



The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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CLIMATE CHANGE: BEST AVAILABLE SCIENCE

CLIMATE CHANGE & THE IMPACT OF NORTHWEST DAMS ON SALMON & STEELHEAD

by Stephen Mashuda, Earthjustice (Seattle, WA)

Introduction

The 1,200 mile Columbia River system, including its largest tributary, the Snake River, is the fourth largest river basin on the continent. It covers a region the size of France with a watershed that varies from the snow-covered spine of the Rocky Mountains, to the high deserts of Idaho, Oregon, and Washington, to the rain-soaked western Cascades. The Columbia watershed is the most heavily dammed in the nation, the product of more than a century of determined dam building.

Because they stand between most of the watershed's salmon and the Pacific Ocean, the eight federal dams on the Columbia and Snake Rivers have been the focus of efforts to recover salmon for decades. For the better part of the past 25 years, those efforts have focused on a series of biological opinions prepared in serially failed attempts to ensure that the continued operation of these federal dams does not jeopardize the survival and recovery of over a dozen species of salmon and steelhead protected by the federal Endangered Species Act (ESA).

The first case concerning the validity of a **biological opinion** (BiOp) for the operation of the federal dams on the Columbia and Snake Rivers was decided twenty-three years ago this month. In that decision, Federal District Court Judge Malcolm Marsh wrote that the federal agencies' efforts to address the harms caused by these dams "is seriously, 'significantly,' flawed because it is too heavily geared towards a status quo that has allowed all forms of river activity to proceed in a deficit situation...when the situation literally cries out for a major overhaul." *Idaho Dept. of Fish and Game v. Nat'l Marine Fisheries Service*, 850 F.Supp. 886, 900 (D. Or. 1994).

A decade later, after finding that another BiOp violated the ESA (at that point, the third such decision), Federal District Court Judge James Redden wrote that, "[T]he government's inaction appears to some parties to be a strategy intended to avoid making hard choices and offending those who favor the status quo. Without real action from the Action Agencies, the result will be the loss of the wild salmon." *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, No. CV 01-640-RE, 2005 WL 2488447, at *3 (D. Or. Oct. 7, 2005), *aff'd*, 524 F.3d 917 (9th Cir. 2008).

Less than a year ago, another federal judge, Judge Michael Simon — the third to examine the federal government's compliance with the ESA in Columbia River system in as many decades — observed:

The Federal Columbia River Power System remains a system that "cries out" for a new approach and for new thinking if wild Pacific salmon and steelhead, which have been in these waters since well before the arrival of homo sapiens, are to have any reasonable chance of surviving their encounter with modern man.

Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 184 F.Supp.3d 861, 876 (D. Or. 2016) (*NWF v. NMFS*).

Climate Change & the ESA

Evolving Science

"Best Available"

No Jeopardy

ESA Section 7 Consultation

2014 BiOp

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As these conclusions illustrate, the story of litigation over the harms to salmon caused by these eight federal dams is correctly understood as a battle to change a long-entrenched status quo. But the "status quo" ain't what it used to be. Over this same period, the additional harm to salmon and steelhead caused by climate change has become both more apparent and well-documented. As Judge Simon held in the course of a comprehensive rejection of the 2014 BiOp, the federal agencies who manage these dams have failed to keep pace with the evolving state of the "best available science" regarding the impacts of climate change. In rejecting the agencies' treatment of climate change in the 2014 BiOp, this opinion also outlined what federal agencies must and can do when considering their actions in the context of the harms from climate change. While the federal District Court's holding and reasoning provides much-needed guidance for the National Marine Fisheries Service and other agencies in the long-running battle over dams and salmon, this decision will also help to define what constitutes the "best available science" for other agency actions that must be evaluated in the context of a warming world.

The Requirements of ESA Section 7

Section 7 of the ESA requires that any federal agency undertaking an action must ensure that its action will not jeopardize the continued existence of any threatened or endangered species. Whenever an agency proposing an action determines that it "may affect" a listed species, Section 7 requires the agency to consult with one or both of the federal wildlife agencies depending on the species affected. In the case of Pacific salmon and steelhead, that agency is the National Marine Fisheries Service (NMFS or NOAA Fisheries). If NMFS determines that the action is likely to adversely affect a species, it must prepare a BiOp to determine whether the action is likely to jeopardize the survival and recovery of the species and/or destroy or adversely modify their critical habitat. If NMFS finds that the action will likely have either of these effects, it may propose, and the action agency can adopt, a "reasonable and prudent alternative" (RPA) that would avoid jeopardy or adverse modification and allow the action to move ahead. If there is no RPA, the action cannot commence or continue. Throughout this process, Section 7 requires all of the agencies involved to "use the best scientific and commercial data available." 16 U.S.C. § 1536(a)(2).

The 2014 BiOp concluded that continued dam operations would cause jeopardy and result in the destruction or adverse modification of critical habitat. NMFS therefore proposed an RPA consisting of 73 actions, such as tweaks to dam operations and a suite of tributary and estuary habitat restoration projects that, in its view, would avoid jeopardy and adverse modification. The 2014 BiOp, like its predecessors, was challenged by a plaintiffs' coalition of commercial and sport-fishing groups, conservationists, and clean energy advocates. The State of Oregon also challenged the BiOp as an intervenor-plaintiff, and the Nez Perce Tribe supported the plaintiffs as amicus curiae.

Climate Change: NMFS's Treatment of Recent Science

In the 2014 BiOp, NMFS devoted over 30 pages to summarizing and cataloguing the growing body of scientific evidence — much of it prepared by NMFS — documenting the effects of climate change in the Columbia Basin and in the marine environment. NMFS summarized the evidence showing that stream temperatures continue to rise throughout the watershed, with effects on all freshwater life stages of salmon. It presented, for example, recent evidence showing that high water temperatures in the Snake River had twice blocked salmon passage in 2013 alone, causing the loss of 30% of returning endangered Snake River Sockeye and 7-12% of Snake River fall Chinook and steelhead. NMFS also summarized numerous studies showing changes in the timing and type of precipitation that resulted in continued decreases in freshwater stream flows during the summer months.

The agency also presented evidence from recent studies showing dramatic contractions of suitable marine habitat (up to an 88% decrease of summer range for Chinook) expected for all species of salmon by 2080. As that study makes clear, these marine habitat contractions are already occurring and will result in a 24% reduction in ocean Chinook summer habitat by the 2020s.

But while NMFS catalogued this information in the BiOp, it failed to use it in any significant way. It did not, for example, propose additional actions to address these additive harms, nor did it evaluate the efficacy of its RPA in the context of climate change science showing the increased harm to salmon over time. Instead, it dismissed all of this information as providing "additional details" that are "generally consistent with" or "within the range of assumptions" and its "expectations" about climate impacts in its previous decisions. The plaintiffs challenged NMFS's failure to use the best available climate science as a violation of ESA Section 7.

Climate Change & the ESA

Additive Stressor

Double Count

Habitat Improvement

Temporal Mismatch

The Court's Decision

After a detailed analysis of the record, the federal district court (Court) rejected NMFS's approach as arbitrary and capricious and contrary to the ESA. *See NWF v. NMFS*, 184 F.Supp.3d at 914-923. The Court found that the agency's failure to apply any of the increasingly detailed scientific information about the present and future impacts of climate change infected its analysis in three primary ways.

First, it held that without a full analysis of the impacts of climate change, NMFS could not adequately define or analyze the true extent of the problem facing salmon harmed by the hydrosystem, and thus could not draw a rational conclusion that the RPA it proposed as necessary to avoid jeopardy, would actually do so. Because the best science available to the agency demonstrates that climate change acts as an additive stressor on salmon populations — above and beyond the harms caused by the dams — the agency cannot assume that the dams are operating against the backdrop of a steady state where the future will be much like the recent past.

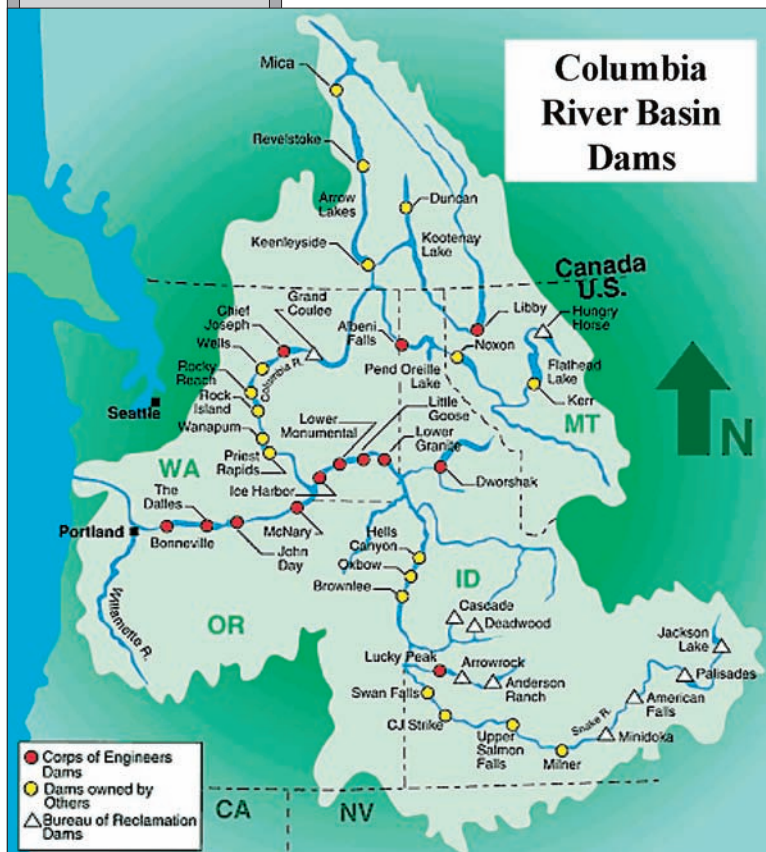
In reaching this conclusion, the Court rejected NMFS's argument that it need not define the magnitude of the problem because it determined that its RPA contained the types of actions that one would take to mitigate for climate effects. *See id.* at 916-917, 920. Plaintiffs argued that the agency could not double-count the actions in its RPA — which NMFS calculated to offset the harms caused only by the current operation of the dams — as also serving to mitigate for the additional harm caused by climate change. The Court determined that NMFS's comparative approach could not substitute for an actual analysis, holding that "it is not clear that the actions *are sufficient in number and magnitude* to ameliorate for climate change, even if they are *of a type* that might ameliorate for climate change." *Id.* at 920 (emphasis in original).

Second, the Court decided that the agency did not consider the effects that worsening conditions from climate change would have on the efficacy of the mitigation actions that it did propose in the RPA. In other words, NMFS could not double-count its RPA actions to offset both harm from dams and harm from climate change. As noted above, NMFS's "no jeopardy" finding for its RPA rested on a suite of habitat improvement actions in tributary streams and in the Columbia River estuary. NMFS concluded — albeit arbitrarily (*see id.* at 902-914) — that these habitat improvements would eventually make up for the harm caused by the ongoing operation of the dams. In making this finding, however, the agency did not consider "whether the survival benefits attributed to habitat actions would be diminished by the future effects of climate change." *Id.* at 918. Nor did it consider whether additional actions would be necessary to achieve the same results in light of the harm caused by climate change. While the agency had before it "information that climate change may well diminish or eliminate the effectiveness of some of the

BiOp's habitat mitigation actions," the Court found that it arbitrarily failed to analyze or account for these effects. *Id.*

NMFS also argued that it need not consider climate change effects beyond the ten-year period of the BiOp. However, NMFS explicitly based its "no jeopardy" finding on benefits from these habitat actions that would not likely accrue, if at all, until the 2030s or beyond. *See id.* at 918-919. The Court rejected this temporal mismatch as arbitrary and determined that the agency's analysis of climate impacts must be at least coextensive with its biological projections of the status of the species and its projections of benefits from habitat mitigation actions. *Id.* at 918.

Finally, the Court concluded that NMFS failed to account for the fact that climate change also increases the likelihood of catastrophic events "that can quickly imperil the listed species." *Id.* at 922. While not a factor in the Court's opinion, the region experienced just such a catastrophic event in the summer of 2015 when dry conditions, low flows, and high temperatures all contributed to unprecedented salmon mortality in the Columbia and Snake Rivers. More than 98% of the returning endangered Snake River Sockeye were killed that summer along with over 250,000 other adult salmon. As that, and several less severe examples demonstrate, "such a potential catastrophe should be considered." *Id.* at 923.



Climate Change & the ESA

New BiOp

CVP Approach

Fish Passage

NMFS Guidance

Uncertainty Allowed

Where Do We Go From Here?

After finding these and many other violations, the Court remanded the 2014 BiOp to NMFS, which now has until the end of 2018 to produce a new BiOp that complies with the ESA. While the discussion and reasoning in the opinion provides extensive guidance for NMFS to properly consider climate change in its analysis, at least two other sources provide additional guidance for the agency on remand.

First, as the Court noted throughout its discussion of climate change, NMFS's approach to this issue in the Columbia and Snake Rivers stands in stark contrast to its treatment of climate change in a similar BiOp for the operation of the dams and reservoirs that comprise the Central Valley Project (CVP) in California. Contrary to the approach it took in the Columbia/Snake BiOp, the analysis in the CVP BiOp: (1) looked at a projected range of future climate conditions; (2) analyzed the effects of those conditions on the affected salmon and steelhead in addition to the harms caused by the dams; and (3) determined that additional actions — above and beyond what is necessary to mitigate the harm from the dams — were needed to account for the additive harms from climate change. To accomplish this last goal, NMFS proposed, among other things, a detailed examination of fish passage above Shasta and Folsom dams to give fish access to high-elevation habitat currently blocked by those projects. Similar actions focused on the impacts of climate were missing entirely from the 2014 BiOp in the Columbia and Snake River systems.

Second, NMFS finalized its “*Guidance for Treatment of Climate Change in NMFS Endangered Species Act Decisions*” in September 2016 (“Guidance” available at: www.nmfs.noaa.gov/op/pds/documents/02/110/02-110-18.pdf). This guidance, while not as comprehensive as the decision in *NWF v. NMFS*, dovetails favorably with some of the issues decided in that case. (The Guidance applies to the agency's listing and critical habitat determinations under Section 4 of the ESA, 16 U.S.C. § 1533; those applications are not the subject of the present article.)

Like the Court's decision in *NWF v. NMFS*, the Guidance confirms that the “best available science” about climate change need not be 100% precise or certain to be used and analyzed in Section 7 consultations. The Guidance at 1 recognized that ESA's “best available science standard does not require that information be free from uncertainty” in order for NMFS to consider and act upon it. Compare that with the Court's statement in *NWF v. NMFS*, 184 F.Supp.3d at 921, which noted that “the ESA does not require scientific certainty” and that “uncertainty does not excuse NOAA Fisheries from conducting an



Climate Change & the ESA

Precautionary Approach

analysis using the best available science regarding climate change and its effects.” Indeed, the Guidance recognizes that “[C]urrent climate change information indicates that both uncertainty of climate projections and the degree of risk to many species from climate change increase over time.” It also specifically emphasized that “NMFS does not need to know with precision the magnitude of change over the relevant time period if the best available information allows NMFS to reasonably project the directionality of climate change and overall extent of effects to the species or its habitat.” Guidance at 3.

NMFS also recognized that the ESA’s principle of “institutionalized caution” should be applied when considering the effects of climate change under Section 7. *Id.* The ESA requires that federal agencies apply a precautionary approach when evaluating the impacts of their actions. This “institutionalized caution” mandate requires agencies to place the burden of risk on the project being evaluated, not on the species. *See Wash. Toxics Coal. v. EPA*, 413 F.3d 1024, 1035 (9th Cir. 2005) (“Placing the burden on the acting agency to prove the action is non-jeopardizing is consistent with the purpose of the ESA and what we have termed its ‘institutionalized caution mandate[]’”) (citation omitted).

Timeframe Consideration

Finally, in contrast to the agency’s arguments about the timeframe for analysis in *NWF v. NMFS* discussed above, the Guidance specifically recognized that the agency should “project climate effects over the timeframe of the action’s direct and indirect effects.” The Guidance pointed out: “It will usually be the case that consideration is not limited to only the duration of the specified activity, but also to its continuing effects for the foreseeable future.” Guidance at 3.

Conclusion: What’s Next?

Habitat Decisions

While these legal concepts are important, it is instructive to think about how their application could drive management decisions in practice. The Snake River basin in Idaho contains the best habitat remaining for salmon in the lower 48 states — and offers the highest chance for salmon recovery in the Columbia River watershed. This vast complex of federally-protected Roadless Wilderness in central Idaho is home to high-elevation, cold streams fed by snowpack that will be the last areas to be affected by climate change. It is known as Noah’s Ark for salmon in a warming world. This is habitat that cannot be improved upon or fixed; it has not been altered in the first place. But right now this habitat is missing the salmon and steelhead that should be filling these streams in large numbers. If the federal agencies are taking a hard look at the impacts of climate change in the Columbia River basin, they will need to consider what is keeping fish from getting to and from these increasingly valuable pristine spawning streams. As scientists both inside and outside the government have pointed out for years, the primary impediments are the four Lower Snake River dams.

Dam Impediments

Judge Simon observed last May that an open-minded evaluation of all available alternatives, including removing these dams, “may be able to break through any logjam that simply maintains the precarious status quo.” *NWF v. NMFS*, 184 F.Supp.3d at 878. In a system where the “status quo” looks worse for salmon every year, a full and transparent consideration of the impacts of climate change in the agencies’ upcoming decisions must put removal of these dams front and center.

Dam Removal?

Disclaimer: While formed in the course of representing clients in litigation concerning the impacts of dams on salmon and steelhead, the views expressed in this article are the author’s own and should not be attributed to Earthjustice or its clients.

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Restoration & CWA Compliance

FERC Relicensing

Thermal Load

Nonpoint Sources

Quality Trading Program

RESTORATION AS COMPLIANCE

WATERSHED RESTORATION AS A REGULATORY COMPLIANCE TOOL

by Richard M. Glick and Michelle Smith, Davis Wright Tremaine (Portland, OR)

Introduction

Idaho Power Company (IPC) is currently in the process of relicensing the Hells Canyon Complex hydroelectric project (Hells Canyon Complex) with the Federal Energy Regulatory Commission (FERC). The Hells Canyon Complex consists of three dams on the Snake River, located in the reach forming the border between Oregon and Idaho. As part of its relicensing, IPC must obtain certification under the federal Clean Water Act (CWA) section 401 from both Oregon and Idaho determining that the water quality standards of each state will be protected.

As explained in more detail in the following article in this issue, IPC has proposed an innovative, watershed-scale restoration strategy to reduce thermal loads upstream of the Hells Canyon Complex. This proposal would address temperature water quality standards by offsetting the temperature load allocation given to the Hells Canyon Complex under the Snake River-Hells Canyon Total Maximum Daily Load (TMDL). The strategy is called the Snake River Stewardship Program (SRSP), developed by IPC with The Freshwater Trust. The purpose of this article is to explain that program's legal underpinnings. The Oregon and Idaho Departments of Environmental Quality (ODEQ and IDEQ) are evaluating the SRSP as a tool to provide reasonable assurance of CWA compliance.

At the outset, we note that certification under CWA section 401 is a different legal context than that which applies to "point sources," i.e. end-of-pipe dischargers of pollutants. Point sources require a discharge permit under the National Pollutant Discharge Elimination System (NPDES) program pursuant to section 402 of the CWA. Dams are not considered point sources subject to a discharge permit requirement. *See, National Wildlife Federation v. Gorsuch*, 693 F.2d 156 (D. C. Cir.1982).

More diffuse sources of discharge are called "nonpoint sources," which are generally not required to obtain a discharge permit. Hydroelectric dams undergoing the FERC licensing process, however, are subject to section 401 certification. *See, S. D. Warren Co. v. Maine Board of Environmental Protection*, 547 U.S. 370 (2006). Section 401 directs federal agencies to request water quality certification from the state in which a discharge may occur as a result of a federal approval. The certification may contain conditions to protect state standards, which conditions are then incorporated into the federal license or permit. CWA section 401(d). In other words, section 401 informs the federal licensing process and provides a direct mechanism for state water quality concerns to be made part of the federal decision. Section 401 certifications are not permits themselves.

While the primary driver for the development of the SRSP was to address temperature effects of the Hells Canyon Complex, the SRSP will have numerous other positive impacts on the health of the Snake River and certain tributaries. These include significant improvements to habitat conditions that will benefit native species.



Water Quality Trading in Oregon

The Oregon legislature directed ODEQ to "develop and implement a pollutant reduction trading program," and in 2015, ODEQ adopted a comprehensive water quality trading program codified at Oregon Administrative Rules (OAR) Chapter 40 Division 39. Oregon has broadly defined water quality trading as "the use of water quality credits generated at one location in a trading area to comply with water quality-based requirements at another location within the trading area." OAR 340-039-0005(13). As such, Oregon encourages water quality trading to address water quality exceedances for a variety of pollutants and nutrients. (ODEQ, *Internal Management Directive (IMD)*, available at: www.oregon.gov/deq/Filtered%20Library/IMD-WQTrading.pdf). In addition, Oregon water quality regulations specifically permit both point sources and nonpoint sources to engage in trading. *Id.*

Restoration & CWA Compliance

Thermal Trading

Plan Components

BMPs

Offset “Credits”

Baseline Requirements

“Trading Ratios” (Variables)

Annual Reporting

Approval Discretion (Policies)

Oregon regulations recognize that water quality trading may be used to comply with water quality standards, and with respect to temperature, Oregon regulations specifically recognize that a nonpoint source “may engage in thermal water quality trading in whole or in part to offset its temperature discharge.” OAR 340-041-0028(12)(f). Trading programs used to offset temperature discharges must comply with the requirements of OAR Chapter 40 divisions 39.

Oregon’s trading rules establish several specific components that trading plans must contain. OAR 340-039-0025(4),(5) and (6). The plan must be sufficiently detailed to “demonstrate that the water quality benefits generated by trading projects implemented under the plan will be of the quantity and quality necessary to meet the regulatory obligations of the credit users and that the proposed trade will meet the purpose and policies” of the water quality trading program. IMD at 21. In addition, trading plans must occur within a defined trading area. Oregon rules define a trading area as “a watershed or other hydrologically-connected geographic area.” OAR 340-039-0005(5). At a minimum the trading area must include the discharge point, any downstream portions that are impacted by the discharge, and the trading project. OAR 340-039-0025(c). The trading area may be defined by the TMDL or water management plan. OAR 340-039-0035. Alternatively, in the absence of a TMDL, the trading plan may define the trading area.

The trading plan must also describe the best management practices being employed to generate credits. OAR 340-039-0025(e). As defined in OAR 340-039-0005(1), best management practices are “in-water or land-based conservation, enhancement or restoration actions that will reduce pollutant loading or create other water quality benefits.”

The basic premise of water quality trading programs is that reduction in nutrient or pollutant loading in one area can be used to offset pollutant loading at the discharge. “Credits” are defined as a “measured or estimated unit of trade for a specific pollutant that represents the water quality benefit a water quality trading project generates at a location over a specified period of time, above baseline requirements and after applying trade ratios or any other adjustments.” OAR 340-039-0005(3). The calculation of the credit requires consideration of existing regulatory requirements and certain variables that may affect the impact of the trading activity on the discharge.

First, regulatory requirements with which the discharge must comply are known as the baseline. Benefits achieved through baseline requirements cannot be considered part of the credit generated by the trading program, on the theory that the project is legally obligated to comply with those requirements independent of the trading program. OAR 340-039-0030; OAR 340-0005(6). Baseline requirements may be derived from any state, federal or local laws, such as section 401 certifications, Department of Agriculture rules, and federal land management plans. Baseline requirements must be determined for both the credit user and credit generator. IMD at 16. For example, the implementation of riparian restoration by a nonpoint source that is already called for under state regulation cannot be counted as a credit by a point source discharger.

Second, the trading plan must identify and apply “trading ratios” to the credits generated from a project in order to account for real world variables. IMD at 17. Examples include attenuation of benefits through the water body, uncertainty regarding measuring the water quality benefit, or uncertainty in the performance of the mitigation measures. OAR 340-039-0043; OAR 340-039-0025(5)(e). Trading ratios may either increase or decrease the number of credits that must be generated or that can be claimed.

In addition to outlining how credits will be generated, the water quality trading plan must also identify and comply with specific monitoring, performance verifications, and tracking and reporting requirements. OAR 340-039-0025(5)(g), OAR 340-039-0025(5)(h), OAR 340-039-0025(5)(i). For example, a trading plan is required to submit an annual report that provides the results of the trading project in the preceding calendar year, the number of credits generated in the last year, the total number of credits generated to date, and a confirmation that those credits were available during the period in which they were needed. In addition, the trading plan must identify how the trading program will be monitored and tracked to ensure that the conservation or restoration actions used are conforming to water quality standards.

ODEQ’s approval of a water quality trade is discretionary; but in all cases, ODEQ may only approve a water quality trade if it promotes certain enumerated policies. OAR 340-039-0025. These policies include: (1) attaining reductions in pollutant loading and leading to progress meeting water quality standards; (2) reducing the cost of implementing Total Maximum Daily Loads; (3) establishing “incentives for voluntary pollutant load reductions from point and nonpoint sources within watershed”; (4) providing offsets for discharges resulting from new growth; (5) resulting in long-term improvements in water quality; and (6) achieving “demonstrable benefits to water quality or designated uses” identified in the water quality standards. Further, in all circumstances, ODEQ regulations require the opportunity for public notice and a comment prior to the approval of a trading plan. OAR 340-039-0025.

Restoration & CWA Compliance

Updated Guidance

Trading Subjects

Nonpoint Sources

Idaho Program Factors

Pollutant Load Offsets

Credits Quantification

Discretion

Finally, while ODEQ regulations governing the water quality trading program do not provide for specific enforcement mechanisms, trading guidance indicates that ODEQ may enforce the water quality trading plans pursuant to its general enforcement authority under OAR Chapter 340 Division 012 to ensure compliance with water quality standards. IMD at 41. The applicability of these enforcement provisions in the context of section 401 certification is uncertain, a discussion of which is beyond the scope of this article.

Water Quality Trading in Idaho

Idaho has not adopted regulations that establish a water quality trading program; instead, Idaho's water quality trading program is governed by an updated guidance document published in October 2016. However, Idaho Department of Environmental Quality (IDEQ) regulations do specifically authorize water quality trading as a means to comply with water quality standards. IDAPA 58.01.02.055.06.

As in Oregon, Idaho's guidance contemplates that a variety of pollutants and nutrients may be the subject of a water quality trade. Specifically, the guidance provides that trading is most appropriate to address nutrients such as phosphorus and nitrogen, temperature, and in some cases sediments. IDEQ, *Water Quality Trading Guidance*, pg. 7, available at: <http://deq.idaho.gov/media/60179211/water-quality-trading-guidance-1016.pdf>.

In addition, while Idaho's prior guidance appeared to limit water quality trading to point sources, the updated guidance now recognizes that water quality trading may be used by certain permitted nonpoint sources: "hydroelectric facilities or other permitted nonpoint source discharges operating under a §401 certification or other enforceable agreement." *Id.* at 3, fn.1. Further, while the guidance specifies that "two different types of trades are recognized for water quality trading: point-point trading and point-nonpoint trading," it further clarifies that hydroelectric facilities are considered point sources under the guidance. *Id.* at 7.

With respect to plan components, Idaho identifies a number of factors that are necessary to engage in a trading program.

Factors necessary to engage in a trading program in Idaho are:

- consistency with existing regulations (both state and federal)
- a TMDL (which provides the pollutant loading requirements)
- good compliance records
- pollution discharge limits in permits
- enforceable mechanisms (such as an order, license or permit)
- a plan to address uncertainty
- clear trading areas and baseline policies
- a plan designed to ensure the water quality benefits throughout the life of the plan
- a plan to avoid hotspots
- identification of the "credit life" (the time frame within which the credit can be used to offset the permittee's discharge)
- monitoring and transparency

Based on the above factors, the guidance identifies two particular circumstances in which water quality trading can be utilized to offset pollutant loads: (1) to offset discharges into a water quality limited water body for which a TMDL or a "similar watershed analysis" has been completed; and (2) to "offset new or expanding point source discharges" into a water quality limited water body. *Id.* at 6. With respect to the SRSP, the Snake River is subject to a TMDL which was used to establish the pollutant load baseline.

Similar to Oregon, Idaho requires that the plan proponent must provide a means to quantify the credits generated by the program. With respect to quantifying pollutant reductions, Idaho recognizes that reductions can be measured in a variety of ways and only requires that the framework "rely on a scientific basis, and be accurate, repeatable, sensitive, and transparent." In all cases, the method must be approved by IDEQ. *Id.* at 15. Idaho also requires the application of "trading ratios" to account for real world variables. *Id.* at 16.

Idaho also adopts similar monitoring, annual reporting, and tracking requirements as described in connection with the Oregon program. *Id.* at 22-24.

As with Oregon, Idaho reserves complete discretion in approving trading plans, and the guidance notes that "water quality trading is a highly evaluated and regulated environment" and should not be seen as the "panacea for [a] source's obligations..." *Id.* at 24. Further, as in Oregon, trading plans are subject to public comment and input. *Id.* at 20.

Restoration & CWA Compliance

EPA Role Varies

EPA Trading Guidance

EPA Program Components

Watershed Approach

EPA's Role in Water Quality Trading

The US Environmental Protection Agency (EPA) has no direct role in the review or approval of a water quality trading plan in the context of a section 401 water quality certification. However, EPA may have a role in approving water quality trading plans that are incorporated into a NPDES permit. In states where EPA has delegated permitting authority under the NPDES program, the EPA has a limited oversight role in water quality trading programs. Note, however, that EPA will have a greater role in states in which EPA has not delegated permitting authority under the NPDES program. In those states, such as Idaho, water quality trading plans incorporated into NPDES permits must be approved by EPA.

In order to assist states in designing water quality trading programs, EPA has published water quality trading guidance (www.epa.gov/sites/production/files/2016-04/documents/wqtradingtoolkit_app_b_trading_policy.pdf) and more recently a toolkit for permit writers (www3.epa.gov/npdes/pubs/wqtradingtoolkit.pdf). Both of these documents identify certain plan components that EPA believes are necessary to ensure that water quality trading is consistent with the CWA and to ensure the proposed trade will not result in adverse localized impacts to water quality or beneficial uses.

Generally, EPA will support trading that is used to: (1) to maintain water quality standards in waters where standards are attained; (2) to assist in attaining water quality standards in impaired water bodies where a TMDL has not been created; and (3) to assist in attaining water quality standards in impaired waters where a TMDL has been created if the trade is consistent with the assumptions/requirements on which the TMDL is created.

Finally, the EPA policy identifies the following as necessary components of a water trading program: (1) methods for enforcement and monitoring; (2) clearly defined units of trade; (3) identified time periods in which credits may be generated and used; (4) standardized protocols to quantify pollutant loads, load reductions, and credits; (5) public participation and access to information; and (6) provide for the assessment of environmental and economic effectiveness of the program.

Conclusion

The Snake River Stewardship Program embodies the policy underlying state and federal trading programs. That is, rather than installing a chiller or other device to cool water temperatures downstream of the Hells Canyon Complex, Idaho Power Company proposes a watershed approach designed not only to address temperature standards by offsetting the temperature load assigned to the Hells Canyon Complex by the TMDL, but also to restore aquatic conditions degraded by a century's worth of human activity on the Snake River. The specific components of the plan are described in the next article, and provide concrete examples of how these regulatory concepts may be put into practice.

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Watershed Restoration

Thermal Load Allocation

Hells Canyon Complex

TMDL

Temperature Criteria

Temperature Standards

Sensitive Uses

WATERSHED-SCALE RESTORATION PROGRAM ADDRESSING ELEVATED WATER TEMPERATURES

IDAHO POWER COMPANY'S SNAKE RIVER STEWARDSHIP PROGRAM

by Stacey Baczkowski and Ralph Myers, Idaho Power Company (Boise, Idaho)
Kaola Swanson and Tim Wigington, The Freshwater Trust (Portland, Oregon)

INTRODUCTION

The Idaho Power Company's Snake River Stewardship Program is a watershed-scale restoration program designed to reduce solar heat load contribution to water temperatures by increasing riparian shade in tributaries and reducing shallow backwater areas in the Snake River. The Program is also designed to improve aquatic and terrestrial habitat by increasing water velocity, water depth, and improving substrate and riparian conditions. The thermal benefits of the Program will be used to offset the thermal load allocation for Idaho Power below the company's Hells Canyon Dam.

Idaho Power Company owns and operates the Hells Canyon Complex, which is located in west central Idaho and northeastern Oregon on the Snake River. The Complex is in the southern part of Hells Canyon and forms three reservoirs: Brownlee, Oxbow, and Hells Canyon. The Brownlee, Oxbow, and Hells Canyon dams were constructed from 1955–1967 and were originally authorized under a 50-year license issued in 1955. Idaho Power filed an application with the Federal Energy Regulatory Commission (FERC) in July 2003 for a new license authorizing the continued operation and maintenance of the Complex. Because the Snake River is a border water between Idaho and Oregon, Idaho Power has also filed applications with both Idaho and Oregon's Departments of Environmental Quality for Clean Water Act (CWA) §401 water quality certifications.

The Snake River – Hells Canyon Total Maximum Daily Load (TMDL) imposed a temperature load allocation for the outflow from the Hells Canyon Dam. The load allocation applies from October 23 through April 15 for Snake River Fall Chinook spawning. The spawning water temperature criteria are difficult to meet below the Hells Canyon Complex because the water flowing into the Complex exceeds the temperature criteria for most of the summer and early fall. The TMDL determined that elevated water temperatures upstream of the Complex are due in part to anthropogenic sources such as upstream and tributary impoundments, water withdrawals, channel straightening and diking, and the removal of streamside vegetation. In fashioning the load allocation for Idaho Power, the TMDL noted that the Complex dams do not add heat to the system, but rather delay the river's cooling pattern. Because the causes of elevated water temperatures upstream of the Complex are best addressed through watershed restoration, Idaho Power proposed the Snake River Stewardship Program as part of its §401 water quality certification application. Idaho Power is collaborating with The Freshwater Trust, a nonprofit organization with river restoration experience, to design and implement the Stewardship Program.

ELEVATED WATER TEMPERATURE

Temperature standards in Oregon and Idaho are similar in nature. Both states have five types of temperature standards:

- 1) biologically-based criteria that ensure thermally optimal conditions
- 2) natural conditions (as determined by the states), which supplement biologically-based criteria
- 3) air temperature exclusion criteria that allow for exceedance of numeric and natural conditions
- 4) human use allowance, which allow insignificant additions of heat due to anthropogenic sources
- 5) site-specific criteria, requiring water-body specific rulemaking that is based on the unique characteristics of the watershed

IDAPA 58.01.02. n.d., OAR 340-041 n.d.

Temperature criteria are applicable to specified locales and times depending on the species and activities that are present. Additionally, Oregon requires that the seasonal thermal pattern in the Snake River must reflect the natural seasonal thermal pattern (OAR 340-041-0028(4)(d)). The purpose of the biologically based temperature criterion is to protect designated temperature-sensitive beneficial uses, including specific salmonid life cycle stages, when and where those uses occur.

Watershed Restoration

Temperature Fluctuations

Water temperature in the Snake River within the vicinity of the Hells Canyon Complex can be an issue relative to both cold water biota and salmonid spawning, depending on the location and associated use. Summer temperatures throughout the Snake River and tributaries within the vicinity of the Complex are substantially warmer than the temperature criteria for cold water biota. In fact, fish mortality has been documented in the Snake River upstream of the Complex because of excessively warm summer water temperatures. In contrast, the Snake River downstream of the Complex has notably cooler summer temperatures that creates better thermal conditions for cold water species. However, the net thermal load storage that occurs in the Complex during summer months, which results in cooler maximum summertime temperatures downstream of the Complex, contributes to the delayed cooling of water downstream of the Complex in the fall. The delayed cooling downstream of the Complex, relative to inflowing temperatures results in Complex discharge temperatures that do not meet the salmonid spawning criteria when Snake River Fall Chinook are spawning downstream of the Complex. While temperatures during the first several weeks of the salmonid spawning period are warmer than the biologically based spawning criterion of 13°C, there is no site-specific evidence to support a conclusion that temperature exceedances are having substantive negative effects on spawning success.

Snake River Stewardship Program

Idaho Power, in collaboration with The Freshwater Trust, has proposed the Snake River Stewardship Program (Program) to address the causes of elevated water temperatures upstream of Brownlee Reservoir.

Components

The Program includes the following components:

- **Instream projects**, which can include creation of floodplains and wetlands, will reduce water surface area, increase water velocities, and increase channel depths. These projects will reduce the surface area exposed to thermal loading, increase scouring of gravels, increase hyporheic flows, and decrease excessive macrophyte growth, thereby improving aquatic and terrestrial habitat (see below). The Program has identified 55 potential instream sites in a section of the Snake River between Walter's Ferry and Homedale in southwestern Idaho.

Hyporheic Zone: The hyporheic zone is the subsurface area of sediment and interstitial spaces in a streambed and hyporheic flows are the interactions of surface and groundwater within this area. Hyporheic flows have a strong influence on stream ecology, biogeochemical cycling, and water temperatures. The buildup of organic and inorganic materials in the hyporheic zone negatively affect hyporheic flows by filling the interstitial spaces and limiting water flow. The Program will improve hyporheic flows by reducing sediment discharged into the river and by increasing water velocities, which will facilitate flushing of organic and inorganic materials from the interstitial spaces.

Macrophytes: Macrophytes, also commonly called algae or aquatic plants, occur naturally within river systems. Within portions of the Snake River, low-flows, shallow water, and anthropogenic sources of sediment and nutrients have contributed to macrophyte proliferation. The unnaturally high abundance of macrophytes contributes to water quality problems by further decreasing water velocities. The lower velocities cause sediment to settle out of the water column, further decreasing the water depth and consequently increasing the water temperature and filling in interstitial spaces; this also creates ideal conditions for additional macrophyte growth. By increasing water depth and velocity and addressing anthropogenic sources of sediment, the Program will not only address water temperature, it will address the causes of increased macrophyte growth.

- **Tributary projects** will reduce thermal loading by restoring riparian vegetation. The Program has identified potential restoration sites in 12 subbasins that flow to the Snake River. Additionally, riparian restoration will provide more diverse fish and wildlife habitat/refugia, and the riparian buffers will help trap sediment and pollutants before entering the tributaries.
- **Sediment reduction** in a key section of the Snake River will help protect instream projects and improve water quality. Agricultural return drains are a significant source of sediment loading to the Snake River. Sediment deposition prevents oxygen exchange between the water column and interstitial spaces, provides areas and nutrients for macrophyte growth, and reduces hyporheic exchange. Sediment deposition also contributes to channel aggradation in the Snake River. Idaho Power has implemented a pilot program in the Grand View, Idaho area to convert flood irrigation to pressurized irrigation. These projects will reduce the amount of sediment and nutrients entering the Snake River, helping to ensure that instream projects can retain high function.

Floodplains & Wetlands

Hyporheic Zone

Macrophytes (Algae)

Riparian Vegetation

Sediment Loading

Watershed Restoration

Identifying Project Areas

Shade Potential

Modeling Benefits

Modeling Shade Benefits

Landowner Assessment

Instream Projects (Public Lands)

Feasibility

To demonstrate that the Program could meet Idaho Power's thermal load allocation, Idaho Power identified potential project areas throughout the mainstem Snake River and in 12 subbasins. To understand how many projects were needed, planners had to compare potential "thermal benefit" supply against its thermal exceedance from the Hells Canyon Complex. The attenuation of those benefits between project locations and the inflow to the Complex and subsequent further attenuation of those benefits through the Complex needed to be taken into account. As established in the TMDL, Idaho Power's upstream thermal benefit need is approximately 12 billion kilocalories per day (kcal/day) (July – October daily average). To determine potential thermal benefit supply, the Program used aerial imagery and light detection and ranging (LiDAR) data to identify and assess potential project areas.

Not all riparian areas were modeled for shade potential — in fact, some areas were excluded based on topographical and land ownership constraints. For example, potential project areas in steep canyons were not included as the conditions can make restoration difficult and there is already substantial shade from canyon walls. Moreover, areas above substantial in-river impoundments were also excluded because any benefits from those projects would need to be further attenuated. After excluding those areas, the Program then focused on the remaining suitable land.

Next, geospatial data was used to evaluate existing vegetation conditions and to model the current solar load experienced at those sites. Potential project areas were then re-modeled using expected post-project vegetation conditions. The difference between the current and post-project conditions is the potential "uplift" at a project site, measured in kilocalories per day of thermal benefit. The estimated thermal benefit from all modeled potential instream and riparian project sites is approximately 30.2 billion kcal/day of upstream thermal benefits. This amount is about 2.5 times the 12 billion kcal/day required for compliance with Load Allocation assigned to the Hells Canyon Complex in the TMDL.

Calculating Thermal Benefits Using Shade-a-lator

Shade-a-lator is a module of the Heat Source model developed by Oregon State University and ODEQ. It was used to model pre- and post-project thermal conditions. The module uses water surface area, local topography, bank slope, stream orientation, and latitude and longitude when calculating the sun angle every 25 meters along the center of a modeled reach for every model time step (once per minute). The calculation points are called "nodes" and Shade-a-lator calculates the total solar radiation at each node based on the physical characteristics and existing vegetation. Thermal benefits are calculated by subtracting existing thermal benefits from modeled thermal benefits based on post-project vegetation conditions. Modeling for potential tributary projects assumed a 50-foot wide planting area and one of two vegetation scenarios: a mature riparian canopy dominated by 100 foot tall cottonwoods with a canopy density of 80% or a mature riparian community dominated by shrubs and willows that are 15-feet tall and a canopy density of 70%.

Willing Landowners

The Program was developed based on the principle that projects will be implemented on lands with willing landowners. While more than twice as many thermal benefits were identified compared to Idaho Power's obligation, the Program also recognized that not all potential sites would be viable upon closer review and not all landowners would be willing to participate. The Program therefore assessed feasibility using a variety of scenarios that included different levels of landowner participation and a portfolio comprised of different percentages of instream and tributary projects. The Program assessed variables that can affect landowner recruitment (e.g., perception of the Program, time available to recruit and implement projects, financial incentives) and used their own recruiting experiences to determine that up to 40% of the likely available riparian projects in tributaries could feasibly be recruited within a thirty-year window (the Program excluded a number of suboptimal sites for the purposes of testing feasibility; these sites can be recruited if necessary, and so the actual recruitment percentage compared to all available supply is actually closer to 28%).

The feasibility considerations for instream projects are different because factors that can affect recruitment success for instream projects are different from those associated with riparian projects. All instream project sites are located on public lands. This means that once relationships are built with the appropriate agencies and the permitting process has been completed for one project, the same process can likely be repeated for additional instream projects. As such, when considering feasibility, the Program determined that approximately 75% of instream projects could be recruited. This analysis shows that Idaho Power would still be able to obtain approximately 25.6 billion kcal/day without 100% recruitment of all modeled potential projects.

Watershed Restoration

Tracking Operations

Monitoring Data

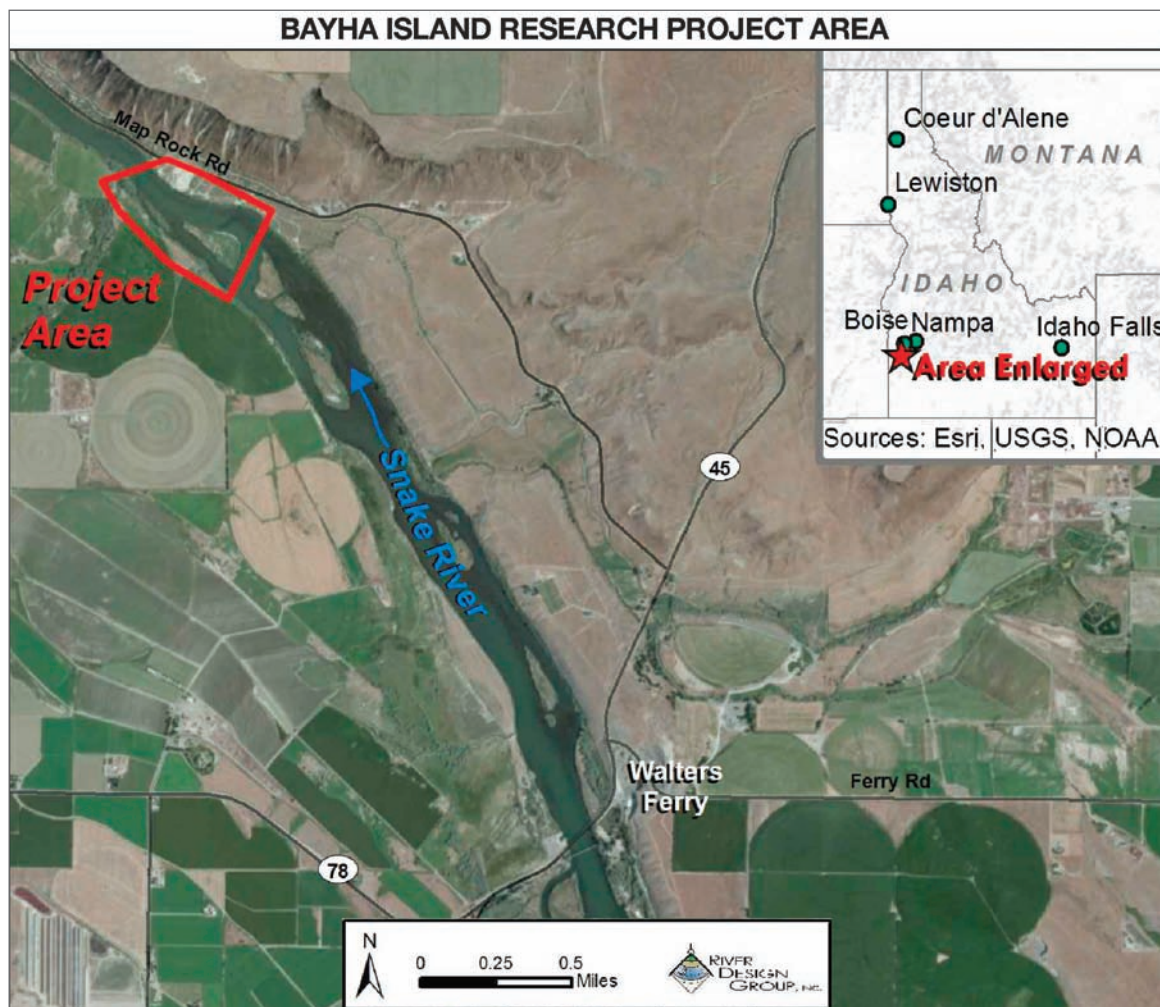
Research & Feasibility

Long-term Stewardship and Tracking

Idaho Power is anticipating a 40 to 50-year FERC license and has proposed a 30-year implementation timeframe for the Program. The magnitude and duration of the Program, combined with the need to document and demonstrate compliance, has led to the development of rigorous stewardship and tracking processes and tools. Ongoing maintenance of projects for the life of the FERC license is necessary to ensure that thermal benefits are realized over the life of the license. Idaho Power will use a combination of qualitative and quantitative monitoring, complemented by remote sensing (e.g., LiDAR), to ensure that project sites remain on track over time. Additionally, an independent auditor will sample a subset of projects annually to ensure that projects have been implemented as proposed and are meeting Program standards. Monitoring data will be used to determine project-specific maintenance needs and to adaptively manage Program tools. Project information and monitoring data will also be available on a publicly accessible website; thermal benefits will be tracked over time and progress towards meeting compliance goals will be readily available.

BAYHA ISLAND RESEARCH PROJECT

It is one thing to propose a large-scale watershed program and another to demonstrate that implementation and success are feasible. Successfully implementing research projects prior to receiving a license is critical to demonstrating the feasibility of the Program. In addition, these projects provide valuable pre- and post-construction data that will help with development of Program tools, and help build out the supply chain and labor market necessary to implement the Program at scale. Project-specific data will also allow for the validation of model assumptions. Idaho Power initiated the Bayha Island Research Project (Bayha Project) in 2014 and construction occurred from July–November, 2016.



Watershed Restoration

Channel Deepening

Required Permits

Floodplain Creation

Implementation Success

Bayha and Wright Islands are part of the US Fish and Wildlife Service (USFWS) Snake River Islands Unit of the Deer Flat National Wildlife Refuge and are in the mainstem Snake River approximately 2.5 miles downstream of Walter's Ferry in southwestern Idaho. The Bayha Project was designed to narrow and deepen a section of the Snake River channel by creating approximately ten acres of floodplain adjacent to the islands, thereby increasing water velocity and decreasing thermal load by decreasing the surface area of the river at low summer flows. The floodplain was also planted with trees and shrubs to prevent erosion, provide shade, and improve habitat.

Idaho Power had to obtain numerous permits to conduct pre- and post-construction sampling and to construct the project.

Necessary Permits included the following:

- US Army Corps of Engineers §10 of the Rivers and Harbors Act and §404 of the Clean Water Act
- Idaho Department of Water Resources streambed alteration and water right
- Idaho Department of Environmental Quality §401 water quality certification
- Idaho Department of State Lands easement
- USFWS Special Use Permit, and Biological Assessment and Biological Opinion for the Snake River physa (*Haitia (Physa) matricina*)
- Owyhee County Conditional Use Permit
- US Environmental Protection Agency construction stormwater permit

Idaho Power worked with the adjacent landowner to obtain access to the project site and construction staging areas, mine gravel, and excavate topsoil. Collaboration with the landowner and the USFWS were key to the success of the project.

During construction, approximately 51,000 square yards (yd³) were excavated from the Snake River adjacent to the islands and this material was used as bulk fill for floodplain creation. Excavation changed the channel depth from approximately 2 feet to 6-8 feet. Additionally, approximately 22,000 yd³ of gravel was imported to bring the floodplain to the desired elevation and approximately 6,300 yd³ of topsoil was imported to facilitate planting. Approximately 7,800 yd³ of material was temporarily placed in the river to create coffer dams and work pads. Contractors installed 150 brush (3 to 6-inch diameter) and 50 small logs (6 to 12-inch diameter) per acre to create roughness to reduce river velocities and minimize erosion while plants get established. The floodplain was planted with 200 wetland sod mats and approximately 15,000 plugs and one-gallon container plants that included willows, cottonwoods, dogwood, currant, and Wood's rose.

The successful implementation of the Bayha project demonstrated that the Idaho Power Company can recruit willing landowners, obtain the necessary permits, and implement a project that meets Snake River Stewardship Program standards.



Watershed Restoration

Riparian Research

CONCLUSION

NEXT STEPS

In addition to long-term maintenance and monitoring on the Bayha project, Idaho Power is planning to design and implement riparian research projects prior to receiving a license. Idaho Power and The Freshwater Trust are currently evaluating sites in the Powder River basin in eastern Oregon and the Weiser River basin in western Idaho. Both of these basins flow into the Snake River and into Brownlee Reservoir.

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Idaho Power Snake River Stewardship Program website:

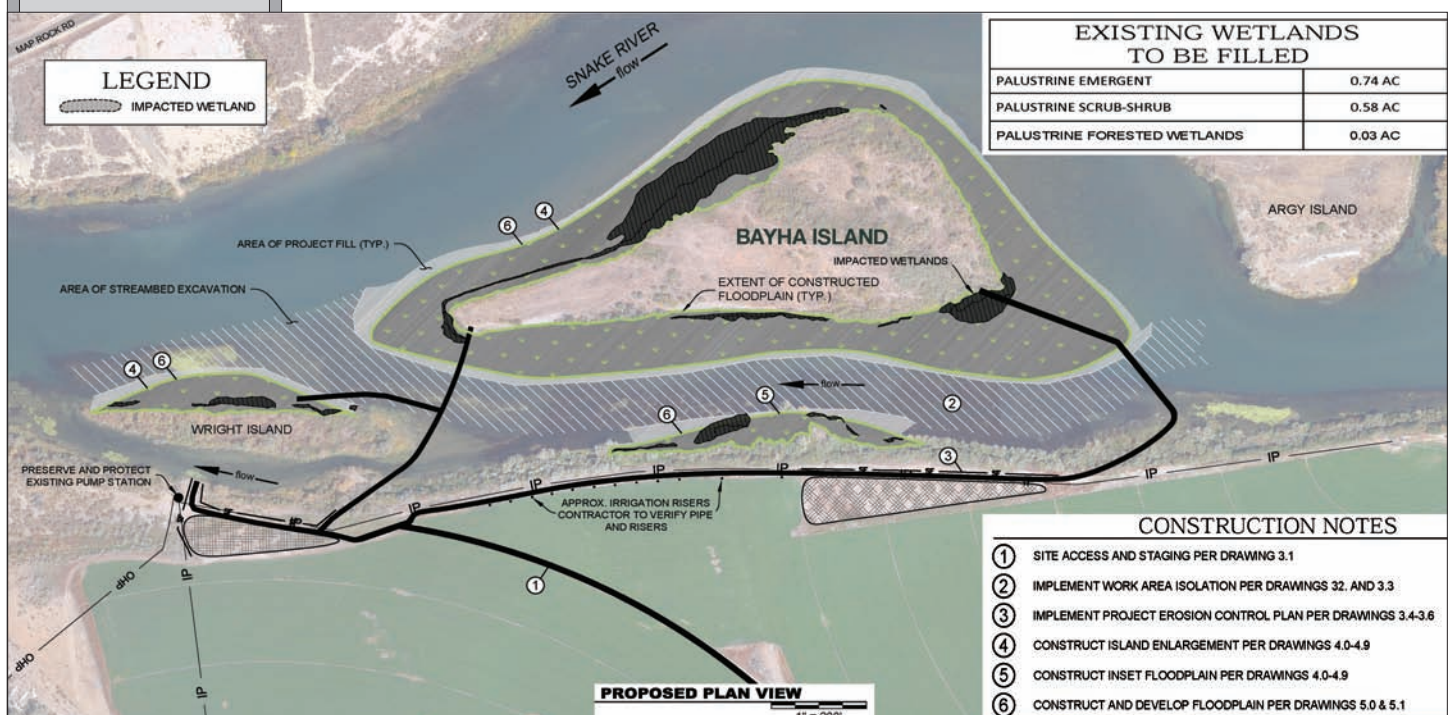
www.idahopower.com/OurEnvironment/WaterInformation/snakeRiver/default.cfm

Stacey Baczkowski is a Senior Biologist within the Water Quality Program at Idaho Power Company. She has previously worked as a consultant and regulator addressing water quality issues and developing and evaluating coastal salt marsh and riparian restoration projects. She leads the development of Idaho Power's Snake River Stewardship Program.

Ralph Myers is the Water Quality Program Supervisor within the Environmental Department at Idaho Power Company. He has been working for Idaho Power since 1989. His primary focus has been conducting and managing water quality studies and issues associated with ongoing operations and the relicensing of Idaho Power's Snake River hydroelectric projects. Much of the past 15 he has been focused on getting Clean Water Act Section 401 certification for the Hells Canyon Complex.

Kaola Swanson manages key analysis tasks for quantified conservation actions and water quality trading programs for The Freshwater Trust. Her research includes policy analysis, program feasibility evaluation, and conservation prioritization. Kaola identifies potential for new credit markets, develops protocols for conservation actions, and evaluates TMDL programs, NPDES permits, and water quality trading program design. Her experience includes landscape ecology, forest ecology, ecosystem service valuation, and environmental education and outreach.

Tim Wigington brings several years of diverse environmental law, policy, and business experience to The Freshwater Trust. As Associate Managing Director, Tim manages the organization's finances, works to improve cost forecasting/management processes, helps administer implementation projects, and develops ecosystem service pricing and risk management models. Tim also works with the policy and analytical teams to help design water quality improvement solutions that balance policy, legal, technical, and economic variables, while also helping to develop new policy that will strengthen ecosystem service programs. Tim's prior experience focused on hazardous waste, land use, property and insurance litigation, and revenue forecasting modeling related to timber management.



PCBs

Wastewater
Treatment

1979 Ban

Legacy
PCB Products

PCB MEASUREMENT & REMOVAL

THE NEXT FRONTIER IN MICROCONSTITUENT REGULATION
A CASE STUDY OF PCBs IN MUNICIPAL WASTEWATER TREATMENT

by Lynn Williams Stephens, Michael Milne, Adam Klein, & Valerie Fuchs, Brown and Caldwell, WA
Rob Lindsay, Water Resources, Spokane County Environmental Services, WA
Lisa Rodenburg, Department of Environmental Science, Rutgers University, NJ

INTRODUCTION

Polychlorinated biphenyls (PCBs) are a ubiquitous contaminant found throughout the environment, including air and water. They are present in sewage, stormwater, groundwater, and even rainfall. The health hazards associated with PCBs have caused regulatory agencies to investigate PCB sources and impacts associated with municipal wastewater treatment.

PCBs are a broad group of 209 manmade chemicals (congeners) not found naturally in the environment; some of these congeners have been shown to cause cancer and other adverse health effects in humans and animals. PCBs are very stable and are resistant to extreme temperature and pressure. Prior to their manufacture being banned in 1979, PCBs were used widely in electrical equipment such as: capacitors and transformers; hydraulic fluids; lubricants; plasticizers; and even carbonless copy paper. Common current sources of PCBs are commercial products manufactured prior to 1979, many of which included a specific combination of congeners and were branded as Aroclors (Monsanto Corporation's trademark for their line of mixtures of PCB congeners sold for different industrial applications that are now banned/legacy products). Figure 1 shows the types of products which contained specific Aroclors.

Figure 1. A summary of PCB products made in the United States under the trade name "Aroclor"
Sources: (1) Litten 2007, (2) Brown 1994

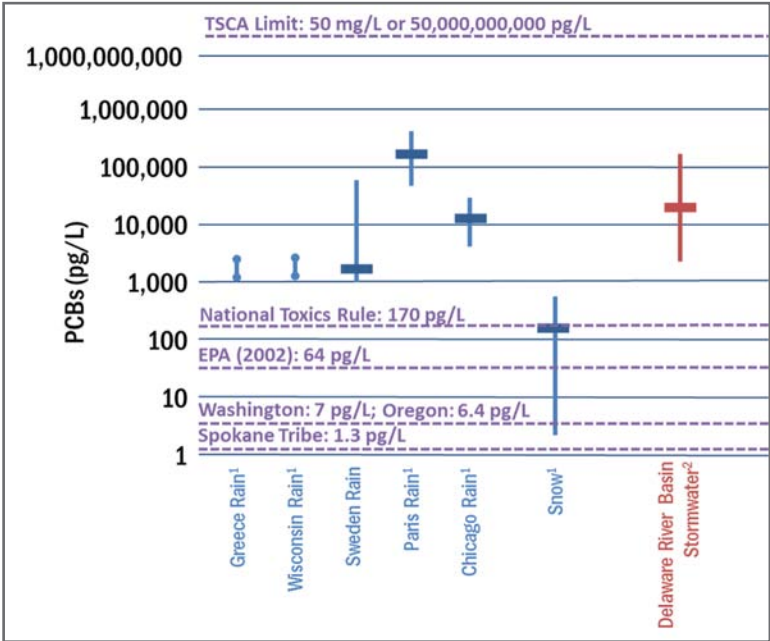
Aroclor	1016	1221	1232	1242	1248	1254	1260	1262	1268
% of 1957-77 US production	13%	1%	0.2%	52%	7%	16%	11%	1%	1%
Capacitors	■	■		■					
Transformers				■		■	■		
Heat transfer				■					
Hydraulic fluids			■	■	■	■	■		
Vacuum pumps					■	■			
Gas-transmission turbines		■		■					
Rubbers		■	■	■	■	■			■
Synthetic resins					■	■	■	■	■
Carbonless copy paper				■					
Adhesives		■	■	■	■	■			
Wax extenders				■		■			■
Dedusting agents						■	■		
Inks						■			
Cutting oils						■			
Pesticide extenders						■			
Sealants and caulking compounds						■			

Sources: Litten, S. 2007. Contaminant Trackdown in Urban Settings. Brown, J.F., 1994. Determination of PCB Metabolic, Excretion, and Accumulation Rates for Use as Indicators of Biological Response and Relative Risk. Environ. Sci. Technol. 28, 2295-2305.

PCBs
Bioaccumulation
Fish Consumption Rate
Standards v. Environmental Concentrations
Analytical Limitations
NPDES Requirements
TMDL Limits
Spokane Rive Impairment

Because PCBs are very persistent in the environment and can bioaccumulate to high concentrations in fish and shellfish, there are an increasing number of water bodies found to be impaired by PCBs. Due to these impairments, the US Environmental Protection Agency (EPA), states, and tribes are establishing increasingly stringent water quality standards for PCBs. In 2002, EPA increased its recommended water quality criteria fish consumption rate from 6.5 grams per day (g/d), which equates to one bite of fish per day, to 175 g/d, which equates to one small filet per day. This change in fish consumption criteria resulted in a water quality standard concentration for total PCBs of 64 picograms per liter (pg/L). One pg/L equates approximately to one part-per-quadrillion (ppq). More recently, the water quality standard concentration of 7 pg/L took effect in Washington State in December 2016. The State of Oregon’s water quality standard for human consumption is 6.3 pg/L and the Spokane Tribe recently established a water quality standard of 1.3 pg/L. All of these standards are based on total PCBs (the sum of all 209 congeners). Figure 2 compares concentrations found in the environment (rain, snow, and stormwater) to the EPA and state regulatory standards.

Figure 2. A comparison of PCB concentrations in the environment and regulatory standards
Sources: (1) Los Alamos 2012, (2) Yagecic 2014



Most wastewater treatment facilities across the country currently measure PCBs using EPA Method 608. EPA Method 608 has a detection limit at the microgram per liter (µg/L) or parts per billion level, far higher than the pg/L or ppq water quality concentrations, and higher than levels typically observed in wastewater treatment plant influent or effluent. As analytical methods in the ppq range become more widespread and accepted, many plants will begin to find detectable levels of PCB in their influents and effluents, as well as in the receiving waters, which may become classified as impaired.

As an increasing number of water bodies are being listed for impairment, dischargers are being regulated to monitor and reduce PCB loading to those water bodies. In the United States, a growing number of National Pollutant Discharge Elimination System (NPDES) permits are requiring management programs to identify and control sources of PCBs, and monitor PCBs at ppq levels. These permit requirements can be technically challenging and very costly.

In addition to increased monitoring, some utilities are seeing Total Maximum Daily Load (TMDL) limits set for PCBs. The EPA approved a TMDL for PCBs in San Francisco Bay and in 2011 the Watershed Permit required both municipal and industrial wastewater dischargers to take actions to reduce PCB discharges to San Francisco Bay. The Delaware Estuary is also impaired for PCBs and has established TMDLs to reduce loadings.

In Eastern Washington, dischargers to the Spokane River were compelled to begin extensive PCB monitoring and to develop annual toxic management reports starting in 2013. PCBs are being examined in this region because the Spokane River is a 303(d) listed river for PCBs. In the Spokane River region, many entities have come together to participate in the Spokane River Regional Toxics Task Force that aims to lead efforts to find and reduce sources of toxics compounds in the Spokane River through implementation efforts and collaboration.

PCBs**Wastewater
Treatment****Sampling****Detection
Analysis****“Track-Down”
Samples****Blank
Samples****BACKGROUND**

Spokane County owns the Spokane County Regional Water Reclamation Facility (Facility), which provides treatment for wastewater before discharging to the Spokane River. This Facility treats an average flow of 8 million gallons per day (mgd) with biological nutrient removal and membrane bioreactor (MBR) technology, which provides tertiary treatment. The Washington State Department of Ecology (Ecology) issued Spokane County's NPDES Permit for the Facility in 2011.

Spokane County has conducted PCB sampling bimonthly at two influent pump stations and quarterly at the Facility's effluent for several years. Additionally, the County has conducted extensive sampling throughout its sewer collection system in an effort to track down potential point sources of PCBs. This article will highlight the findings from several years of PCB sampling.

METHODOLOGY

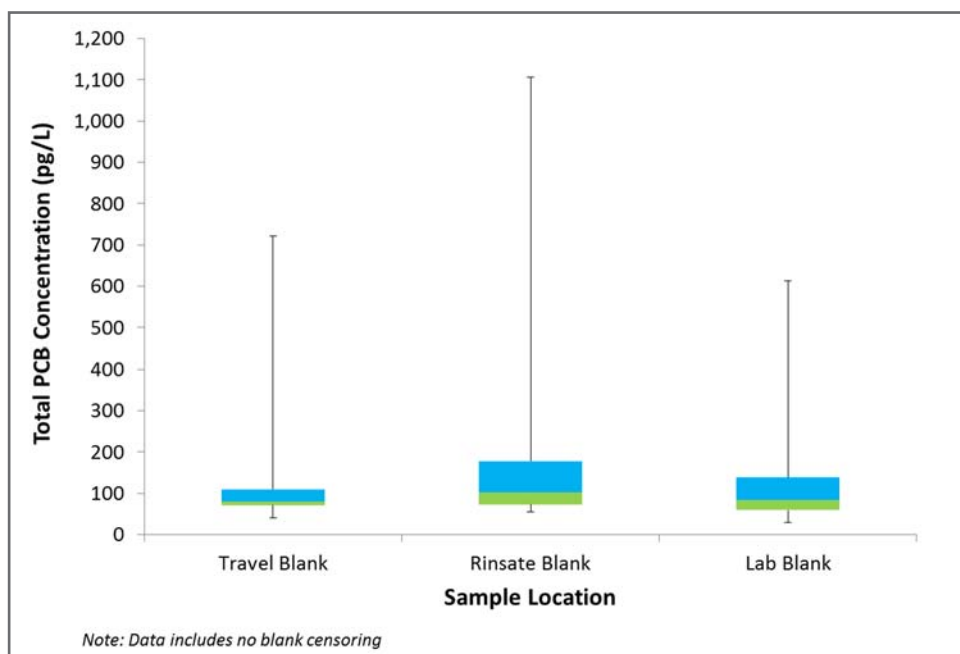
All of Spokane County's samples have been analyzed using EPA Method 1668A, which allows detection at the ppq level. The quality assurance and control processes used included: the collection and analysis of rinsate blanks (ultra-pure water passed through sampling equipment to check for contamination from sampling equipment); travel blanks (ultra-pure water sealed during transit to check for contamination during shipment); and laboratory blanks (ultra-pure water provided by the laboratory); as well as matrix spike solutions. Data from the blank samples were used to censor the analytical data to eliminate interferences, which are common when analyzing field samples at the ppq level. The regional approach to eliminate interferences is to apply a 10x censor. What this means is that any congener which was detected in a field sample at a concentration within 10 times the concentration detected in the associated blank (rinsate, travel, or lab blank) was excluded from the total PCB concentration. Influent pump station and effluent samples were collected over a 24-hour period using 24 time-weighted samples at hourly intervals.

Composite samples were also collected upstream of the influent pump stations throughout the sewer collection system. These sewer collection system samples — referred to as “track-down samples” — were mini composite samples collected over a 40-minute time period. Track-down samples were collected from 21 locations throughout the County's sewer collection system between 2013 and 2016. The goal of this track-down sampling was to identify potential sources of PCBs into the collection system.

RESULTS AND DISCUSSION

Results are presented in terms of total PCBs, which is the sum of the concentrations of all 209 congeners. In Figure 3, the box-whisker plot shows the median, first and third quartile, and minimum and maximum values for the rinsate, travel, and laboratory blanks over the sampling period. The first quartile (Q1) represents the value where 25 percent of the data are less than this value. The third quartile value (Q3) represents the value where 75 percent of the data are less than this value.

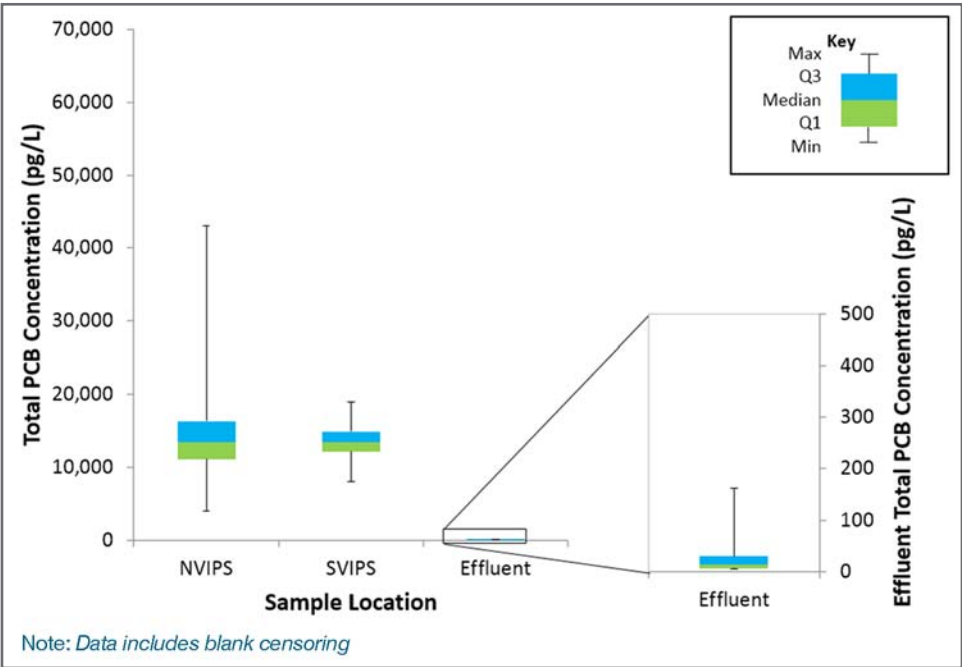
Figure 3. Box-whisker plot of total PCB concentrations in blank samples



PCBs
Influent & Effluent Concentrations (>99% Removal)
Source Identification Tool
Analysis Factors
Consumer Products

Figure 4 summarizes the total PCB concentrations measured at the two influent pump stations (NVIPS and SVIPS) and the Facility effluent. The total PCB data in Figure 4 is based on applying the blank censoring approach described above. The results presented in Figure 4 are based on 26 sampling events.

Figure 4. Box-whisker plot of total PCB concentrations in influent trunk line and effluent samples



The total PCBs in the blanks exceed the water quality criterion for Washington State (see Figure 2). PCB concentrations in the effluent samples were much lower than the influent pump stations (NVIPS and SVIPS) samples, as shown in Figure 4. Based on the average concentrations of PCBs and flows measured at the NVIPS, SVIPS, and effluent locations, the Facility is removing more than 99 percent of the total mass of PCBs entering the Facility.

SOURCE IDENTIFICATION

As part of the collection system sampling, the team investigated the relationship between PCB profiles and concentrations. PCB profiles analyze the pattern of congener concentrations within each sample. Such profiling can be used to help identify relationships between samples and potential sources. Positive Matrix Factorization (PMF) was used for the profiling analysis. PMF is an advanced source apportionment tool developed by Paatero and Tapper (1994) that has been used to identify PCBs sources in water, sediment, and air (Bzdusek et al., 2006; Du et al., 2008; Rodenburg et al., 2011). PMF analyzes the congener composition of field samples and relates the samples to each other, as well as to a database of known sources (e.g. Aroclors). The PMF2 software (YP-Tekniika KY Co., Helsinki, Finland) was used in this study.

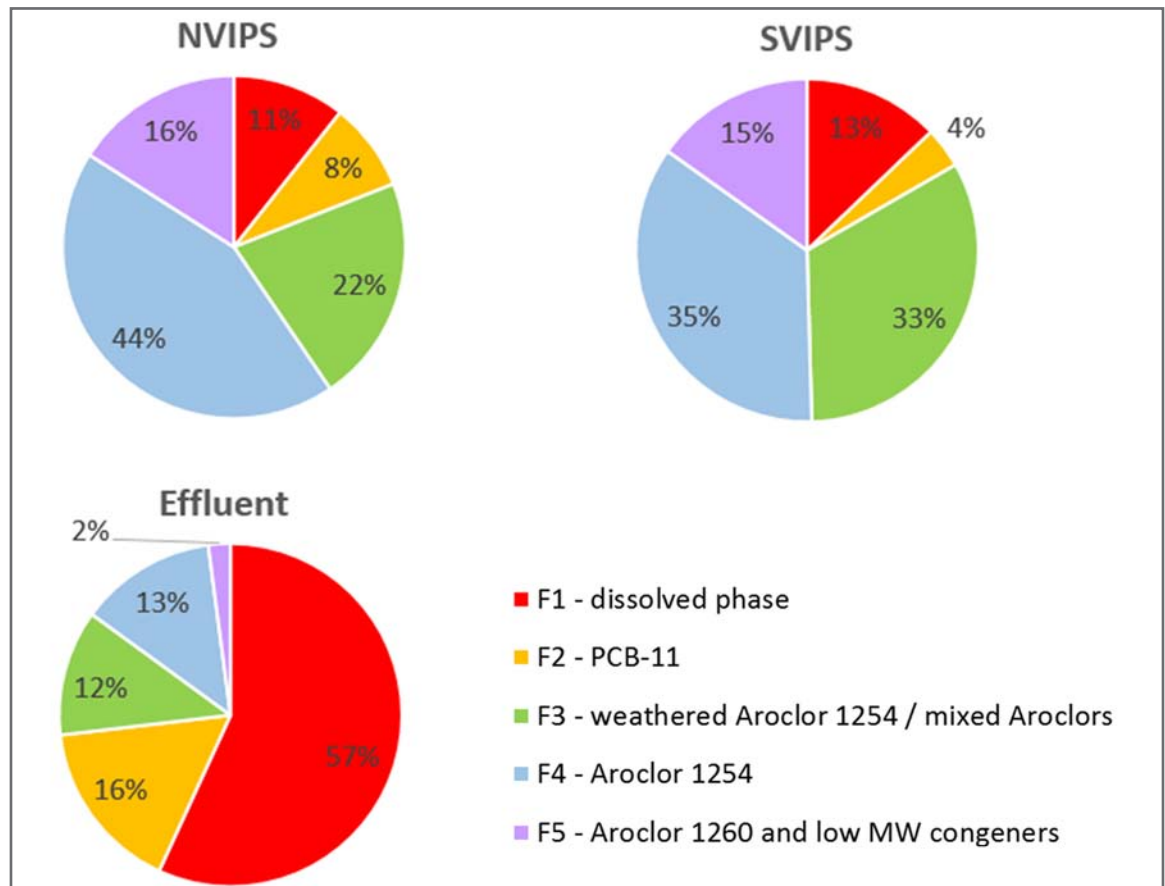
The PMF analysis identified five factors (F1 through F5), which characterize the field samples. The pie charts presented in Figure 5 represent the average contribution of each factor to the total PCBs measured in selected samples. The number of factors and their composition is based on the PMF analysis, which includes a statistical analysis of the sampling data and trying to achieve high correlation coefficients. Each factor represents a combination of congeners. Some factors resemble the commercial Aroclor products (previously produced, now banned via the federal Toxics Substances Control Act (TSCA)). While it has long been acknowledged that some chemical manufacturing processes inadvertently generated PCBs (up to 50 ppm is allowed per TSCA), it was not known until recently that the inadvertently formed PCBs can constitute a large amount of PCBs in some areas (Litton 2007).

The PMF analysis included other factors, which are linked to individual congeners or high- or low-molecular weight mixtures. For example, Factor 2 represents an individual congener, PCB-11, that is thought to enter the environment primarily from the use of diarylide yellow and other pigments in printing on paper and textiles (Rodenburg 2010). Ecology studied PCBs in general consumer products and found PCB-11 in 66% of the 68 products tested (Ecology 2014). PCB-11 concentrations ranged from 1 to 48 parts per billion (ppb) and was found in almost all paint and colorant samples (Ecology 2014). The City of Spokane identified PCBs in yellow road paint and utility locate paint, and high concentrations associated with “hydroseeding” — a planting method using a sprayed slurry of seeds and mulch (City of Spokane 2015).

PCBs

Figure 5.

Contribution of each of the five factors to the total PCB mass in the influent trunk lines and effluent



Analysis Results

By examining the individual congeners in each of the samples, PCB-11 was measured at relatively high concentrations (compared to other congeners) in both the influent and effluent. The effluent is comprised of a relatively higher percentage of low molecular weight congeners (Factor 1) due to the efficient removal of high molecular weight PCBs by the wastewater treatment system. The PMF analysis demonstrated that the main sources of PCBs in the influent are not necessarily found in the effluent. Most of the factors in the influent are strongly correlated to a single Aroclor or Aroclor mixtures, with Aroclor 1254 being the most abundant.

APPLICATION OF BEST MANAGEMENT PRACTICES

The County used the track-down sampling and PMF results to help refine their toxic management activities. Through these efforts and participation in the Spokane River Regional Toxics Task Force, the County has helped improve understanding of PCB sources and has implemented a range of measures to address them including:

- Education of customers about PCBs through a multimedia public outreach program
- Providing input to the Washington Legislature regarding the revision of the Toxics Management Act to reduce inadvertent production of PCBs
- Ongoing support for industry-wide reformation of products that can contain elevated concentrations of PCB-11
- Removal of mechanical and electrical equipment found to contain PCBs
- Ongoing support to the local EnviroStars program, a local source control/waste minimization program aimed at businesses
- Leadership and participation in the Spokane River Regional Toxics Task Force

The Spokane River Regional Toxics Task Force developed a *2016 Comprehensive Plan to Reduce PCBs to the Spokane River* that was adopted in November of 2016 (SRRTTF 2016). See http://srtrtf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf

Regional Plan

PCBs**Standards
v.
Detection****Facility
Effectiveness****Source Types****CONCLUSIONS**

Toxics analysis programs are complex and costly. While EPA Method 1668A can detect PCB congeners at the ppq level, it is critical to note that individual congener reporting limits typically range around the Washington water quality standard and above the Spokane Tribe water quality standard. Therefore, when you examine total PCB values (sum of individual 209 congeners), the detection limit is often above the water quality standards. Even though measurement can occur at these low levels, there is still a disconnect between the water quality standards and the method detections.

Facility effluent concentrations are often similar or even lower than concentrations observed in the laboratory blanks. Effluent concentrations are also similar to or lower than concentrations observed in rainwater, and other supposedly pristine sources.

The Facility was found to provide very effective treatment, removing more than 99 percent of the total PCBs measured in the influent. Collection system track-down and PCB profile analysis suggests that PCB contamination in the influent is typically generalized with a large number of small sources rather than a small number of large sources.

The PMF analysis identified five distinct source types or factors that accounted for 99 percent of the total PCB mass across all samples. The abundance of PCB-11 is most likely from yellow and other pigments that could be coming from household laundries. Other factors suggest evidence of Aroclor contamination (Aroclor 1254 being the most abundant), which appears to be distributed throughout the collection system rather than associated with large discrete point sources.

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2016 Comprehensive Plan to Reduce Polychlorinated Biphenyls (PCBs) in the Spokane River:

http://srrttf.org/wp-content/uploads/2016/04/2016_Comp_Plan_Final_Approved.pdf

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GROUNDWATER INCLUDED IN TREATY WATER RIGHTS



9TH CIRCUIT RULES ON RESERVED RIGHTS FOR TRIBE

by David Moon, Editor

Treaty Groundwater

Reserved Right to Groundwater

Reservation Establishment

Arid Region

Aquifer Declining

Groundwater Purchases

Imported Water

Quality Concerns

Litigation Phases

INTRODUCTION

On March 7, the U.S. Court of Appeals for the Ninth Circuit (9th Circuit or Court) upheld a federal district court's 2015 ruling that the Agua Caliente Band of Cahuilla Indians (Tribe) "has a reserved right to groundwater underlying its reservation as a result of the purpose for which the reservation was established." *Agua Caliente Band of Cahuilla Indians, et al. v. Coachella Valley Water District, et al.*, Case No. 15-55896 (March 7, 2017); *Slip Op.* at 6. The decision is extremely important for its precedence value in western water law, as the Court itself noted "...we recognize that there is no controlling federal appellate authority addressing whether the reserved rights doctrine applies to groundwater." *Id.* at 5. The 9th Circuit's decision was based on the finding that the "United States impliedly reserved appurtenant water sources, including groundwater, when it created the Tribe's reservation in California's arid Coachella Valley." *Id.* The unanimous three-judge panel's decision, written by Judge Richard Tallman, is the first time a federal appeals court held that the *Winters* doctrine encompasses groundwater.

BACKGROUND

The Tribe has lived in the Coachella Valley since before California became a state in 1850. Presidential Executive Orders formally established most of the Aqua Caliente Reservation in 1876 and 1877; the reservation consists of approximately 31,396 acres interspersed in a checkerboard pattern among several cities in Riverside County, California. "In short, the United States sought to protect the Tribe and 'secure the Mission Indians permanent homes, with land and water enough.' Comm'r of Indian Aff., Ann. Rep. 37 (1877)." *Id.* at 6-7. The dilemma for the Tribe, however, is the fact that water is scarce in this "arid southwestern desert" and "surface water is virtually nonexistent in the valley for the majority of the year. Therefore, almost all of the water consumed in the region comes from the aquifer underlying the valley—the Coachella Valley Groundwater Basin." *Id.* at 7-8.

After noting that the groundwater basin supports nine cities, 400,000 people and 66,000 acres of farmland, the 9th Circuit turned to the facts that led to the lawsuit and the scope of the problem.

Given the demands on the basin's supply, it is not surprising that water levels in the aquifer have been declining at a steady rate. Since the 1980s, the aquifer has been in a state of overdraft, which exists despite major efforts to recharge the basin with water delivered from the California Water Project and the Colorado River. In total, groundwater pumping has resulted in an average annual recharge deficit of 239,000 acre-feet, with cumulative overdraft estimated at 5.5 million acre-feet as of 2010.

Id. at 8 (footnote omitted). The Tribe doesn't pump groundwater for use on the reservation. Instead, it purchases groundwater from the Appellant water agencies. The Tribe does receive a minimal amount of surface water from the Whitewater River system — enough to irrigate about 360 acres — but the groundwater purchased from the water agencies is the main source of water for all types of use on the reservation throughout the year.

The Tribe filed the lawsuit against the water agencies in May 2013 (Desert Water Agency and the Coachella Valley Water District) due to the concern over diminishing groundwater resources and the issue of water quality of the water supplied to them. As noted above, the water agencies have been importing water into the groundwater aquifer from the Colorado River. The Tribe asserted an ownership interest in the aquifer under the Valley floor, and challenged the decades long practice by the water agencies of depleting the water in the aquifer and using degraded Colorado River water to partially replenish the supply. Instead of pre-treating the Colorado River water, the water agencies put the water into the aquifer, degrading the quality of the natural groundwater. According to the Tribe, it complained for years that the districts did not have a long-term plan to responsibly and sustainably manage the groundwater resource and have ignored the Tribe's concerns repeatedly over the years. The Native American Rights Fund (NARF), along with Catherine Munson of the Kilpatrick Townsend law firm, represented the Tribe in its action to secure its right to groundwater and its role in ensuring a sustainable water future.

By stipulation, the parties divided the litigation into three phases. Phase I, at issue in this appeal to the 9th Circuit, addressed whether the Tribe has a reserved right and an aboriginal right to groundwater. Phase II will address whether the Tribe beneficially owns the "pore space" of the groundwater basin underlying the Agua Caliente Reservation and whether a tribal right to groundwater includes the right to receive water of a certain quality. Finally, Phase III will attempt to quantify any identified groundwater rights.

Treaty Groundwater	<p>The federal district court held that the reserved rights doctrine applies to groundwater and that the US reserved appurtenant groundwater when it established the Tribe's reservation. The district court also held that the Tribe does not have an aboriginal right to groundwater. The Tribe did not appeal that issue so the 9th Circuit did not address it.</p>
Court's Analysis	<p>THE DECISION: TRIBE'S RESERVED RIGHT & ABORIGINAL RIGHT TO GROUNDWATER</p> <p>The issue before the 9th Circuit was whether the Tribe has a federal reserved right to the groundwater underlying its reservation. The Court determined that this question was best analyzed in three steps:</p> <ul style="list-style-type: none"> • whether the United States intended to reserve water when it created the Tribe's reservation; • whether the reserved rights doctrine encompasses groundwater; and • whether the Tribe's correlative rights under state law or the historic lack of drilling for groundwater on the reservation, or the water the Tribe receives pursuant to the Whitewater River Decree, impacts the answers to those questions.
Winters Limitations	<p>Underlying Water Law: <i>Winters</i> Doctrine</p> <p>The 9th Circuit cited prevailing federal water law, in accordance with the <i>Winters</i> doctrine, which governs the scope of federal reserved rights granted to tribal entities. <i>See Winters v. United States</i>, 207 U.S. 564 (1908). "Despite the longstanding recognition that Indian reservations, as well as other reserved lands, require access to water, the <i>Winters</i> doctrine only applies in certain situations: it only reserves water to the extent it is necessary to accomplish the purpose of the reservation, and it only reserves water if it is appurtenant to the withdrawn land. <i>Winters</i>, 207 U.S. at 575–78; <i>Cappaert</i>, 426 U.S. at 138. Given the limitations in the <i>Winters</i> doctrine, we must first decide whether the United States, in establishing the Agua Caliente Reservation, impliedly reserved water. <i>See United States v. New Mexico</i>, 438 U.S. 696, 701 (1978)." <i>Id.</i> at 12.</p>
"Primary Purpose"	<p>Next, the 9th Circuit laid out the "primary purpose" limitation for reserved rights:</p> <p>In <i>New Mexico</i>, the Supreme Court emphasized that, under the reserved rights doctrine, the government reserves only "that amount of water necessary to fulfill the purpose of the reservation, no more." <i>Id.</i> (quoting <i>Cappaert</i>, 426 U.S. at 141). "Where water is only valuable for a secondary use of the reservation...the United States [must] acquire water in the same manner as any other public or private appropriator." <i>Id.</i> at 702. In other words, <i>New Mexico</i> established a "primary-secondary use" distinction. Water is impliedly reserved for primary purposes. It is not, however, reserved for secondary purposes.</p> <p><i>Id.</i> at 13 (footnote omitted).</p>
State v. Federal Law	<p>Another legal question the 9th Circuit ruled on concerned the authority of federal versus state water law. The water agencies asserted that if other sources of water existed for the Tribe and the lack of a federal groundwater right would not entirely defeat the purpose of the reservation — Congress must have intended to defer to state water law, which would require the US to obtain water rights like any private water user. "<i>New Mexico</i>, however, is not so narrow. Congress does not defer to state water law with respect to reserved rights. <i>Id.</i> at 702, 715. Instead, Congress retains 'its authority to reserve unappropriated water...for use on appurtenant lands withdrawn from the public domain for specific federal purposes.' <i>Id.</i> at 698." <i>Slip Op.</i> at 14.</p>
Guiding Principle	<p>The 9th Circuit continued its discussion regarding the guiding principles related to reserved rights. "The federal purpose for which land was reserved is the driving force behind the reserved rights doctrine... But the question is not whether water stemming from a federal right is necessary at some selected point in time to maintain the reservation; the question is whether the purpose underlying the reservation envisions water use." <i>Id.</i> at 14.</p>
General Purpose	<p>Intent to Reserve Water</p> <p>The Court focused its attention on the primary purpose of the reservation and whether or not that purpose contemplated water use. Looking first to the Executive Orders that established the reservation — which declared that the land was to be set aside for "the permanent use and occupancy of the Mission Indians" — the 9th Circuit pointed out that "specific purposes of an Indian reservation...[are] often unarticulated. The general purpose, <i>to provide a home for the Indians</i>, is a broad one and must be liberally construed. <i>Walton</i>, 647 F.2d at 47 (emphasis added)." <i>Id.</i> at 16.</p>
Implicitly Reserved	<p>Water is inherently tied to the Tribe's ability to live permanently on the reservation. Without water, the underlying purpose — to establish a home and support an agrarian society — would be entirely defeated. Put differently, the primary purpose underlying the establishment of the reservation was to create a home for the Tribe, and water was necessarily implicated in that purpose. Thus, we hold that the United States implicitly reserved a right to water when it created the Agua Caliente Reservation.</p> <p><i>Id.</i> at 17.</p>

<div data-bbox="99 149 365 283"> Treaty Groundwater </div> <div data-bbox="99 283 365 451"> Appurtenance </div> <div data-bbox="99 451 365 640"> "Only Viable Water Source" </div> <div data-bbox="99 640 365 850"> Arid Reality </div> <div data-bbox="99 850 365 1060"> Precedential Impact </div> <div data-bbox="99 1060 365 1270"> State Water Law </div> <div data-bbox="99 1270 365 1480"> Preempts State Law </div> <div data-bbox="99 1480 365 1690"> Non-Use </div> <div data-bbox="99 1690 365 1984"> Water Agencies' Arguments </div>	<div data-bbox="365 149 1536 1984"> <p>Do the Tribe's Reserved Rights Encompass Groundwater?</p> <p>The 9th Circuit returned to the "other main limitation of the reserved rights doctrine" under <i>Winters</i>. The unappropriated water must be "appurtenant" to the reservation. <i>See Cappaert</i>, 426 U.S. at 138. Appurtenance, however, simply limits the reserved right to those waters which are attached to the reservation. It does not limit the right to surface water only. <i>Cappaert</i> itself hinted that impliedly reserved waters may include appurtenant groundwater when it held that "the United States can protect its water from subsequent diversion, whether the diversion is of surface or groundwater." <i>Id.</i> at 143. If the United States can protect against groundwater diversions, it follows that the government can protect the groundwater itself.</p> <p><i>Slip Op.</i> at 18 (footnote omitted)</p> <p>The fact that groundwater is the "only viable water source" in many locations in the western US was duly noted by the Court. When a reservation "depend[s] for present and future survival substantially or entirely upon pumping of underground water" the 9th Circuit found it was unthinkable "that the United States reserved land for habitation without reserving the water necessary to sustain life." <i>Slip Op.</i> at 18-19, citing <i>In re Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source</i>, 989 P.2d 739, 746 (Ariz. 1999).</p> <p>The Court then referenced the specific factual situation faced by the Tribe in this case and why the reliance on groundwater is critical. "More importantly, such reliance exists here, as surface water in the Coachella Valley is minimal or entirely lacking for most of the year. Thus, survival is conditioned on access to water — and a reservation without an adequate source of surface water must be able to access groundwater." <i>Id.</i> at 19. Given the arid reality of the location of Indian reservations throughout the West, the 9th Circuit held that the <i>Winters</i> doctrine does include appurtenant groundwater.</p> <p>The <i>Winters</i> doctrine was developed in part to provide sustainable land for Indian tribes whose reservations were established in the arid parts of the country. And in many cases, those reservations lacked access to, or were unable to effectively capture, a regular supply of surface water. Given these realities, we can discern no reason to cabin the <i>Winters</i> doctrine to appurtenant surface water. As such, we hold that the <i>Winters</i> doctrine encompasses both surface water and groundwater appurtenant to reserved land.¹⁰ The creation of the Agua Caliente Reservation therefore carried with it an implied right to use water from the Coachella Valley aquifer.</p> <p><i>Id.</i> at 19 (footnote 10 stated that the parties did not dispute appurtenance, since the Coachella Valley Groundwater Basin clearly underlies the Tribe's reservation).</p> <p>Correlative Rights, Lack of Groundwater Drilling & Surface Water Adjudication</p> <p>In the third section of the opinion, the 9th Circuit stated that the final issue involves "the contours of the Tribe's reserved right, including its relation to state water law and the Tribe's existing water rights." <i>Id.</i> The Court cited several important cases regarding the nature of federal reserved water rights and the fundamental principles that govern them. Although the citations do not specifically deal with groundwater, they do address aspects of the reserved rights at issue.</p> <p>A "reserved right in unappropriated water...vests on the date of the reservation and is superior to the rights of future appropriators." <i>Cappaert</i>, 426 U.S. at 138. Further, reserved rights are not analyzed "in terms of a balancing test." <i>Id.</i> Rather, they are federal water rights that preempt conflicting state law. <i>See Walton</i>, 647 F.2d at 51-53; <i>see also New Mexico</i>, 438 U.S. at 715 ("[T]he 'reserved rights doctrine'...is an exception to Congress' explicit deference to state water law in other areas."). Finally, the rights are not lost through non-use. <i>See Walton</i>, 647 F.2d at 51. Instead, they are flexible and can change over time. <i>See id.</i> at 47-48; <i>United States v. Ahtanum Irrigation Dist.</i>, 236 F.2d 321, 326 (9th Cir. 1956).</p> <p><i>Id.</i> at 19-20.</p> <p>The Court set forth the water agencies' basic arguments on the issue:</p> <p>Despite the federal primacy of reserved water rights, the water agencies argue that because (1) the Tribe has a correlative right to groundwater under California law and 2) the Tribe has not drilled for groundwater on its reservation, and (3) because the Tribe is entitled to surface water from the Whitewater River Decree, the Tribe does not need a federal reserved right to prevent the purpose of the reservation from being entirely defeated. Put differently, the water agencies argue that, because the Tribe is already receiving water pursuant to California's correlative rights doctrine and the Whitewater River Decree, a federal reserved right is unnecessary.</p> <p><i>Id.</i> at 20.</p> </div>
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Treaty Groundwater

State Water Entitlements

Winters Expansion

Reserved Water Sources

Quality Issue Remains

The 9th Circuit concisely dismissed the water agencies' positions, citing three reasons:

First, state water rights are preempted by federal reserved rights. *See Walton*, 647 F.2d at 51; *see also Ahtanum Irrigation Dist.*, 236 F.2d at 329 ("Rights reserved by treaties such as this are not subject to appropriation under state law, nor has the state power to dispose of them."). Second, the fact that the Tribe did not historically access groundwater does not destroy its right to groundwater now. *See Walton*, 647 F.2d at 51. And third, the *New Mexico* inquiry does not ask if water is currently needed to sustain the reservation; it asks whether water was envisioned as necessary for the reservation's purpose at the time the reservation was created. *See supra* Part III.B. Thus, state water entitlements do not affect our analysis with respect to the creation of the Tribe's federally reserved water right.

Id. at 20-21.

CONCLUSION

The expansion of the *Winters* doctrine to grant reserved rights for groundwater as well as surface water is a significant victory for the Tribe. It also establishes a critical precedent for other tribes in the US where surface water supplies are insufficient for the primary purpose of the reservation and groundwater resources are available for use. "In sum, the *Winters* doctrine does not distinguish between surface water and groundwater. Rather, its limits derive only from the government's intent in withdrawing land for a public purpose and the location of the water in relation to the reservation created. As such, because the United States intended to reserve water when it established a home for the Agua Caliente Band of Cahuilla Indians, we hold that the district court did not err in determining that the government reserved appurtenant water sources — including groundwater — when it created the Tribe's reservation in the Coachella Valley." *Id.* at 21.

The parties to this litigation will probably battle on in Phases II and III over more specific aspects of the scope of the Tribe's reserved rights. Of those remaining issues, the issue which looms largest is whether a tribal right to groundwater includes the right to receive water of a certain *quality*. The Tribe clearly values the pristine quality of the groundwater resource appurtenant to the reservation, as opposed to the quality of Colorado River water imported into the basin, so one can expect this issue to be of great concern for all the parties going forward. The federal district court will also address any limits of the reserved groundwater rights and how to quantify those rights.

FOR ADDITIONAL INFORMATION: 9th Circuit Opinion available at: www.ca9.uscourts.gov/opinions/

WATER BRIEFS

WATER WORKS CASE IA

DES MOINES CASE DISMISSED

On March 17, a federal district court in Iowa dismissed all the claims filed by the Des Moines Water Works (DMWW) against upstream irrigation drainage districts. DMWW, which supplies drinking water in the Des Moines area, maintained that the drainage districts were polluting DMWW's water source with nitrates, beyond the maximum allowed by law, in the water flowing downstream to the water utility. DMWW alleged state tort claims and federal and state statutory and constitutional claims against ten upstream drainage districts and three upstream County Board of Supervisors as Trustees of the Drainage Districts.

The federal district court certified four questions of state law to the Iowa Supreme Court (Supreme Court). The first two questions dealt with the "doctrine of implied immunity," which would grant the drainage districts unqualified immunity from the damages claims and also equitable remedies and claims. The Supreme Court answered in the affirmative, essentially ruling that under Iowa law the drainage districts were immune from any such claims by DMWW. *Slip Op.* at 3-4.

The third question dealt with the ability of DMWW to assert protections "afforded by the Iowa Constitution's inalienable rights, due process, equal protection, and takings clauses against drainage districts as alleged in the complaint." The Supreme Court answered they could not, since those protections exist only to "protect citizens against overreaching government." That court further noted that even if DMWW could sue under these clauses, "an increased need to treat nitrates drawn from river water to meet standards for kitchen tap water would not amount to a constitutional violation." *Id.* at 4.

The final question was whether or not DMWW had a property interest that may be the subject of "a claim under Iowa Constitution's takings clause"? The Supreme Court said no — for the same reasons as discussed in regard to the third question.

Given these responses by the Supreme Court, the federal district court granted summary judgment motions by the drainage districts defendants and dismissed all the claims asserted by DMWW. "Defendants contend that the Certified Questions Opinion precludes the possibility of redress. In other words, they argue that under Iowa law, drainage districts have no power to redress DMWW's alleged injuries, even if DMWW prevails on Count I and/or Count II. I agree." *Id.* at 10

It is important to note that the federal district court did not rule on the federal Clean Water Act (CWA) issues in the case. Those issues included the issue of whether the drainage district's activities resulted in a "point source discharge" under the CWA, whether nitrates are considered a "pollutant" as defined by the CWA, or whether the drainage districts' actions fall within the agricultural stormwater exception. *See Moon, TWR #143*

For info: Opinion available at: www.scribd.com/document/342452360/Ruling-on-Summary-Judgment-00795075xB8DF0

WATER BRIEFS

WATERS OF THE US US

EPA PROPOSES TO RESCIND OR REVISE

The EPA has released a proposal to “Review and Rescind or Revise” the “Clean Water Rule: Definition of ‘Waters of the United States’” (2015 Rule) that was issued by EPA and the Army Corps of Engineers in June, 2015. The scope of “waters of the United States” as defined by the prior regulations has been subject to litigation in several US Supreme Court cases, most recently in *Rapanos v. United States*, 547 U.S. 715 (2006) (*Rapanos*). See Moon, *TWR* #139; Glick and Atencio, *TWR* #149.

EPA’s notice of this proposed action was published in the Federal Register on March 6th (Fed Reg Vol.82, No 42k, p 12532) and states in part:

On February 28, 2017, the President of the United States issued an Executive Order directing the EPA and the Army to review and rescind or revise the 2015 Rule. Today, the EPA and the Army announce their intention to review that rule, and provide advanced notice of a forthcoming proposed rulemaking consistent with the Executive Order. In doing so, the agencies will consider interpreting the term “navigable waters,” as defined in the CWA in a manner consistent with the opinion of Justice Scalia in *Rapanos*.

The 2015 rule was based on Justice Kennedy’s opinion in *Rapanos*, which held that any waters sharing a “significant nexus” with navigable waters fall under Clean Water Act jurisdiction. Justice Scalia’s opinion in *Rapanos* includes requiring a “continuous surface connection” between “relatively permanent” waters for a water body to fall under Clean Water Act jurisdiction — a much narrower standard.

The Federal Register goes on to explain why EPA and the Army Corps believe they will not need to address the 2015 Rule’s scientific and policy justification put forth by the Obama-era agencies at the time of its promulgation.

Agencies have inherent authority to reconsider past decisions and to revise, replace or repeal a decision to the extent permitted by law and supported by a reasoned explanation. *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (“*Fox*”); *Motor Vehicle Manufacturers Ass’n of the United States, Inc., et al. v. State Farm Mutual Automobile Insurance Co., et al.* 463 U.S. 29, 42 (1983) (“*State Farm*”). Importantly, such a revised decision need not be based upon a change of facts or circumstances. A revised rulemaking based “on a reevaluation of which policy would be better in light of the facts” is “well within an agency’s discretion,” and “[a] change in administration brought about by the people casting their votes is a perfectly reasonable basis for an executive agency’s reappraisal of the costs and benefits of its programs and regulations.” *National Ass’n of Home Builders v. EPA*, 682 F.3d 1032, 1038 & 1043 (D.C. Cir. 2012) (citing *Fox*, 556 U.S. at 514–15; quoting *State Farm*, 463 U.S. at 59 (Rehnquist, J., concurring in part and dissenting in part)).

On February 28, 2017, attorney generals of the District of Columbia, Hawaii, Massachusetts, New York, Oregon, Vermont and Washington issued a statement opposing any weakening of the 2015 rule, stating, in part:

We won’t hesitate to protect our people and our environment—including by aggressively opposing in court President Trump’s actions that ignore both the law and the public’s paramount need for clean water.

On October 9, 2015, the US Court of Appeals for the Sixth Circuit, having assumed jurisdiction over multiple cases objecting to the 2015 Rule, stayed the 2015 Rule nationwide pending further action of the court.

On April 3, 2017, the US Supreme Court announced it would be proceeding with a 2015-related case despite a White House request to hold off on consideration until after the rescind or revise process is completed. The case — *National Association of Manufacturers v. Department of Defense* — does not concern the merits of the 2015 regulation. The industry groups involved object to the Sixth Circuit’s assumption of jurisdiction and are contending that lower district courts should first hear the challenges, which can then be appealed to the Supreme Court.

For info: Donna Downing, EPA, 202/ 566–2428 or CWAwaters@epa.gov; Gib Owen, Army Corps, 703/ 695–4641 or gib.a.owen.civ@mail.mil
EPA website: www.epa.gov/cleanwater/rule/notice-intention-review-and-rescind-or-revise-clean-water-rule

GROUNDWATER US

USGS BRACKISH GROUNDWATER INVENTORY

A new nationwide assessment by the US Geological Survey (USGS) suggests that the nation’s brackish groundwater could help stretch limited freshwater supplies.

This study, the first of its kind in more than 50 years, found that the amount of brackish groundwater underlying the country is more than 800 times the amount currently used each year. With issues like drought, groundwater depletion, dwindling freshwater supplies, and demand for groundwater expected to continue to rise, understanding brackish groundwater supplies can help determine whether they can supplement or replace taxed freshwater sources in water-stressed areas.

In general, brackish groundwater is groundwater that has a dissolved-solids content greater than freshwater but less than seawater. It is defined for this assessment as having a dissolved-solids concentration ranging from 1,000 to 10,000 milligrams per liter.

This new assessment builds on a 1965 study which, for more than five decades, has served as the primary source of information on the national distribution of brackish groundwater. By incorporating data from more than 380,000 sites, compared to about 1,000 for the 1965 study, the 2017 assessment provides more comprehensive, nationwide data on the quantity and quality of brackish groundwater across the country. This includes information like chemical composition of the water and well yields, which are necessary for understanding the potential — at the national and regional scales — for expanding brackish groundwater development and for informing decision and policy makers.

All water naturally contains dissolved solids that, if present in sufficient concentration, can make the water brackish, or slightly salty. Sources of these dissolved solids can include ancient seawater, coastal seawater, dissolution of naturally occurring minerals, leaching from saline soils, road salt, brine from oil and gas wells, or other human activities.

The assessment provides data for states and other public

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agencies interested in using brackish groundwater. It also supports the efforts of the US Bureau of Reclamation to promote sustainable water treatment for brackish aquifers.

Advances in desalination technology and increases in demand for uses that don't need high-quality water, like mining, oil and gas development, and thermoelectric power generation, have led states like Texas and California to turn to brackish groundwater as an alternative to freshwater.

Data from the study indicate that brackish groundwater is present at some depth within 3,000 feet below ground beneath parts of every state except New Hampshire and Rhode Island. Using available data, a conservative estimate for the volume of brackish groundwater underlying the country is more than 35 times the amount of fresh groundwater currently used each year. Consequently, it is reasonable to consider brackish groundwater a substantial water resource available for use by the nation.

In some parts of the country, freshwater has become more limited and brackish groundwater use has been increasing. Growth in brackish groundwater facilities is likely due to the fact that brackish water is cheaper to process than seawater and not limited to coastal areas. In 2010, there were 649 active desalination plants in the United States with a capacity to treat 402 million gallons per day.

For info: Jennifer Stanton, USGS, 508/ 490-5063 or jstanton@usgs.gov; "*Brackish Groundwater in the United States*" (USGS Paper 1833) available at: <https://pubs.er.usgs.gov/publication/pp1833>

INSTREAM FLOWS WA EXCEPTIONS IN RULES

Minimum instream flows in Washington state have received a great deal of attention by the Washington Supreme Court (Supreme Court) recently. In general, instream flows have been granted enormous protection from reductions or mitigation proposals that would impact the minimum instream flows, and the Supreme Court significantly limited the application of the "overriding considerations of public interest" standard. See Pors, *TWR* #145 and Moon, *TWR* #141. The Supreme

Court on March 8, however, refused to accept review of a decision by the Washington Court of Appeals, thereby letting stand the decision of October 17, 2016. The Court of Appeals decision affirmed that the Department of Ecology, in its issuance of a permit for power generation, could rely on an explicit exception to the minimum instream flows contained in the rule which established those flows. *Center for Environmental Law and Policy, et al. v. Washington Department of Ecology, et al.*, 196 Wn.App. 360, 383 P.3d 608 (2016).

"Unlike in *Swinomish* and *Foster*, Ecology did not approve the water right under the OCPI exception. And, this was not because Ecology erroneously skipped over the OCPI exception step. Instead, Ecology did not need to invoke that exception, because it invoked the regulatory exception in WAC 173-549-020(5) — a rule promulgated under chapters 90.22 RCW and 90.54 RCW. RCW 90.22.010 grants Ecology express authority to establish minimum water flows. And, RCW 90.54.040 provides that Ecology is directed, through the adoption of rules, to insure that the waters of the state are utilized in the best interest of the people. WAC 173-549-020(1) establishes the minimum instream flows for the Similkameen River. And, WAC 173-549-020(5) provides a minimum instream flow exception for hydroelectric projects such as the PUD's that are consumptive for only a portion of the stream's length. Chapter 90.22 RCW and 90.54 RCW authorized the adoption of WAC 173-549-020, and it went through the rulemaking process. Therefore, whether Ecology can decrease the minimum instream flow via a regulatory exception has been resolved. Notably, CELP does not challenge the validity of WAC 173-549-020. The plain language of WAC 173-549-020(5) is clear, and it carves out a regulatory exception to WAC 173-549-020(1) and (2)'s minimum flows notwithstanding the statutory OCPI exception in RCW 90.54.020(3)(a)." (footnote omitted; *Slip Op.* at 21-22).

The ruling makes it clear that instream flows in Washington are not protected absolutely in every case. If an explicit exception is contained in the same rule that established the

instream right, Ecology can *decrease* the minimum instream flow in accordance with the applicable rules.

For info: Slip Opinion available at: www.courts.wa.gov/opinions/index.cfm?fa=opinions.showOpinion&filename=748416MAJ

RECLAIMED WATER BEER CA FULL CIRCLE PALE ALE

As part of a promotion for Pure Water San Diego, Stone Brewing — a beer maker from Escondido, California — brewed a beer with reclaimed water for the occasion. Stone Full Circle Pale Ale was brewed specifically for, and available exclusively at, the Pure Stone event held on March 16. It was consumed in a few hours by politicians and VIPs.

The reclaimed water used in Stone Full Circle Pale Ale was: Cleaner than normal tap water; Allows for a more reliable source of supply; Benefits the environment and community; and Reinforces Stone Brewing's commitments to sustainability and the community.

As Stone Brewing notes on its website, "The bottles, cans or kegs of Stone Brewing beer in your fridge or on tap at your local bar were not brewed with reclaimed water. Not yesterday, not today, and not anywhere in the foreseeable future. Unfortunately, but it is what it is." Despite this fact, Editor David Moon can still highly recommend Stone Brewing's other beers and hopes that they consider making Full Circle Pale Ale in the future!

For info: Stone Brewing at: www.stonebrewing.com/

RECLAMATION AUTHORITY US STORAGE RELEASE FOR FISH

On February 21, the Ninth Circuit held that the US Bureau of Reclamation (BOR) has broad statutory authority to determine the amount of water to be released from reservoirs to protect fish populations in the lower Klamath River, in excess of the amount previously designated in the applicable water release schedule. *San Luis and Delta-Mendota Water Authority v. Haugrud*, Case No. 14-17493 (9th Cir. 2017). The "Background" section of the Opinion provides an excellent overview of the physical layout involved, California's

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water system, statutory consideration, and the fishery concerns at issue. *Id.* at 8-20.

"In late summer 2013, the Bureau of Reclamation ('BOR') released Trinity River water from the Lewiston Dam, above and beyond the amount designated in the applicable water release schedule (a schedule that was devised to benefit only the Trinity River basin). That water flowed down the Trinity River and into the lower Klamath River, where winter-run salmon were beginning their migration upriver to their spawning grounds. BOR released the water to help prevent a mass die-off of these salmon in the lower Klamath, which are threatened when the Klamath River runs low. BOR asserted that the Act of August 12, 1955, ('1955 Act') gave it the power to release this extra water. The 1955 Act 'authorized and directed' the Secretary of the United States Department of the Interior ('DOI') 'to adopt appropriate measures to insure the preservation and propagation of fish and wildlife.' We agree with BOR. The broad language of this clause gave BOR the authority to implement the 2013 water release.

In implementing the 2013 water release, BOR also did not violate the Central Valley Project Improvement Act or California water law (and correspondingly the Reclamation Act of 1902, which requires agencies to comply with state water law), as alleged by Cross-Appellants San Luis & Delta-Mendota Water Authority and Westlands Water District. Finally, Cross-Appellants lack standing to pursue their Endangered Species Act claim." *Slip Op.* at 7-8.

The court's analysis of Reclamation authority was based on statutory language contained in the 1955 Act. "We perceive no ambiguity in the language regarding the preservation and propagation mandate contained in section 2 [for fish and wildlife]. This expansive clause, directing the Secretary to adopt any 'appropriate measures,' contains no limiting language, geographic or otherwise. The absence of limiting language indicates Congress intended to delegate broad authority to the Secretary, allowing the Secretary substantial discretion to determine what constitutes 'appropriate measures' in the face of unforeseen or changing circumstances." (citations omitted); *Id.* at 23.

The Water Contractors' ESA claims were denied because the Ninth Circuit held that they lacked standing to bring such claims. "The Water Contractors' posited series of events that must occur before the economic harm is realized is both too uncertain and too remote to constitute a reasonably probable threat of injury." *Id.* at 33. The Ninth Circuit also found problems with the causal link to economic harm. "Not only is the alleged threat to the Water Contractors' economic interests not 'reasonabl[y] probabl[e],' it is also not 'fairly traceable' to BOR's actions, because it 'rel[ies] on conjecture about the behavior of other parties.'" (citations omitted); *Id.* at 34).

For info: Opinion available at: <http://cdn.ca9.uscourts.gov/datastore/opinions/2017/02/21/14-17493.pdf>

STATE BANS FRACKING MD

Republican Governor Larry Hogan on April 4th signed HB 1325, which bans hydraulic fracturing ("fracking") in the State of Maryland. The Executive Director of Food & Water Watch (a nonprofit consumer organization), Wenonah Hauter, said that "[M]aryland's fracking ban is the latest milestone in a strong and growing movement to resist fossil fuels throughout the country. This is a huge victory for public health, common-sense environmental protection, climate stability and, not least, the power of grassroots organizing. This bold turn will reverberate nationally at a time when the Trump administration seeks to decimate environmental protections for the sake of corporate polluter profits."

For info: Governor Hogan's Office, 410/974-3901 or <http://governor.maryland.gov/>

P3S IN WATER SECTOR US
ALTERNATIVE PROJECTS

To help broaden understanding of how public-private and public-public partnerships ("P3") and performance based infrastructure project delivery models can be used by communities to develop water infrastructure projects, EPA and the West Coast Infrastructure Exchange provided assistance under a cooperative agreement to the University of North Carolina (UNC) Environmental Finance Center to perform an in-depth examination of nine projects where

communities used these alternative project delivery models. UNC's report, "The Financial Impact of Alternative Water Project Delivery Models," provides detailed case studies for each of the communities highlighting outcomes of the models including how the project was developed and procured, how risks were allocated, and the financial structure and features.

In conjunction with the report's release, EPA's Water Finance Center published a companion perspective on the report, which provides an overview of the P3 procurement model, the model's benefits and risks, and the decision process used to solicit P3 services.

For info: EPA website: www.epa.gov/waterfinancecenter/

PUEBLO WATER RIGHTS NM
LAW REVIEW ARTICLE

A law review article by Richard W. Hughes, entitled "*Pueblo Indian Water Rights: Charting the Unknown*" was recently published by the Natural Resources Journal. *See* 57 Nat. Resources J. 219 (2017). The Abstract of the article sets forth the scope of Hughes' article. "This article examines the so-far-unsuccessful efforts to judicially define and quantify the water rights appurtenant to the core land holdings of the 19 New Mexico Pueblos, many of whose lands straddle the Rio Grande. It explains that the Tenth Circuit Court of Appeals has squarely held that Pueblo water rights are governed by federal, not state law, and are prior to those of any non-Indian appropriator, but also that the Tenth Circuit acknowledged that it could not say how those rights should be characterized. Part I of the article examines the course of the cases that have sought to achieve this elusive goal. Of the first six cases, filed half a century ago, three ended in negotiated settlements and none of them has yielded a definitive ruling on the nature or measure of Pueblo rights. Of the three cases filed since then, only one is in active litigation on the Pueblo rights issue, but that case may finally lead to a substantive ruling. Part II discusses the few rulings that have been issued in these cases so far relative to Pueblo water rights, and examines the distinctive nature of the issues that are presented by the unique

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circumstances of the Pueblos' history and landholdings. The article notes that the ultimate determination of the nature and measure of Pueblo rights could have dramatic consequences for any effort to adjudicate rights on the mainstem of the Upper and Middle Rio Grande.

For info: Article available at: www.narf.org/nill/bulletins/lawreviews/2017.html

INFRASTRUCTURE NEEDS US “FAILURE TO ACT” REPORT

Every four years, the American Society of Civil Engineers (ASCE) publishes *The Infrastructure Report Card*, which grades the current state of national infrastructure categories on a scale of A through F. Since 1998, America's infrastructure has earned persistent D averages, and the failure to close the investment gap with needed maintenance and improvements has continued. The larger question at stake is the implication of D+ infrastructure on America's economic future.

The *Failure to Act* report series answers this key question — how does the nation's failure to act to improve the condition of US infrastructure systems affect the nation's economic performance? In 2011 and 2012, ASCE released four *Failure to Act* reports in a series covering ten infrastructure sectors that are critical to the economic prosperity of the US.

These reports were followed by a fifth, comprehensive final report, *Failure to Act: The Impact of Infrastructure Investment on America's Economic Future*, which addressed the aggregate economic impact of failing to act in more than one sector. The purpose was to provide an aggregate analysis of the economic implications for the US of continuing its current investment trends in multiple infrastructure categories.

The ASCE has recently released an update to the *Failure to Act* comprehensive report, entitled *Failure to Act: Closing the Infrastructure Investment Gap for America's Economic Future*. The 32-page report, released in mid-March, addresses the current infrastructure gaps between today's needs and investment and how they will affect the future productivity of industries, national competitiveness, and future costs to households.

Failure to Act shows that business costs and, therefore, prices will increase

if surface transportation systems worsen, ports, airports and inland waterways become outdated or congested, and if water, wastewater and electricity infrastructure systems deteriorate or fail to keep up with changing demand. Greater costs to transport the wide array of imported goods that supply domestic manufacturers and rising costs for exports will affect our ability to compete in global markets. Irregular delivery of water and wastewater services and electricity will make production processes more expensive and divert household disposable income to these basic necessities.

From 2016 to 2025, each household will lose \$3,400 each year in disposable income due to infrastructure deficiencies; and if not addressed, the loss will grow to an average of \$5,100 annually from 2026 to 2040, resulting in cumulative losses up to almost \$34,000 per household from 2016 to 2025 and almost \$111,000 from 2016 to 2040 (all dollars in 2015 value). Over time, these impacts will also affect businesses' ability to provide well-paying jobs, further reducing incomes. If this investment gap is not addressed throughout the nation's infrastructure sectors by 2025, the economy is expected to lose almost \$4 trillion in GDP, resulting in a loss of 2.5 million jobs in 2025.

Closing each infrastructure investment gap is possible, and the economic consequences caused by these gaps are avoidable with investment. The economic analysis of this report indicates that our nation's inland waterways and marine ports, electricity infrastructure, airports, as well as water and wastewater infrastructure have all shown some modest improvement or been stable since the previous reports. However, this is not the case with the surface transportation investment gap, which has increased since the prior studies.

For info: Full Report available at: www.infrastructurereportcard.org/the-impact/failure-to-act-report/

DROUGHT IMPACT STUDY WA AGRICULTURAL ECONOMICS

On February 14, the Washington State Department of Agriculture (Department) released “2015 Drought and Agriculture: A Study by the Washington State Department of

Agriculture” by lead author Kelly McLain. Calling the report a “milestone for the agency,” the Department's press release noted that since 1970 “Washington has experienced more than half a dozen droughts and, in all that time, this is the first attempt to quantify the impacts of these disastrous climatological events.”

The Department's Natural Resources Assessment Section (NRAS) spent the past year identifying metrics that give some measure of the economic impact the 2015 drought in Washington State had on our farmers and ranchers. The work entailed numerous meetings with farmers, ranchers and organizations involved in agriculture. NRAS staff conducted surveys and visited farms around the state and partnered with agriculture organizations, academic institutions, and conservation districts.

The resulting estimate places economic damage from the 2015 drought at somewhere between \$633 million to \$773 million dollars statewide. There are a number of caveats to those figures that the report explains in detail, but they result from the best available data, according to the Department. Earlier estimates made at the first signs of drought in May 2015 anticipated even higher losses, based on what could happen if nothing were done to mitigate the effects of the drought. “This report is the first successful attempt to tally the impacts of the drought on Washington agriculture and it lays the groundwork to improve the accuracy of future drought impact projections.” Department Press Release, Feb. 14, 2017.

An independent evaluation and review is contained in one of the appendices to the Study, “Evaluation and Recommendations by the Washington State Academy of Sciences of Interim Report: 2015 Drought and Agriculture.” See Appendix B (page 60 start). The Washington State Academy of Sciences (Academy) goes into detail about the methodologies utilized and the bases for the Study's conclusions. This evaluation and review is essential to fully understand the Study's calculations and conclusions. See “Results” at Appendix at 72.

For info: Study available at: agr.wa.gov/FP/Pubs/NaturalResourcesAssessmentPubs.aspx; Kelly McLain, 360/ 902-2067 or kmclain@agr.wa.gov

WATER BRIEFS

**INSTREAM WATER CO BASIN
BASIN STATES TRANSFERS COMPARED**

A new report from Stanford's Water in the West program — *Colorado River Basin Environmental Water Transfers Scorecard* — assesses progress among states in the Colorado River Basin with respect to environmental water rights transfers. Such transfers provide a legal tool that enables water rights holders to voluntarily transfer their water to rivers, streams, and wetlands to benefit the environment and potentially generate revenue.

Despite the potential benefits and appeal of environmental water rights transfers, the laws regarding their regulation and approval vary from state to state. As a way of increasing the use of these transfers, the report scores and subsequently ranks each state in terms of existing laws and policies that support them.

The report and its methodology were developed by researchers at Water in the West and AMP Insights, a consulting firm in Oregon with extensive experience in environmental water transfers, with support from the Walton Family Foundation. The report builds on Water in the West's 2015 report *Environmental Water Rights Transfers: A Review of State Laws*, prior work by AMP Insights and work by other researchers.

The researchers looked at factors such as legal authorization, the process for creating transfers, the level of protection of transferred rights, and how the states treat environmental water rights.

According to the report, Arizona scored the lowest with unclear and untested regulations and procedures to allow for voluntary, compensated transfers of existing water rights for environmental purposes. Colorado scored highest because of its relatively robust framework for authorizing and approving water rights transfers. California also scored well as it provides state funding for improving environmental flows.

However, all of the observed states had room to improve their scores by offering greater incentives for this unique way to protect the natural properties of streams and rivers. The

report describes specific avenues for progress that each state could focus on.

Though few states had seen many water rights transfers, an encouraging finding was that in every basin state, there is an active community of conservation organizations and state agencies working together to restore stream flows and reach voluntary agreements with irrigators.

For info: Report available at: http://waterinthewest.stanford.edu/sites/default/files/Co_River_Basin_Env_Transfers_Scorecard.pdf

**GROUNDWATER US
USGS SURVEYS**

The USGS has identified 68 principal aquifers, or regionally extensive aquifers that can be used as a source of drinking water, across the nation. Groundwater pumped from these aquifers provides nearly 50 percent of the nation's drinking water. Twenty of these principal aquifers account for about 75 percent of the nation's groundwater pumped for public supply and 85 percent of the groundwater pumped for domestic supply. These 20 principal aquifers are being intensively evaluated by the USGS National Water-Quality Assessment Project between 2012 and 2023. Summary results for five principal aquifers are recently completed and now available online.

USGS is assessing water quality in source (untreated) water from wells in principal aquifers. Most consumers receive water that has been treated by local utilities to meet federal drinking-water standards. Understanding what constituents are in untreated water can help decision makers manage and treat water resources.

These regional aquifer studies provide water utilities and resource managers with information about:

- Regulated and unregulated constituents from natural or human sources
- Pesticides, pharmaceuticals, hormones and other constituents of concern for human health
- Understanding present groundwater quality, to be compared with future conditions
- Regional and national statistics on

water quality, as context for individual wells

- A comparison of water quality in the shallow and deep parts of aquifer systems
 - Environmental tracers that can be used to understand sources and sustainability of groundwater supplies
 - Improving understanding of local, regional, and national hydrogeology
- The five aquifers in these new studies include:
- Basin and Range basin-fill aquifers (western U.S.)
 - Valley and Ridge carbonate-rock aquifers and the Piedmont and Blue Ridge carbonate-rock aquifers (eastern U.S.)
 - Northern Atlantic Coastal Plain aquifer system (east coast of U.S.)
 - Southeastern Coastal Plain aquifer system (southeastern U.S.)
 - Coastal Lowlands aquifer system (south central U.S.)

Findings

- One or more inorganic constituents exceeded human-health benchmarks in 4 to 20 percent of samples collected from the five principal aquifers.
- Organic contaminants were not found at levels of concern.
- Contaminants from geologic sources — primarily trace elements such as arsenic, fluoride and manganese — were the most common to exceed human-health benchmarks.
- Radioactive constituents exceeded human-health benchmarks by small percentages — 1 to 3 percent — in all but one (Basin and Range basin-fill aquifers) of the five aquifers studied.
- The nutrient nitrate was the only constituent from manmade sources that exceeded the human-health benchmark. These findings were in the Valley and Ridge carbonate-rock aquifers and the Piedmont and Blue Ridge carbonate-rock aquifers at a low percentage (2 percent).
- Understanding how natural features and human activities affect groundwater quality helps to predict how and why aquifer vulnerability to contamination varies across the nation.

For info: Studies available at: www.usgs.gov/news/quality-nation-s-groundwater-progress-a-national-survey

April 18 WA 5.1 Advanced Long-Term LID Operations: Permeable Pavement Training, Olympia. Olympia Center, 222 Columbia Street NW. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	April 27-28 CA Headwaters Tour 2017, Sacramento. Sierra Nevada. Presented by Water Education Foundation. For info: www.watereducation.org/tour/headwaters-tour-2017	May 9 WA 5.0 Advanced Long-Term LID Operations: Bioretention Training, Seattle. Center for Urban Horticulture, 3501 NE 41st Street. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	May 16-17 TX Environmental Trade Fair & Conference, Austin. Austin Convention Ctr. Sponsored by Texas Commission on Environmental Quality. For info: www.tceq.texas.gov/p2/events/etfc/etf.html
April 18 WA 5.1 Advanced Long-Term LID Operations: Permeable Pavement Training, Vancouver. Water Resources Education Ctr., 4600 SE Columbia Way. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	April 30-May 5 MO Assoc. of State Floodplain Managers (ASFP) National Conference 2017, Kansas City. Kansas City Convention Ctr. For info: www.asfpmconference.org/2017/	May 9 WY "MODIS & Snowcover Patterns: How Changes in Snow Affect Water Yield" by Stephanie Kampf, CSU: Wyoming Water Forum, Cheyenne. Herschler Bldg., Conference Room 1699. Presented by State Engineer's Office. For info: https://sites.google.com/a/wyo.gov/seo/interstate-streams/water-forum	May 17-18 ID 2017 Water Reuse Conference (Pacific Northwest), Boise. Riverside Hotel. For info: www.deq.idaho.gov/assistance-resources/conferences-trainings/2017-water-reuse-conference/
April 20 WEB "Introduction to SWAT": EPA's Water Quality Modeling Webinar, WEB. 10am - Noon PDT. Modeling as Applied to TMDL & Water Quality Permitting Programs. For info: https://attendee.gotowebinar.com/register/7421924870795104001	May 3 WA 5.0 Advanced Long-Term LID Operations: Bioretention Training, Olympia. Olympia Center, 222 Columbia Street NW. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	May 9-11 WA Washington Hydrogeology Symposium 2017, Tacoma. Hotel Murano. For info: Mary Jane Shirkawa, 206/ 221-3936, mjshir@uw.edu or http://depts.washington.edu/uwconf/wordpress/wahgs/	May 18-19 TX 7th Annual Water Reuse in Texas Conference, El Paso. TBA. For info: https://eventegg.com/water-reuse-texas/
April 20 WA 5.0 Advanced Long-Term LID Operations: Bioretention Training, Moses Lake. Moses Lake Fire Depart. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	May 3-4 CA SGMA Conference - Groundwater Sustainability Plan Tools, Los Angeles. DoubleTree by Hilton Hotel Modesto. Presented by Groundwater Resources Assoc. of California. For info: www.grac.org/events/64/	May 9-12 CA Assoc. of California Water Agencies 2017 Spring Conference & Exhibition, Monterey. Monterey Marriott & Portola Hotel & Spa. For info: http://www.acwa.com/events/acwa-2017-spring-conference-exhibition	May 21-23 GA 2017 Industrial & Commercial Water Reuse Conference, Atlanta. Westin Peachtree Plaza. For info: https://watereuse.org/news-events/event-calendar
April 25 WA A Northwest Vision for 2040 Water Infrastructure Presentation, Seattle. Ivar's Salmon House on Lake Union, 401 NE Northlake Way, 5:30-8 pm. Presented by AWRA - Washington Chapter. For info: http://waawra.org/event-2504599	May 4 WA 6.2 Advanced LID Design: Bioretention Media & Compost Amended Soils Training, Seattle. Center for Urban Horticulture, 3501 NE 41st Street. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	May 12 WA 5.1 Advanced Long-Term LID Operations: Permeable Pavement Training, Seattle. Center for Urban Horticulture, 3501 NE 41st Street. Presented by Dept. of Ecology. For info: www.eventbrite.com/o/lid-training-team-8360043510	May 23 WEB Enforcement and Compliance History Online (ECHO) Webinar, WEB. Presented by EPA; 1:30 pm EDT. For info: https://echo.epa.gov/ or https://echo.epa.gov/help/training#upcoming
April 27 WEB Innovative State Water Agency Practices: Working Toward Resilience Webinar, WEB. Presented by EPA, 1-3 pm EDT. For info: https://attendee.gotowebinar.com/register/7126072679312246531	May 4-5 CA P3 Water Summit: Forging Partnerships to Meet America's Water Challenges, San Diego. Grand Hyatt. For info: p3watersummit.com	May 15 WA Natural Resources Damages Conference, Seattle. Washington State Convention Ctr. For info: Environmental Law Education Center, www.elecenter.com/	May 25 CA 2017 Santa Ana River Watershed Conference, Ontario. Ontario Convention Ctr. Convened by the Santa Ana Watershed Project Authority & Coordinated by Water Education Foundation. For info: http://www.watereducation.org/OWOW2017
April 27 TX Financing Sustainable Water: Rates / Revenue / Resources Workshop, Austin. LCRA Redbud Center, 3601 Lake Austin Blvd. Presented by Alliance of Water Efficiency & Lower Colorado River Authority. For info: Valerie Miller, LCRA, Valerie.miller@lcra.org or www.eventbrite.com/e/financing-sustainable-water-workshop-tickets-32970770462	May 8-9 CA 11th Annual NEPA Conference, San Francisco. Hotel Nikko. For info: CLE Int'l, 800/ 873-7130 or www.cle.com	May 16-17 WA Washington State Municipal Stormwater Conference (MUNICON), Yakima. Yakima Convention Center. Organizers: Washington Stormwater Center, Yakima County and the Washington Department of Ecology. For info: Laurie Larson, Washington Stormwater Center, 253/ 445-4593 or www.wastormwatercenter.org/municon2017/	May 29-June 2 Mexico XVI World Water Congress: Bridging Science & Policy, Cancun. Organized by the International Water Resources Assoc. For info: www.worldwatercongress.com/
	May 8-11 MI Annual National River Rally Conference, Grand Rapids. Amway Grand Plaza Hotel. Hosted by River Network. For info: www.rivernetwork.org/events-learning/river-rally/about/		June 1-2 WA Shoreline Regulation in Washington State Seminar, Seattle. Hilton Garden Inn Downtown. For info: The Seminar Group, 800/ 574-4852, info@theseminargroup.net or www.theseminargroup.net



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June 1-2 WA

Tribal Water in the Pacific Northwest Conference, Seattle. Courtyard Seattle Downtown/ Pioneer Square. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

June 6-7 Ireland

Blue Tech Forum 2017: Water and the 4th Industrial Revolution, Dublin. The Marker Hotel. For info: <http://www.bluetechforum.com/>

June 8-9 CO

Fighting Back on the Colorado River: Carving Out Progress on Multiple Fronts: 2017 Martz Summer Conference, Boulder. UC School of Law, Wolf Law Bldg. Presented by Getches-Wilkinson Center. For info: www.colorado.edu/law/research/gwc/events

June 11-14 PA

ACE 17: Annual Conference & Exposition, Philadelphia. Pennsylvania Convention Center. Presented by American Water Works Association. For info: www.awwa.org/conferences-education/conferences/annual-conference.aspx

June 12-13 CA

2017 California Water Law & Policy MCLE Conference: "Coping With Drought, Floods & the New Federal Administration", San Francisco. Hotel Nikko. Presented by Argent Communications Group. For info: www.registrationheadquarters.com/events/

June 12-13 ID

Idaho Water Users Assoc. Summer Water Law & Resource Issues Seminar, Sun Valley. TBA. For info: IWUA, 208/ 344-6690 or www.iwua.org/

June 12-13 CO

Endangered Species Act, Wetlands, Stormwater & Floodplain Regulatory Compliance for Energy and Utilities, Denver. EUCI Offices, 4601 DTC Blvd., Ste. 800. For info: www.euci.com/event_post/0617-endangered-species-act/

June 12-14 FL

Nutrient Symposium 2017, Fort Lauderdale. Hyatt Regency. Presented by Water Environment Federation. For info: <http://www.wef.org/Nutrients/>

June 14-16 CA

Bay-Delta Tour 2017, Delta. Sacramento-San Joaquin Delta. Presented by Water Education Foundation. For info: <http://www.watereducation.org/tour/bay-delta-tour-2017>

June 15 WA

Celebrate Water - Center for Environmental Law & Policy Annual Fundraiser, Seattle. Ivar's Salmon House. For info: CELP, <http://celebratewater2017.bpt.me/> or <http://celp.org>

June 20 N

Republican River Basin-Wide Water Management Plan Meeting, Cambridge. Cambridge Community Center, 722 Patterson Ave. Hosted by Nebraska Dept. of Natural Resources. For info: <http://dnr.nebraska.gov/RRBWP/project-and-meeting-schedule>

June 21 TX

Dam Safety Workshop, Decatur. Decatur Civic Center. Presented by Texas Commission on Environmental Quality. For info: www.tceq.texas.gov/p2/events

June 22-23 WA

Water Law in Washington Conference, Seattle. TBA. For info: Law Seminars Int'l, 206/ 567-4490 or www.lawseminars.com

June 22-23 NV

19th Annual Law of the Colorado River Conference, Las Vegas. Caesars Palace. For info: CLE Int'l, 800/ 873-7130 or www.cle.com