applications, and further protect critical (and often sacred) resources.

One of the most persistent criticisms of the hydropower licensing process is that there is insufficient communication between parties in a licensing. Often, the communication gaps are representative of the number of tasks a given regulator is responsible for at a given time. In the case of potential or actual impacts of a hydropower project to an American Indian reservation, the process of determining the 4(e) condition moves from FERC to the Secretary of the Interior to the Bureau of Indian Affairs (BIA) to the impacted tribe, back to BIA, back to the Secretary, back to FERC. By devolving the authority directly to the tribe, two layers of red tape are removed. Much the same middle management and review is removed by delegated section 18 authority; allowing the tribe to propose fish passage conditions would eliminate reviews by the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service and the Secretaries of the Interior and Commerce, respectively.

Submitting applications directly to the tribes has the added benefit of quickly putting them into the hands of the resource managers who are going to devote the most significant amount of attention to them from the beginning. While federal resource managers safeguarding Indian reservations and fisheries under 4(e) and 18 have devotion to the agency mission and their responsibilities under treaties and statutes, they are not making decisions that will directly affect their lives and the lives of their community. The added real-life implications for the conditioning reviews will ensure that applications are addressed in the most expedient manner.

Most tribal governments spend most of their time managing the community existing within the boundaries of the reservation. Unlike most federal regulators, who are often located long distances from the Indian reservation that has been or could be impacted by a hydropower project, tribal resource managers know the lay of the land, local stakeholders, and how more or less water in the river could impact the economy. The local knowledge of the project and the players is invaluable and should have greater prominence in hydropower licensing, not less.

While many tribes have always had a knowledge and familiarity with their resources, they either lacked the technical, scientific capacity to have their knowledge respected or sufficient funding to retain such experts. This is no longer the case. Tribal governments oversee police forces, medical clinics, K-undergraduate education, energy regulatory offices, and museums. Many tribes have environmental offices and wildlife offices with a technical sophistication on par with that of the state(s) in which their reservations are located. They are no less capable of overseeing the day-to-day needs of their communities than any non-Native government. Tribes provide these services pursuant to federal law, contracts with the federal government, and their own tribal laws. Particularly as regards maintaining fisheries in the Northwest, dedicated stewardship of the fishing stock serves the dual purposes of protecting their physical and spiritual sustenance as fish are “not much less necessary to the existence of the Indians than the atmosphere they breathed.” *United States v. Winans*, 198 U.S. 371 (1905).

Devolving the 4(e) and 18 authorities to technically capable tribes will recognize their sovereignty, the skill and dedication of tribal resource managers, and hasten the review process.

4. Based upon your experience with multiple license and re-license processes, what factors result in the greatest delays and costs to complete the process?

We believe Ann Miles, former Director of the Office of Energy Projects at FERC, described one of the greatest sources of delay very well:

> "Staff's experience has shown that agencies can have different timing requirements for the information needed for their decisions, which results in differing review periods. Information that an agency considers vital to its determination may not be available until after the FERC environmental review is complete and the Commission has issued an order. Providing agencies with timely and complete information necessary to perform Congressionally-mandated [sic] project reviews is the single most crucial step in ensuring process accountability and efficiency. This is the responsibility of the project sponsor and is often outside of the control of permitting agencies." (Testimony of Ann Miles to the Committee on Energy and Commerce Subcommittee on Energy and Power United States House of Representatives, May 13, 2015, p. 27.)

Another source of delay occurs when licensees resist using standard practices in developing and implementing studies. For example, on the Don Pedro Hydroelectric Project (FERC No. P-2299) on the Tuolumne River in California, the study process was delayed by at least one year because the Licensees deviated from the Commission's study plan.

In the Don Pedro Project, the study was designed to determine the quality of the recreational boating experience by having paddlers evaluate a set range of flows using different boat types. Although the study plan outlined a standard, best practice methodology, the licensees departed from the study plan and implemented one that involved little background research, reduced the geographic scope, garnered inadequate participation and deployed an oversimplified survey. The Commission determined that the first analysis was inadequate and required the licensees to do another study in the summer of 2013. (FERC *Determination on Requests for Study Modification and New Studies for the Don Pedro Hydroelectric Project*, available on the Commission's website from the eLibrary feature at https://www.ferc.gov/docs-filing/eLibrary.asp. Accession number 20130521-3001, Appendix B7 RR-03-Lower Tuolumne River Lowest Boatable Flow.)

A major source of delay for applicants who seek to construct new hydroelectric projects is often their lack of experience with affected stakeholders, site-specific resource issues, standard studies and the licensing process. New project applicants often introduce themselves and their proposed project in filings with FERC, without having talked with other licensees, resource agencies, environmental organizations, and officials of local

governments. Many applicants have looked at the power potential of a new site, but have not considered such interests as water right holders who already divert from a dam proposed for retrofitting for hydropower, or well-known fishery and recreational issues. For example, on the Daguerre Point Dam Hydropower Project on the Yuba River in California, an applicant proposed to reconfigure an existing diversion dam without considering pre-existing problems with upstream and downstream passage of fish, some of which are ESA-listed. By failing to reach out in advance to the water agency that uses the diversion dam for water delivery or to the relevant resource agencies, the applicant increased the cost of the licensing process and eventually walked away from the site. (See *Comments of Foothills Water Network on Pre-Application Document for Daguerre Point Dam Hydropower Project*, available on the Commission's website from the eLibrary feature at https://www.ferc.gov/docs-filing/eLibrary.asp, accession number 20130219-5040.) MOU between FERC and agencies, as well as FERC sharing best practices and preliminarily granting study requests, would help avoid situations like this.

5. **There is apparently interest in development of small hydroelectric projects and an assumption that these projects might move through the licensing process more quickly. Is the size of the hydroelectric project directly related to its environmental impacts?**

The short answer is no. A paper by Abbasi and Abbasi (Abbasi, T. and S.A.Abbasi. Small hydro and the environmental implications of its extensive utilization. *Renewable and Sustainable Energy Reviews* 15:2134–2143, 2011.) demonstrates that environmental problems caused by small hydropower are "no less numerous, and no less serious, per kilowatt generated" than those from larger centralized hydropower facilities.

All dams, regardless of size, degrade water quality, alter important riparian processes (such as flow regimes and sediment transport), and harm river-dependent species. This is especially true when a dam is located on a small, sensitive headwater stream, or where the watershed is already degraded by other dams. Additionally, dams require major construction, leading to deforestation, and construction of new roads, buildings, and other infrastructure. All of these activities have negative impacts on rivers and streams.

Dam impacts on fisheries do not necessarily scale up with size. An old 500 kilowatt hydro plant with no fishway near the head of tide on a coastal river can have much larger impacts on recreationally and commercially important fish than a modern 50 MW plant that can afford good fish passage or appropriate mitigation.

The hydropower industry uses the terms "small," "incremental" and "micro" hydropower to describe some projects. For some, this evokes images of covered bridges, water wheels, and mill dams, but the reality is quite different. These terms usually refer to the dam's nameplate generating capacity rather than the size or environmental footprint of the dam or reservoir. A more accurate description of most of these projects would be "low-power," as the dams themselves are often quite large in size.

Several dams that could have been described as "small" have made headlines when they were removed because they had significant negative impacts to the aquatic and riparian ecosystem relative to their value for power generation. Examples include but are not limited to:

- The 14.7 MW Condit Dam on Washington's White Salmon River, which was 125 feet high and 471 feet wide.
- The 13.3 MW Glines Canyon Dam on Washington's Elwha River was 210 feet high.
- The 3.5 MW Edwards Dam on Maine's Kennebec River was 917 feet wide and 25 feet high.

Removing these dams has restored fish passage, healthy flow regimes and other important aquatic and riparian ecosystem functionality to the rivers they once blocked.

Projects described as "run-of-river" are also often incorrectly perceived as having less impact. In the United States, "run-of-river" typically means "inflow generally equals outflow." While large, high-capacity storage dams do typically alter a river's hydrology more than a run-of-river project, run-of-river projects are by no means impact-free. Many hydropower projects described as "run-of-river" involve "bypassed reaches," which are sections of river that have no flow due to hydropower operations, or have unnatural daily flow fluctuations, which is incredibly harmful to the river. "Run-of-river" projects can also block fish passage. Washington's Elwha, Glines Canyon, and Condit dams were all run-of-river projects and all three were removed because the owners of the dams determined that the value of the power they produced did not justify the costs associated with the environmental impacts.

In addition to having a large environmental impact, small dams often produce substantially less power than advertised: hydropower dams are typically capable of an output that is only 40-50% of their stated nameplate capacity. The output of low-power hydropower dams is even further constrained by seasonal water availability. On many streams, the flows needed to sustain full generating capacity are rarely available, following storms or during periods of high spring snow melt. On other streams located in colder climates, or at higher elevations where below freezing temperatures reduce water flow during much of the winter, hydropower dams cannot produce power consistently throughout the year. The timing of these flows is not in sync with the demand for power. Rivers flow their highest in the winter and spring when the demand for power is at its lowest, and at their lowest in the summer, when demand for power is at its highest.

A good example of seasonal flow impacting the feasibility of hydropower development comes from the 2005 Clearwater Creek project. In 2005 the Federal Energy Regulatory Commission (FERC) dismissed a new license for a proposed hydropower dam on Clearwater Creek in Washington's Nooksack watershed due to the applicant's failure to provide a timely response to FERC's request for additional information about the project (Dismissal of license application for the Clearwater Creek Project No. 11495, February 12th, 2003. FERC eLibrary Issuance 20030212-3012.) It was estimated that the high water season on the Nooksack ran for only six weeks per year; as a result, the dam's

proposed 6.0 MW of nameplate capacity was a highly inflated representation of the energy it would have actually been able to produce resulting in negative net annual benefits (Final Environmental Impact Statement, Warm Creek and Clearwater Creek Hydroelectric Projects, Washington, June 2002. FERC eLibrary Issuance 20020705-0121.)