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Our Debt to the River: The Scientific Case Against Industrial Salmon Hatcheries



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Our Debt to the River: The Scientific Case Against Industrial Salmon Hatcheries

Anyone who spends time on our rivers understands the profound story they tell—a story of return, resilience, and relationships as old as the mountains. But that story is becoming frayed. Wild salmon, the heart of this cycle, have experienced a region-wide decline, and a convenient myth is partly to blame. For decades, the prevailing narrative has been that industrial-scale hatcheries could compensate for our impacts to the freshwater environment. The feeling of loss that comes with seeing this strategy fail is not something to ignore; it's a call to action, demanding that we look honestly at the science.

A powerful **viewpoint paper in *Aquaculture, Fish and Fisheries***

(<https://onlinelibrary.wiley.com/doi/10.1002/aff2.70103>) by researcher Benjamin William Van Alen provides this exact clarity. It argues that the five billion hatchery salmon released annually don't supplement wild returns—they actively supplant them. The paper explains that the fundamental flaw in the hatchery strategy is the belief that the ocean is an infinite resource and freshwater habitats are the sole limiting factor. We've heard this before: the endless forests, the endless herds of buffalo, the endless *fill in the blank*. The reality, as Van Alen states, is:

“The ocean is already full of locally adapted biota. Nature abhors a vacuum. There is not, and will never be, an open niche for hatchery salmon.”

When billions of hatchery fish are released, they compete directly with wild fish for limited food and space. This is why the author concludes it is “wild reduction, not hatchery production.”

This intense competition drives a process of “ecological overshoot,” a concept first quantified in a **2002 PNAS study** (<https://www.pnas.org/doi/pdf/10.1073/pnas.142033699>) showing that the global human economy is consuming more than the Earth can regenerate annually. The salmon paper demonstrates this on a regional scale through what it calls “nutrient mining.” Wild salmon are a keystone species precisely because they perform a vital function: they return to their home streams to spawn, die, and provide dividends on their ocean migration back to the river, delivering a wave of marine-derived nutrients that fertilizes the entire ecosystem. As Van Alen poignantly puts it, wild salmon are “literally dying for more.”

This is in part because humans dammed, dredged, logged, mined, and extracted as much as we could— from these waters—but we have also taken to releasing billions of artificially reared fish. Fish hatcheries, built as a quick fix, have often made the problem worse by replacing diverse, self-sustaining runs with uniform, less resilient fish. When only a few wild salmon make it home and natural balances are disrupted, their young—the smolts—can end up carrying more nutrients away to the ocean than the adults bring back, due to how few of them survive. Over time, this human-caused imbalance can flip the river from a lifeline nourished by salmon to a system being quietly drained, reversing an ancient cycle that once fueled life in the watersheds of the Pacific Northwest.

These impacts ripple far beyond the fish themselves. New research in ***Marine Ecology Progress Series*** (<https://www.int-res.com/journals/meps>) shows that artificially high salmon numbers from hatcheries—especially pink salmon in the North Pacific—can reshape entire marine food webs, altering plankton communities, depleting forage fish, and reducing the resilience of seabirds and marine mammals. These cascading effects undermine the very ocean productivity that wild salmon, and countless other species, rely on. Industrial hatchery production doesn't just weaken wild salmon runs—it can destabilize the ecosystems that sustain life from microscopic algae to killer whales.

The evidence of this failure is stark. Van Alen's paper highlights how the productivity of Fraser River sockeye salmon has steadily declined since large-scale hatchery releases began. In contrast, in Bristol Bay—where there are no production salmon hatcheries—productivity has remained stable and robust. This is not a coincidence. The data also reveal a coast-wide pattern of collapsing forage fish populations, like herring and eulachon, in the same regions dominated by industrial

...the pattern of collapsing forage fish populations, like herring and coho, in the same regions dominated by massive hatchery releases.

The paper’s conclusion is direct and unavoidable:

“The rebuilding of wild salmon is impossible with continued production releases of hatchery salmon.”

The path forward, then, is not to continue funding a failed experiment but to change course based on the clear evidence. The most critical and immediate step is for fisheries managers to significantly reduce hatchery releases in regions where they directly compete with and replace wild fish populations. This means prioritizing the health of wild, self-sustaining runs over artificial production targets that degrade the entire ecosystem.

It also requires supporting organizations that advocate for wild fish, speaking up at public fishery management meetings, and sharing this science with our communities. Wild salmon have always fulfilled their responsibility to the river; it’s time we fulfilled ours to them.

Do you have a legal or policy concern?

We often hear from citizens worried that environmental laws aren’t being followed. When that happens, we work with legal teams to evaluate whether action needs to be taken and, if warranted, use the court system to enforce laws like the Clean Water Act, Endangered Species Act, and other laws designed to protect wild fish. You can **share your legal or policy concerns with us through our online form** (<https://wildfishconservancy.org/take-action/>).

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