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# Beyond Water Volume in the Klamath Basin: Realizing Solutions For Fish, Farms, and Wildlife

Few opinions are more deeply embedded in Klamath Basin water debates than the notion that more water automatically produces more fish. However, decades of fisheries science and more than 25 years of experience in the Basin tell a different, more complex story.

Fish health depends on far more than one input. Water temperature, habitat quality, dissolved oxygen, disease, predation, historic fishing pressures, ocean conditions, and other overall ecosystem conditions all play critical roles in determining survival and recovery.

Since 2001, water management in the Klamath Basin has been heavily influenced by mandates issued under the Endangered Species Act (ESA) for the purpose of protecting listed fish species. As a result, water allocations have increasingly prioritized instream water volumes, often leaving farms, ranches, wildlife refuges, and rural communities with reduced water supplies. Yet, despite these regulatory actions, fish populations have not improved.

**Why Water Temperature Matters**
High water temperatures, harmful algae blooms, low dissolved oxygen levels, and disease outbreaks can undermine fish survival regardless of how much water is allocated to flow volumes for fish.

Upper Klamath Lake illustrates this challenge. The lake naturally experiences elevated summer water temperatures and heavy nutrient loads. Water in the lake accumulates nutrients and heat. This warm, nutrient-loaded water is then released downstream into the Klamath River.

For salmon, this warm water from Upper Klamath Lake increases stress, reduces dissolved oxygen, and creates conditions that favor disease. For example, numerous studies show that warmer water increases both infection severity and mortality associated with *Ceratonova shasta*, one of the most significant diseases affecting salmon in the Klamath system. This research shows that temperature, under certain conditions, is a stronger predictor of disease-related infection or mortality than flow volume.

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These findings illustrate a broader lesson for Basin management: increasing water volume alone cannot overcome other limiting factors when water quality and temperature conditions remain unfavorable. Fish recovery depends on addressing the conditions that directly influence survival, not simply increasing the quantity of water moving through the system.

**What Early Post Dam Removal Monitoring Has Told Us**

The same principle applies to habitat restoration efforts. Restoring access to habitat is critical for long-term recovery, but habitat access alone, like water volume, cannot overcome the water quality, temperature, and disease challenges that continue to affect fish throughout the Basin.

For years, dam removal was viewed as the most significant opportunity for fisheries recovery. Reconnecting hundreds of miles of habitat and restoring fish passage were expected to provide substantial benefits for salmon populations. The rapid migration of Chinook salmon into areas above the former dam sites exceeded expectations and represents an important restoration milestone.

Yet, in Spring 2026, researchers reported that nearly half of the sampled juvenile Chinook salmon carried *Ceratonova shasta*, with approximately one-fifth showing infection levels associated with mortality. These findings were documented in areas newly accessible to salmon following dam removal, illustrating that disease, temperature, and water quality challenges persist even where habitat has been restored.

The lesson is not that habitat restoration is unimportant, but that recovery depends on addressing multiple limiting factors simultaneously. Just as additional water volume has not guaranteed recovery, expanded habitat cannot eliminate temperature stress, disease pressure, or poor water quality conditions.

As stakeholders consider the next phase of recovery efforts, the focus should expand toward integrated approaches that improve overall biological conditions. Opportunities exist to improve water quality, moderate temperatures, restore ecosystem function, and support fish, wildlife, farms, and rural communities simultaneously. The burden of addressing remaining challenges cannot continue to fall disproportionately on agricultural communities, wildlife refuges, rural economies, or other species that also depend upon Basin water.

**Opportunities to Restore the Basin**

Projects such as Tule Lake Flow-Through offer one example of a broader, integrated approach. Rather than releasing nutrient-rich water directly from Upper Klamath Lake downstream, water would move continuously through agricultural lands, wetlands, and wildlife refuges, where it can benefit from natural treatment processes that can help reduce nutrient concentrations, improve water quality, support groundwater recharge, and moderate temperatures before re-entering the river system. Similar treatment-wetland systems throughout the West have demonstrated measurable reductions in nutrient loading and improvements in water quality through biological uptake and natural filtration processes, although outcomes vary by location and operating conditions.

Perhaps most importantly, Flow-Through is intended to create benefits across multiple parts of the ecosystem. If successful, it could support endangered suckers, improve water quality

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conditions for salmon, enhance wetland habitat for migratory birds and other wildlife, contribute to groundwater recharge, and help sustain the agricultural communities that remain vital to the Basin's economy and culture.

While additional analysis, monitoring, and implementation work will be needed to fully evaluate these outcomes, the concept illustrates the potential for more integrated water management approaches that seek to deliver benefits across multiple Basin interests.

**Moving Toward Meaningful Solutions**

The Klamath Basin has spent nearly three decades focused primarily on a single management approach: dividing up available water according to subjective ESA mandates. This narrow approach has failed.

However, we have a real opportunity to move beyond decades of conflict and toward solutions that improve conditions for fish while sustaining the farms, refuges, wildlife, and communities that also depend upon Basin water. The Klamath Basin has the resources, infrastructure, expertise, and drive to make it happen.

The solution is achievable.

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**About Klamath Water Users Association (KWUA)**

Since 1953, the KWUA has been a 501(c)(4) non-profit corporation representing the interests of Klamath Project farmers and ranchers. KWUA members include rural and suburban irrigation districts, public agencies, and private individuals who operate on both sides of the California/Oregon border. These entities and individuals typically hold water delivery contracts with the U.S. Bureau of Reclamation. The Project is home to over 1,200 family farms and ranches; KWUA's member districts deliver irrigation water to over 170,000 acres of some of the most productive farmland in the Western United States.

KWUA's mission is to preserve and enhance the viability of irrigated agriculture for our membership in the Klamath Basin for the benefit of current and future generations.

KWUA is governed by an eleven-member Board of Directors representing Project districts. The Association employs an Executive Director and staff to execute its policies and priorities.