Snake River Water Overheating Threatens Salmon Survival — Cooling the Snake River by Dam Breaching Is the only Remaining Approved EIS Option

Warm Water Temperatures Threaten the Survival and Recovery of ESA-Listed Salmon

- Water temperatures in the Snake/Columbia Rivers are critically important for migrating salmon and steelhead ("salmon").
- Wild salmon in the Pacific Northwest migrate best at a water temperature of around 16°-18° Centigrade (°C). This temperature optimizes the metabolism and growth rates of juveniles migrating downstream. For adults returning to their spawning grounds, 18°C optimizes their ability to conserve energy, which is critical to successful migration and spawning.
- Hotter water carries less oxygen, which means when salmon migrate through it, there is less oxygen available to them. Reduced oxygen intake can weaken or kill salmon.
- The Snake River reservoirs behind the dams are a known heat sink throughout the depths of their water columns. Warm impounded river water moves more slowly downstream than a free flowing river. This can disrupt migration timing and cause salmon to miss migrating during optimal river temperatures, which in turn can cause mass die-offs, such as occurred during the 2013-2015 adult sockeye migrations.
- Temperature reduction measures for the dams have had little effect, and are becoming even less effective each year due to climate change.
- NOAA temperature forecasts for 2016 indicate that the Pacific Northwest will again have higher than average temperatures. This is already evidenced by faster snow pack melt.
- The 99% loss of Snake River sockeye in 2015, when adult sockeye were migrating upriver through water that reached temperatures as high as 74°F (23°C), in light of continuing climate change, points to the rapid extinction of Snake River salmon, unless immediate action is taken.

Reservoir Drawdown Followed by Breaching the Dams Will Cool the Snake River

- A free flowing lower Snake River would result in decreased daily and hourly water temperatures, both on micro-geographic and entire reach-wide scales. This is due to downstream water mixing through turbulence, faster water velocities over rapids and riffles, intermixed deeper scoured pools that expose substrate buried river, nighttime cooling dynamics, and spring flow that is cooler.
- Lowering a reservoir is termed "drawdown." The Army Corps of Engineers ("Corps") conducted a drawdown test in 1992 that established that the reservoir behind Lower Granite dam could be safely drawn down for emergencies or dam breaching, among other things.
- The reservoir was drawn down during the test to permit free-flow through fully opened gates over spillway crest. The test was conducted to better plan for either a partial drawdown to spillway crest, full drawdown to natural or normative river, or dam breach scenarios. The Corps reduced about one-third of the reservoir to a free flowing channel in the upper reaches below the confluence of the Snake and Clearwater Rivers. The

approximate six-fold increase in water velocity that resulted from the drawdown would greatly benefit juvenile salmon in their outmigration.

- Concerns about turbidity (sediment suspended in water) from eroding channel sediments during the drawdown test were unfounded. Turbidity cleared itself in the flowing water column downriver to the McNary reservoir in the Columbia River in about two weeks.
- Drawdown will speed up the river flow and provide some cooling to the water, which will help avoid mass salmon die-offs if, or more likely when, the Snake River begins to overheat in 2016.
- Reservoir drawdown behind Lower Granite Dam in early summer will provide the needed and only measurable improvements to increase survival of juveniles and returning adults.
- Drawdown will result in temperature improvements behind Lower Granite Dam, and will also cool the downstream reservoirs. In addition, due to drawdown, the colder flows from Dworshak Dam will have a greater cooling effect on the lower Snake.

Mechanics of Drawdown and Dam Breaching

- Drawdown needs to begin in a matter of weeks to save the salmon from an overheated river. The NEPA documentation available to cover such an action is the *2002 Lower Snake River Juvenile Migration Feasibility Study/Environmental Impact Statement* ("*2002 EIS*"). This EIS and Record of Decision is the working, operable EIS for the Corps' current attempts to improve salmon migration and operate the dams.
- The Corps' attempts to improve fish passage have failed, leaving only one Reasonable and Prudent Alternative available in the *2002 EIS*, drawdown and channel bypass to restore natural river flows, aka, breaching.
- Given the unique fish ladder pumping arrangements at lower Granite Dam, the only course of action available to reduce temperatures this summer is to begin drawdown of the Lower Granite reservoir in June, instead of November 2016 or some later date. In the context of the existing EIS, drawdown is the necessary precursor to breaching. Breaching would begin in December of 2016.
- The technical management teams should not wait for the forebay temperature in the surface water photic zone to reach to 68°F (20°C) before beginning drawdown, since the reservoir drawdown rate should not exceed one to two feet per day (1 ft for the first 25 ft).
- The targeted temperatures should be 64°-68°F (18°-20°C), through as large a geographic riverine footprint as practical.
- To maintain the integrity of the NEPA process and the *2002 EIS*, actual breaching by channel bypass (breaching the earthen portion of the dam while leaving the concrete structures in place) should be started in December 2016.[1]
- The contractor currently constructing juvenile bypass improvements at Lower Granite is capable of modifying existing pumps, but should be given a stop work order as soon as possible, to avoid additional lost work and expenditures.

[1] Drawdown should be done only once. Drawdown and refilling the pool was shown to have undesirable biological effects, led to embankment failures and road damage, and would further reduce the already low economic benefits of current dam operations.