

All Essential Components Leading to both a Viable Hydrosystem and Recovery of Salmon and Steelhead in the Columbia/Snake Basin Are Currently Available, and They Would Save the Public a Fortune

This paper lays out five existing essential components or means that the US Army Corps of Engineers (the Corps) and Bonneville Power Administration (BPA) can utilize immediately to avoid further financial and biological losses created by the four Lower Snake River Dams (4 LSRDs). The focus is on policy, instead of litigation, now in its fourth decade, or new legislation. The five means are likely the simplest way to “break the back” of an intractable process of narrowly evolved arguments between constituent groups, influential far beyond what the demographic calculus would suggest. The arguments created a mythology of phony rationalizations perpetuated for the benefit of a few “special interests,” at the expense of the many.

While this paper describes some of the economic, financial, and biological reasons for breaching the 4 LSRDs, its primary purpose is to show how, not why, the dams can be breached very quickly without undo fiscal hardship on any one group, such as BPA ratepayers. Many government reports together reveal both the high costs of the 4 LSRDs, and the benefits derived from retuning the lower Snake River to a free flowing condition. More recent reports also indicate that financial and biological conditions have degraded to the point that discussing breaching the 4 LSRDs can no longer be “kept off the table.” The issue of “mothballing” units and using “disposition” studies has been discussed at BPA Federal Hydro IPR reviews as seen in the meeting notes from June 2016¹. Importantly, NOAA Fisheries 2016 Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook and Steelhead admits “This recovery plan contains an extensive list of actions to move the ESU and DPS towards viable status; however, the actions will not get us to recovery.”² Breaching is not among the options.

The fish returns³ over the last three years reinforce the urgency of breaching immediately. Summaries, analyses and/or corrections to government data and reports can be found at the Damsense.org website. Volunteers who have also contributed or written critical documents created this website. Damsense is not a formal organization, nor do its contributors represent any group or organization. The intent is to provide an accurate and comprehensive resource to the public and decisionmakers, sourced primarily from government documents that amply reveal the ecological failure and the financial hardship to the public of maintaining these four dams. This is entirely appropriate and necessary given the *mythos created by the dam lobbyists*, noted above.

Immediate collaborative action can lead to the financial and biological viability of our hydrosystem, free up government funding for other dams and habitat work, create thousands of new jobs, and likely end otherwise never ending litigation. The five essential components that allow this to happen are:

1. The Corps needs no new authorities to place the 4 LSRDs into a “non-operational” status while normative river flows are reestablished by removing the dams’ earthen portions.
2. The Corps’ 2002 Environmental Impact Statement⁴ and Record of Decision provide the necessary NEPA coverage for breaching, although some updating may be required.

3. Neither the ongoing litigation over the 2014 Federal Biological Opinion nor the Court's order for a new EIS constrains the Corps from breaching the dams through channel bypass *now*.
4. Breaching can be financed through existing debt reduction and credits mechanisms as a fish mitigation action by BPA. New appropriations are not needed.
5. Breaching is far easier than originally planned, making it possible to move from a decision to breach to breaching in a matter of months, not years.

Discussion of the Five Components Available to Decision Makers

1. The Corps needs no new authorities to place the 4 LSRDs into a “non-operational” status, while normative river flows are reestablished by removing the earthen portion of the dams.

The Corps has a fiduciary responsibility ultimately derived from the Public Trust Doctrine to protect the public interest and to fund only beneficial projects as measured by National Economic Development benefit-to-cost ratios (BCR) that exceed 1. That means for every dollar spent, at least one dollar in benefit is returned. The 4 LSRDs have a combined BCR of .15. That means the 4 LSRDs are returning only 15¢ for every \$1 invested. This compares to projections that a free flowing lower Snake River could return at least \$4 for every \$1 invested⁵.

Protecting the public's interest means the Corps can place an underperforming project, such as the 4 LSRDs, into a "caretaker" or "non-operational" status. This does not require a specific or new authorization from Congress to do so. Nor does it require that the project be “deauthorized” by Congress first. The underlying reason for this is that a project “authorization” is not a mandate. It gives the Corps *permission* to build and operate a project for specific purposes as long as it provides economic benefit, conforms to other applicable laws and policies, such as the Endangered Species Act, and receives appropriations. When one or more of these criteria is not met, the Corps does not have permission to build or to continue operation.

Locally, an of example of placing a project into a “non-operational” status is the Willamette Lock and Dam in Portland Oregon, placed into a non-operational status in December 2001 due to low use versus the cost to operations and maintenance⁶. Once a project is in a “non-operational” status, it is Corps' policy to undertake a study, using its Section 216 study authority, to determine the final disposition of lands, structures and equipment. A *draft* Section 216 study for Willamette Lock & Dam was just completed, 16 years after the project was placed into a non-operational status⁷

It is important to note that discussions surrounding the lower Snake Dams are often couched in terms adhering to the “purpose and needs” as authorized by Congress. This is an unnecessary argument on the part of the regional federal agencies, primarily the Corps, to say that the “purpose” of a project cannot be changed without Congressional authorization. Of course it can't. However, placing a project into a “caretaker” or “non-operational” status does not change the purpose. Hence, the Corps is not constrained in anyway from considering breaching as a means of securing the safety of a non-operational dam by routing river flows around the concrete structure. Furthermore, the “needs” for these four dams never has been economically demonstrated^{8 9}.

Finally, while Congress will not need to pass any legislation under the scenario outlined herein, members could object, making it difficult for the Corps to proceed in a timely fashion. For Congress to write legislation to somehow mandate the uninterrupted operation of a project would violate the principles of congressional authorization versus appropriations. HR 3144, sponsored by Congresswoman Cathy McMorris-Rodgers, may indeed be an attempt to do so and is likely motivated by her realization that the Corps can take action to place the 4 LSRDs into a non-operational status.

It is also a long held cultural or institutional norm for local Corps districts and divisions to ignore the economic reality of a project, and, instead, go to great lengths to defend the project. This is understandable to some degree, since the Corps district offices are trying to protect their budget and livelihood. But this does not conform to the Corps' stated values toward public service and avoiding squandering taxpayer dollars, nor does it comport with the Public Trust Doctrine. Compounding this problem are the special interest groups or a small number of individuals who can parlay oversized influence with elected officials by claiming that the Corps will somehow damage locals by asserting fiscal responsibility and placing the dams into nonoperational status.

Congressional representatives and governors are often reluctant to support deauthorizing a project for fear of being perceived as taking something away from their constituents. This leads to frequent arguments between the Senior staff in Headquarters US Army Corps of Engineers (HQUSACE) and the Assistant Secretary of the Army for Civil Works (ASACW) on one hand, and the Corps field commander/staff and elected officials on the other hand, who are not faced with the budget priorities and limitations directed by the Office of Management and Budget (OMB). In short, there is never enough money to fund even high performing projects. And with the administration trying to further reduce the Corps' Civil Works budget, the Corps should be particularly attentive to eliminating poor performing projects in the manner proposed in this paper.

When the Corps places a project into a "non-operational" status, its intent is to stop spending money on it. Therefore, the Corps must first insure that before placing a project into a non-operational status it does not create a safety hazard, damage the environment, or become a nuisance, and that the project requires only minimal funds once it is non-operational. In the BPA IPR discussions, noted above, suggesting that turbine units could be mothballed, this would be very difficult and costly to do without breaching the earthen berms to allow normative river flows around the dams.¹⁰

Over the years studies have looked at drawing down the LSRD reservoirs to spillway crest or below to improve the migratory corridor and recover lost Chinook habitat. Some assume this can be achieved simply by keeping the spillway tainter gates open and letting river full flows pass over the spillway and often refer to this as "maximum spill." Maximum spill would have significant engineering and safety challenges. First, since the dams would continue to be obstacles to fish migration, maximum spill would require complete and expensive design and construction of new fish ladders. Second, the dams were designed under the assumption that the spillways would not be used continually at full flow without interruption. Hence, within a matter of a few years the spillway aprons would start eroding back into the face of the dam. This would lead to undermining and eventual failure of the concrete structure. Apron erosion already has happened at least once on the LSRDs. Drawdown to spillway crest also would leave at least 50 miles of the 140 mile corridor in a reservoir condition, while minimizing the biological benefits of an action that would eliminate all benefits from hydropower and navigation. In other words, there is not much point to partial drawdown to spillway crest. Also, this amount of spill, even with a lower head of water, would increase dissolved gas to levels harmful to fish.

Likewise, to simply “mothball” the turbines without drawdown and using only spillways, would lead to catastrophic dissolved gas levels. Indeed, this was the sole reason the remaining 12 turbine units were installed in the turbine bays after completion of the dams in 1975, since additional power was not needed. To avoid deadly dissolved gas levels caused by excessive flow over the spillways, it has been suggested that the turbine wells be used to convey all or part of the flows. Whether, at full pool, partial or complete drawdown, mothballing the turbine units cannot be done without removing the turbines and making very costly modifications to the turbine wells and draft tubes. Allowing continuous flows without these modifications would impose hydrodynamic forces on the dam that would lead to structural failure.

2. The Corps’ 2002 Environmental Impact Statement and Record of Decision provide the necessary NEPA coverage for breaching, although some updating may be required.

The 2002 EIS has breaching as a reasonable alternative in it. This EIS is used to this day to guide mitigation actions on the dams, as confirmed by the Assistant Secretary of the Army (Civil Works), (ASACW) in January 2017¹¹. Indeed the 2002 EIS states that of the four reasonable alternatives, breaching provides the best opportunity to recover salmon and steelhead. It also states that doing nothing, Alternative 1 the “existing condition”, is slightly better than Alternatives 3 and 2, more “system improvements” (fish bypass hardware) or “transportation” (of juveniles in barges around the dams), respectively. Nevertheless, the Corps selected a modified Alternative 3 that eventually included much of the “transportation” alternative¹². Since selecting these two alternatives in 2002, the Corps has spent nearly \$1 billion on them, with virtually no improvement towards salmon or steelhead recovery. This is on top of the nearly \$1 billion spent since 1988 when the Columbia River Fish Mitigation Program (CRFM) was authorized in an effort to improve fish passage around the 4 LSRDs and McNary Dam, with similar results.

Anticipating the likelihood that the Corps would want to, or would be pressured to, update the current EIS covering the LSRDs, over the past several years a diverse group of economic, engineering and environmental professionals and volunteers from various technical backgrounds including retired Corps staff, with considerable experience with the 4 LSRDs, have reviewed, updated and corrected much of the 3,000 pages of the 2002 EIS. In nearly all cases, this work followed Corps planning guidance and used data in the EIS, or if missing, compiled it from Corps, BPA and NOAA data and reports. An estimate made by knowledgeable NEPA and planning staff with Corps’ experience, indicates that about five people working full time for 4-5 months could do this. Updating is also made easier since a decision to breach would be based on the fact that the two non-breach alternatives of the 2002 Feasibility Study and EIS have largely failed to improve salmon/steelhead survival and initiate recovery. There is, of course, no need to update the non-breach alternatives, which were time consuming and costly undertakings, other than to acknowledge their inability to recover listed species and the need to move onto the remaining alternative in the 2002 EIS, breaching through channel bypass, already deemed to be the biologically preferred alternative. Thus, the most important part of the EIS to update or supplement is the Natural River Drawdown Engineering and Economics Appendices. These were rigorously reviewed and updated by the previously mentioned group of professionals, which revealed that corrections of current costs and economics readily will show additional justification for the “reasonable and prudent” use of the breach alternative.^{13 14}

3. Ongoing litigation over the latest federal biological opinion and the Court's order for a new EIS does not limit or constrain the Corps from acting in the meantime to accelerate salmon and steelhead recovery via breaching and channel bypass.

The January 2017 ASACW letter confirms that the Court's (Judge Simon's) direction for a new and broader NEPA process is a separate action, meaning it does not prevent the Corps from exercising its responsibilities to comply with existing law and regulation today. In other words, it is not a "get out of jail free card" to avoid any action until a new EIS comes out, which is probably 7-10 years away, since the new EIS will be a "programmatic" type for the entire Federal Columbia River Power System (FCRPS). Should breaching the 4 LSRDs be included as one of the many alternatives in the Programmatic EIS and a decision, through yet another process, be made to develop a breach plan, a specific EIS would have to be prepared. By that time the 2002 EIS would be at least 22 years old and the Corps would likely claim that it would be too old to update. By then the salmon and steelhead biological condition will have significantly degraded and the economic failures, evident but ignored today, will be painfully obvious. Hence, a new EIS would be started largely from scratch.

If the Corps and BPA adopt the policy approach outlined in this paper and begin breaching in the very near term, it would be up to the Court to decide what, *if any*, further NEPA, biological opinions or EIS work would be necessary to satisfy the Court's intentions to address recovery of listed species. Breaching certainly would go a long way toward satisfying these goals and likely would indeed end the litigation altogether.

The 2002 EIS took \$33 million and 7 years to complete, but could be shortened, since the breach plan in the EIS and as updated in 2016 (albeit, "unofficially"), would not require much effort to undertake. However, unless the Corps' regional leadership and offices in Portland and Walla Walla, BPA and NOAA fisheries are favorably disposed to breaching, more NEPA process and a new EIS will likely result in another round of *deja vu*. And even if "favorably disposed," this will likely take another 3-4 years to get to a breach decision by the Corps. At that point, if the Corps and BPA wanted to breach, they would need to follow the policy concepts outlined in this paper.

If not, or other special interests demand that Congress pass some sort of legislation to authorize breaching, then Corps policy is to conduct a disposition study for an existing project. This is the Section 216 process noted above and would also require Congressional direction and study appropriations. However, and a critical point, disposition studies are normally done on projects that are already in a non-operational status. At best, this study would show that the dams would need to be placed into a non-operational status first. Or as some wishful thinkers assume, the study could spell out and request authorizing language from Congress that would allow breaching and continuation of operations appropriations prior to and during breaching, in order to place the dams into a non-operational status prior to complete disposition. If this sounds like a confusing, convoluted and contradictory use of the authorizations and appropriations process, it is, and could happen only with a very determined majority effort on the part of the federal/state agencies and Congress to breach. One could assume that Congress could skip the Section 216 study process, but it doesn't simplify the conundrum noted, nor is it necessary. The most appropriate use of a Section 216 study would be in parallel to the breach process in order to determine the final disposition of lands and remaining dam structures. That is why the Corps/BPA strategy outlined herein appears to

be the only way to break out of the intractable and seemingly endless process that has been going on for at least 20 years, with no end in sight.

4. Breaching can be financed through existing debt reduction and credits mechanisms as a fish mitigation action by BPA. New appropriations are not needed.

Since BPA is the responsible bill payer for 92% of the cost of these four dams, BPA is responsible for at least 92% of the breach cost. (The 92% is an average. The cost share ranges from 98.4% for Lower Granite dam to 78% for Ice Harbor dam.¹⁵) However, if BPA sought to pursue breaching the 4 LSRDs as the most cost effective “fish mitigation” measure for salmon and steelhead recovery under the 1980 Power Planning and Conservation Act, BPA can book a 22% credit against the US Treasury debt on these dams. This has the added advantage of avoiding any of the appropriation and authorization conundrums involved in attempting to get Congress to act.

The second financial consideration that works favorably in this scenario is the cost of breaching. When originally estimated by the Corps in 1999, the cost *for full dam removal* was estimated to be \$1.8 billion¹⁶. That amount is often used as the basis for claiming that breaching would cost \$2-\$3 billion in today’s dollars. However, full dam removal was not the Corps’ recommendation for the breach alternative. It was channel bypass. Channel bypass involves removing the earthen berms on all four dams and part of the natural embankment along the two lower dams. This concept restores normative flows and chinook habitat in the entire 140 miles stretch of the lower Snake River. With channel bypass the concrete structure stays in place, which makes breaching much cheaper, while still satisfying all the biological and safety considerations.

In 1999 breaching through channel bypass for the 4 LSRDs was estimated to cost \$859 million¹⁷. However, subsequent and careful review of the planning assumptions used to develop this estimate indicates many assumptions were incorrect or unnecessary. This led to gross overestimates. For instance, in order to prevent \$400,000 in rail and railroad damage, \$109 million was estimated for bank stabilization on just one reservoir. The \$400,000 was the actual cost to repair such damage after the 1992 drawdown test of Lower Granite Dam.¹⁸ Why that figure was not used and an estimate of \$109 million developed instead is indicative of the biases found in the Corps’ assumptions and conclusions. A more reasonable estimate based on corrected assumptions gives an estimate of \$255 million in 1999 dollars for breaching via channel bypass¹⁹. In 2015 dollars the cost would be about \$339 million for all 4LSRDs. The breach cost for the first dam to be breached, Lower Granite, after taking a 22% credit, would cost only \$32 million to breach. The next dam, Little Goose, would cost \$31 million to breach. Lower Monumental and Ice Harbor would cost \$65 and \$72 million, respectively, due to the need to excavate and widen the river embankment and to relocate a rail line at Ice Harbor. These costs could be spread over a period of 4-5 years based on a breach schedule of one dam per year, if breaching were to begin in December of 2017. If not begun in 2017, the biological need to accelerate fish recovery would require breaching two dams per year. Lower Granite and Little Goose could be breached starting in December 2018, followed by breaching one dam per year for the last two dams.

To put these costs into some perspective, the Corps will end up spending about \$120 million by the end of 2018 for unnecessary juvenile fish bypass improvements just on Lower Granite dam. Of this, BPA and its ratepayers would have to repay roughly \$100 million. Another cost to add perspective is the \$40 million initial estimate for the new EIS, which likely will end up costing more than \$100

million. If breaching is started on the schedule noted, at least \$120 million of these costs could be avoided. This is enough to cover the costs of breaching three of the four LSR dams.

As this paper is being written another biological irony has surfaced in the bypass system. Invasive walleyes have found the bypass system a convenient place to find and eat juvenile salmon and steelhead, and now must be fished out by hand at the rate of around 40 a day to prevent significant ESA listed fish kills.

The third financial component concerns the debt and debt service resulting from these 4 LSRDs. Given the failed alternatives selected by the Corps in the 2002 EIS and the nearly \$1 billion spent since 2000 on these failed alternatives, e.g., little or no improvements in Smolt to Adult Returns (SARs) for salmon and steelhead, BPA ratepayers have a good argument for not repaying this debt nor the interest bearing on it. Likewise, Corps' CRFM expenditures prior to signing the EIS yielded few if any sustained recovery benefits. Therefore, these expenditures also should be exempt from repayment by the BPA ratepayers. Ratepayers should not be held accountable for the decisions made by the Corps, especially in light of the fact that over 80% of the individual comments made/sent to the Corps in 1999 supported dam breaching. While BPA has been slow at paying down its debt burden, presumably because it would significantly increase power rates, BPA must make timely interest payments to the US Treasury. These interest payments alone account for about 44% of BPA's cost to operate, maintain, and repair the 4 LSRDs and bypass systems (mitigation), and will continue to increase without debt relief. If not already, these interest payments soon will be greater than the Operations and Maintenance costs for the dams. Hence, interest payments on debt will be the largest cost item for the ratepayers' bill for the 4 LSRDs. System wide, the interest payments are about 33% of operating costs.

In addition to CRFM expenditures, to date 92% of the Corps' Operations & Maintenance and Lower Snake River Fish and Compensation Plan expenditures are also adding to the debt burden and interest payments. And, as yet unaccounted for is the additional BPA cost or debt that will accrue for the repair and replacement of the \$2 billion CRFM investment in the "systems improvements" that must be maintained, if the 4 LSRDs are to be kept in an operational mode. These repair and replacement costs are roughly 50% of the initial cost every 20 years. Those systems, if not properly maintained, will cause additional fish mortality and likely will lead the Corps to a "jeopardy" situation under the Endangered Species Act. Compensation Plan hatcheries are also in need of rehabilitation or replacement. Whether BPA or Corps funded, this will add additional cost/debt burden to BPA and its ratepayers. An example occurred in the spring of this year when juvenile fish were killed or injured on turbine fish screens and collection channels and piping. The reason this occurred was the Corps' Walla Wall Districts' failure to conduct annual maintenance on the screens and failure to repair a trash boom damaged several years ago that allowed debris to impinge upon the screens and block the bypass system. This caused further fish mortality.

There are two cost features that the BPA and the Corps are avoiding to fund further. The first is replacing 21 turbines that have exceeded their design life.²⁰ The reliability of these units continues to decline. Reliability is now around 75%. Currently there is at least one turbine down for major repairs at each dam. Other turbines are temporally unavailable due to various technical issues. Indeed, as an example of breakdowns plaguing these dams, as this document was being written, 5 of 6 turbines at Lower Monumental dam were down for an extended time. It appears from the review of programming documents that BPA has concluded that the cost of replacing these units does not pencil out. Failure to replace these turbines will mean further and longer outages, further loss of revenue, and higher dissolved gas concentrations caused by additional spill that will harm fish.

While this may seem to be a prudent cost saving measure, it is not in the face of the biological consequences of keeping the dams in place.

The other cost avoidance feature is the Corps' failure to conduct "conveyance" dredging on the lower Snake River at Lewiston, Idaho. This was conducted until 1997. Conveyance dredging is needed to remove about half of the 2 million cubic yards of material that is deposited annually in the backwater of Lower Granite reservoir. This is not the same as the dredging to maintain navigation through these same deposits, but is in addition to it. Due to the lack of Navigation Program funds and the fact that additional conveyance dredging is not needed for barge traffic to reach Lewiston, Idaho, these deposits have been building up since 1997. The build up has formed a bench-like obstruction in the Snake River that creates a backwater condition during high water events that could overtop the levees protecting Lewiston. Since conveyance dredging is a necessary requirement to keep Lower Granite dam in operation, BPA and its ratepayers are also responsible for 92% of this cost. While the Corps is hoping the navigation channel will act like a pilot channel for high flows to blow out the plug of sediments, it is just as likely that this will not happen. It all depends on the velocity of the flow event. The risk for ratepayers will be realized when Lewiston is flooded and the insurance companies come looking for the deep pockets to sue²¹.

Given all this, what is a fair and equitable solution to reduce this financial burden for all concerned? The BPA should utilize the existing 4(h)(10)(C) credits of the 1980 Power Planning and Conservation Act,²² an accounting mechanism for "fish credits" for the \$339 million breach cost. To have ratepayers cover the cost of breaching because of failed mitigation efforts by the Corps is onerous. While this author has not been able to ascertain the total debt already on the books at BPA for the 4 LSRDs, it is likely in excess of \$2 billion, based on \$1.5 billion in CRFM debt portrayed in the BPA Focus 2028 Federal Hydro review,²³ and the \$1 billion debt noted on page I12-1 in the Economics Appendix of the 2002 EIS. While these numbers are dated, a lot more debt has accumulated with little evidence of repayment. These are mostly interest payments, which, at 20% of all BPA interest payments for the hydrosystem, is disproportionately high for the 4 LSRDs, since the 4 LSRDs represent about 12% of the net hydropower generation.²⁴

Since the breach costs still would be a fraction of the CRFM debt, further debt reduction and credits should be used by BPA to cover mitigation costs, if any, for irrigators on Ice Harbor pool, at least up to a certain limit, perhaps \$150 million, to cover the construction of higher pumping costs or lower real-estate values. The 2002 EIS addresses this issue as an economic cost, but not necessarily a cost of breaching since the irrigation system is not a federal system. The 2002 EIS lists five other non-federal mitigation modifications likely required for breaching, such as water intakes and effluent diffusers for the Clear Water Paper Company in Lewiston Idaho, but does not provide cost estimates²⁵. Together the modifications should not exceed \$20 million and are well within the scope of what could be covered with mitigation credits. All other mitigation associated with breaching impacts, such as cultural resource protection, is covered in the above breach costs.

The BPA should be giving consideration to further reducing its debt, based upon the amount of lost hydropower revenue resulting from dam breaching, if any. The credit could be based on the cost difference, if any, between lost hydropower revenue and power purchases required to meet loads in BPA's balancing area. While current and projected conservation measures along with a power oversupply situation may limit the credit just described, some form of credit should be given serious consideration as a matter of compensation for debt generated by the failed CRFM program, perhaps even complete debt relief from all CRFM expenditures. Another investment area directly impacted by the failed CRFM program is habitat restoration work in the Snake River basin. Low escapement

of adult fish above the LSRDs means fish are not there in sufficient numbers to take advantage of habitat improvements. The subsequent lack of nutrients left by the absence of adult carcasses is further reducing the habitat function. Restoration work in the rest of the Columbia Basin, coastal rivers and estuaries along the Oregon and Washington coast and the Salish Sea has been impacted negatively. This is because the failure to increase runs on the Snake River has created greater “incidental take” pressure from fishing and predation on other runs in the Pacific Northwest, thus minimizing the effects of habitat restoration in those other areas.

Since BPA, State, or Tribal funded habitat restoration all have been impacted as noted above, or because funds were diverted from other habitat programs to fund the mitigation work on the 4 LSRDs, debt reduction credits should be used to fund this much needed habitat work. The formula for doing so is beyond the scope of this paper, but some immediate compensation should be estimated no later than the start of breaching, given the biological urgency facing the Pacific Northwest ecosystems. The timing of developing near term estimates of these credits, i.e., no more than one year, should also be a part of the renegotiation considerations for the Columbia River Accords.

Taxpayers will suffer, since the large amount of US Treasury debt accumulated because of the 4 LSRDs likely never will be paid back under the status quo. Taxpayers at least would benefit from increased salmon/steelhead runs, if this approach to financing via debt reduction were taken. Local economies would benefit from the survival of other listed species, such as the Southern Resident Killer Whales that depend on the chinook runs for more than 80% of their diet, a large part of which should be composed of Snake River runs. Breaching would allow for the very positive economic benefits to many communities that are derived from a natural river in terms of several thousand more agricultural, recreational and fishing jobs, direct expenditures in the region in excess of \$700 million annually as well as \$20-\$30 million in land lease revenues per year for the Washington State School budget, should the project lands be conveyed to the State. For those taxpayers that are also ratepayers of the BPA, this approach would lessen the financial risk BPA is facing in light of \$16-\$17 billion in total debt, making them the worst public utility in the country in terms of an asset to debt ratio of 93% according to a BPA budget officer²⁶. This approach also would shift Corps and BPA funds to other projects that could benefit the environment and taxpayers far more than the existing situation.

At this point with the deteriorating and harmful 4 LSRDs in place, BPA can only continue to raise rates, which will make the entire hydrosystem less competitive. Lowering costs has rightfully been a BPA priority for decades. However, an aging hydrosystem costs more money to operate, maintain and rehabilitate, not less. The effects of cost cutting have been apparent for years in lower reliability ratings, unplanned outages, fewer in service turbines, etc. Only some significant cost reduction measure, like shutting down the 4 LSRDs as outlined here, will keep the FCRPS a viable energy producer into the future.

The dam situation here is analogous to the reluctant transition from steam to diesel power, which when accomplished became the major contributor to the resurrection of American railroads in the 20th century. The choice for the Pacific Northwest is immediately to drop wasteful dams and retool the rest of the system before the White House Office of Management and Budget demands meaningful repayment of the massive outstanding debt owed the US Treasury. Such repayment demands would drive rates up so fast as to quickly make a mockery of the cheap hydropower promises or claims that have been made to date by elected officials, the Corps, BPA and dam supporting lobbying groups.

5. Breaching is far easier than originally planned, making it possible to move from a decision to breach to breaching in a matter of months, not years.

Given the relative ease of hydraulically breaching an earthen embankment, there is no need for lengthy modeling, engineering, design or complicated/lengthy contracting. New dam overtopping modeling software has been developed since the 2002 EIS was drafted which allows a safe breach plan to be created quickly. The breach itself is done in two phases. First, as drawdown of the reservoir is taking place, earth moving equipment, likely two D8 bulldozers and an excavator, will be cutting a notch in the earthen portion of the dam. When drawdown is below spillway crest and the notch cut to that depth, controlled hydraulic breaching will begin which uses the turbine gates to control flow. This takes approximately 8 hours with maximum flows not exceeding high flows normally encountered during spring runoff. Armoring protection and other channelization work can also be accomplished with several pieces of heavy equipment. The entire “construction” effort can easily be accomplished through “Time and Materials” or rental contracts. Details to the breach approach can be found in the 18 Feb 2016 Supplement (unofficial) to Appendix D Natural River Drawdown Engineers of the 2002 EIS²⁷. In short, what the Corps’ Walla Walla District originally estimated would take several years in modeling, engineering, design and contracting and well over \$70 million, can be done in a matter of months for around \$1 million.

Prepared by Jim Waddell, Civil Engineer, PE Retired, USACE Retired
September 2017

Endnotes

¹ <http://www.bpa.gov/Finance/FinancialPublicProcesses/IPR/2016IPRDocuments/Fed%20Hydro%20IPR%202%20Notes.pdf>, page 1

² http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/proposed_snake_roll_up_10.25.16.pdf, page 219

³ NOTE: As of 10 September 2017 Snake river Spring/Summer Chinook returns to Lower Granite Dam are down 55% from the 10 year average, Fall Chinook are down 60%, steelhead are down 73% and predictions for 2018 based on “jack” chinook returns looks to make it the 3rd consecutive year of plummeting returns. Source: Corps of Engineer fish ladder counts as displayed by http://www.cbr.washington.edu/dart/query/adult_daily, for each run and year. For more background as to the urgency, see the December 2015 Salmon White Paper and Surrogate Appendix, <http://www.damsense.org/wp-content/uploads/2014/12/1.Snake-River-Endangered-Salmon-White-Paper-11-4-15.pdf>, and appendix, <http://www.damsense.org/wp-content/uploads/2014/12/1.2-Appendix-1-Fall-Chinook-Surrogates.pdf>, and the White Paper on Southern Resident Killer Whales, <http://www.damsense.org/wp-content/uploads/2016/05/7.-White-Paper-Southern-Resident-Killer-Whales-2.24.16.pdf>.

⁴ <http://www.nww.usace.army.mil/Library/2002-LSR-Study/>,

⁵ <http://www.damsense.org/wp-content/uploads/2014/12/National-Economic-Analysis-of-the-Four-Lower-Snake-River-Dams-2.16.pdf>, page 6.

⁶ http://www.nwp.usace.army.mil/Portals/24/docs/locations/willamette/WFL_News_release_11-076.pdf,

⁷ <http://www.nwp.usace.army.mil/willamette/locks/>,

⁸ Corps of Engineers, Special Report on Selection of Sites Lower Snake River, March 14, 1947, paragraph 394 comes to justify a positive BCR (the report’s economic calculations showed in preceding chapters that it cost more to produce than could be made from selling it) by including two “if” conditions that are inconsistent with fair and reasonable economic calculation of benefits: “*IF* credit were taken for indirect navigation and power benefits, *which admittedly are great* and *If* additional credit were taken for the use of cheap hydroelectric power over electrical power produced by the next most economical means, full economic justification of this project on the inflated 1946 cost index would be assured”. Emphasis added. These conclusions used to justify the “need” are an example that “two wrongs can make a right” in the Corp’s world of twisting the logic and wording to get the answer they wanted.

⁹ <http://www.damsense.org/wp-content/uploads/2014/12/National-Economic-Analysis-of-the-Four-Lower-Snake-River-Dams-2.16.pdf>,

¹⁰ See note 1, above.

¹¹ <http://damsense.org/wp-content/uploads/2014/12/Waddell-Dec-w-Darcy-Letter-TO-Honorable-Michael-H-Simon-2.23.17.pdf>,

¹² <http://www.nww.usace.army.mil/portals/28/docs/environmental/lrstudy/Summary.pdf>, page 25

¹³ <http://www.damsense.org/wp-content/uploads/2016/05/Cost-of-Dams-Rebuttal-7-29-2015.pdf>, and, <http://www.damsense.org/wp-content/uploads/2015/07/Cost-LSR-Dams-1-1-2015F-2-vers-7-30-15.pdf>,

¹⁴ <http://www.damsense.org/wp-content/uploads/2014/12/National-Economic-Analysis-of-the-Four-Lower-Snake-River-Dams-2.16.pdf>, and <http://www.damsense.org/wp-content/uploads/2014/12/Regional-Economic-Dev-Summary-Reevaluation-Lower-Snake-Dams-22-Feb-16.pdf>,

¹⁵ http://www.nww.usace.army.mil/portals/28/docs/environmental/lrstudy/Appendix_I.pdf, page I12-3, para 12.2.1

¹⁶ http://www.nww.usace.army.mil/portals/28/docs/environmental/lrstudy/Appendix_D-AnnexX.pdf,

¹⁷ Ibid

¹⁸ US Army Corps of Engineers Walla Walla District, 1992 Reservoir Drawdown Test, Lower Granite and Little Goose Dams, page 133.

¹⁹ <http://www.damsense.org/wp-content/uploads/2016/05/4.-Breach-Plan-Estimate-JW-21-Feb-2105.pdf>, Page 6.

²⁰ Citations are difficult to find, as it is the absence in programming documents that show the turbine replacements are not scheduled to occur, at least for the next 20 years.

²¹ The information in this paragraph is derived from the Programmatic Sediment Management Plan (PSMP) prepared by the Corps Walla Walla District. This \$17 million study and plan was prepared in order to satisfy environmental concerns related to maintaining dredging on the lower Snake River. Principally in the Lewiston Idaho area. The District did not however consider breaching and the elimination of waterborne navigation in the alternatives as they claimed it did not satisfy the “purpose and needs” argument. When challenged with public comments showing that the BCR for navigation was too low to justify the “need”, the District then used economic data incorrectly from the 2002 EIS to support their claim for the “need”. Based on the 2002 EIS, their claim of substantial navigation benefits was

shown to be in error in a paper entitled “*Commercial Navigation on the Lower Snake River, Two Wrongs Don’t Make a Right*”, and can be found at http://www.damsense.org/wp-content/uploads/2014/12/Report_LSD-Commercial-Navigation.pdf. It is important to also note that this PSMP shows that movement and deposition of sediment deposits in the river is not harmful to the river ecology and that the continuing deposition of sediments in the Lewiston and Clarkston area of the river are a significant problem in terms of elevating flood risk in Lewiston. Both these points and the fact that these sediments are a natural part of this river system are further supportive of the breaching alternative. The PSMP can be found at

http://www.nww.usace.army.mil/Portals/28/docs/programsandprojects/psmp/PSMP_FEIS_Final_Combined_8-13-14.pdf.

²² 4h10c is a section of the 1980 Power Planning and Conservation Act that BPA refers to when applying for US Treasury credits resulting from the non-hydro portion (e.g., navigation and irrigation) of various fish and wildlife expenses. The section says little about this, but is frequently cited since the clause refers to the Act not changing past accounting practices, that is taking a 22% credit for the non-hydro expenses. A display of these cost can be found on chart 22 of the briefing at: <http://www.bpa.gov/Finance/CostVerification/Documents/20130719-Slice-True-Up-101-Presentation.pdf>

²³ http://www.bpa.gov/Finance/FinancialPublicProcesses/2028/doc2028/Focus%202028_Federal%20Hydro.pdf,

page 7.

²⁴ <http://www.bpa.gov/Finance/FinancialPublicProcesses/IPR/2016IPRDocuments/2016-IPR-CIR-Hydro-Draft-Asset-Strategy.pdf>, chart 23.

²⁵ http://www.nww.usace.army.mil/portals/28/docs/environmental/lrstudy/Appendix_D-AnnexX.pdf, Annexes O through T.

²⁶ <http://www.cbbulletin.com/438250.aspx>,

See also financial report from Moody’s that says that Asset to Debt ratio is 95%,

<http://www.bpa.gov/Finance/FinancialInformation/Debt/RatingAgencyReportsArticles/Moody's%20April%202016%20Final%20Report.pdf>.

²⁷ <http://www.damsense.org/wp-content/uploads/2016/05/4.-Breach-Plan-Estimate-JW-21-Feb-2105.pdf>