

# The Water Report™

*Water Rights, Water Quality & Water Solutions in the West*

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## INSTREAM FLOW ASSESSMENT

THE SCIENCE OF THE ART

APPROACHES TO EVALUATING RIVERINE AQUATIC HABITAT

by Thomas R. Payne, Consulting Fisheries Biologist  
Normandeau Associates, Inc., Arcata, California

### INTRODUCTION

At the last HydroVision conference in Sacramento, California, a panel of instream flow experts spoke to the topic: Establishing Instream Flows — Art or Science? The US Forest Service representative began his presentation with two images: “Art” as represented by the Mona Lisa; and “Science” by Gene Wilder portraying Doctor Frankenstein, complete with wild hair and crazy goggles. Aside from being an amusing introduction, the juxtaposition illustrated quite well two contrasting attitudes concerning instream flow, although I would also add an image of Albert Einstein. This trio would then convey the perspective of many that the practice of instream flow determination is variously: a serious and mature art; an amalgam of madness and nonsense; or a hard and exact science. The perspective held by any particular person is likely to be one of these images, strongly influenced by their education, training, employment, and history of exposure to practical applications.

In fact, instream flow determination is about equal parts art and science, although madness and nonsense often intervene as a result of shallow understanding of riverine dynamics and ecology, lack of direct field experience, and even the occasional bias.

This article provides a brief history of instream flow assessment, an overview of some of the principle methods, a discussion of their relative advantages and disadvantages, and numerous references for additional information.



## A BRIEF HISTORY OF INSTREAM FLOW ASSESSMENT

Instream  
Flow

## Early Projects

Quantitative  
Assessment"Bottom-Up"  
v.  
"Top-Down"  
Approaches

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Instream flow analysis goes by many names around the world, with resulting water management recommendations variously known as minimum flows, instream flows, ecological flows, or environmental flows. The formal practice of making instream flow recommendations started at the federal level in the western United States in the late 1940s and early 1950s; there was no state-level legislation for the protection of instream habitat for fish and wildlife prior to 1967. Most of these recommendations relied on fisheries biologists using their experience and professional judgment and their opinions may or may not have been implemented. Sometimes their recommendations to protect spawning habitat resulted in the diversion of all higher flows, and rivers degraded from the lack of periodic scour (e.g. Trinity River). More often, early projects provided either no or a very low release, such as the 7Q10 sewage discharge dilution standard (i.e., the lowest flow over seven continuous days that would statistically occur in a ten-year period). Passage of the Resources Planning Act of 1965 and the National Environmental Policy Act of 1969 resulted in a statutory need for quantification and documentation of instream flow recommendations in place of professional judgment or 7Q10, and methods for doing so started to multiply (Stalnaker 1982).

The first examples of quantitative instream flow assessments come from California, Oregon, and Washington, driven by hydroelectric dam and irrigation development and the high economic value of impacted salmonid resources. Surveys were done in California by the Department of Fish and Game starting in 1956 to relate the location, quantity, and quality of Chinook salmon spawning area to minimum, optimum, and maximum usable flow (Westgate 1958). In Oregon, Sams and Pearson (1963) measured stream width from aerial photographs and derived optimum flows for salmonid spawning using tables of spawning criteria. The Washington State Legislature in 1967 created a statute to establish minimum stream flows for the protection of fish and other resources. The US Geological Survey, in cooperation with the Washington State Departments of Fisheries and Game, then started field studies that related streamflow and river channel characteristics to suitable physical area for spawning and rearing salmon and steelhead (Swift 1976, 1979).

Similar physical assessment studies can be described as using a "bottom-up" approach for making instream flow recommendations (Dunbar et al. 2011). That is, they are based on models combining explicit physical or hydraulic representation of river features with appropriate biological criteria for different aquatic species.

From the other direction, there are various "top-down" approaches that do not presume it to be possible to adequately model complex biological interactions with the environment. These approaches instead rely on examining some aspect of hydrology or flow patterns over time. One of the first top-down approaches was from Scotland (Baxter 1961), where flow recommendations were made as a percentage of the average daily flow following a statistical analysis of hydrologic patterns in sixteen salmon rivers. In 1975, the US Fish and Wildlife Service (USFWS) derived similar instream flow prescriptions. Often referred to as the "Tennant" (or Montana) method, this USFWS protocol specified various percentages of mean annual flow which would meet subjective habitat quality standards (e.g. poor, good, and excellent) for winter and summer (Tennant 1976).

Most top-down instream flow methods are referred to as "standard setting" because the methods specify rules for flow volumes and timing. Once a standard setting method is chosen, the flow results are "set" — i.e., they are not subject to alternatives comparisons or negotiation. Bottom-up methods, conversely, can be either standard setting or incremental. They can be standard setting if they simply create a rule from physical measurements, or incremental if they provide enough information about biological response to flow change to allow for various alternative interpretations of the data. The following table (adapted from Stalnaker et al. 1995) provides a broad comparison of the two categories of instream flow assessment approaches:

Standard Setting	Incremental
Suitable for low controversy projects	Suitable for high controversy projects
Reconnaissance level planning	Project-specific
Few decision variables	Many decision variables
Inexpensive	Expensive
Fast	Lengthy
Rule-of-thumb	In-depth knowledge required
Less scientifically accepted	More scientifically accepted
Not well-suited for bargaining	Designed for bargaining
Based on historical water supply	Based on fish or habitat

## Instream Flow

### Methods Development

These two basic approaches set the pattern for virtually all subsequent instream flow methods, with “bottom-up” incremental methods being founded on the assumption that physical assessments of habitat will correlate over time to fish populations and “top-down” standard setting methods assuming that aspects of hydrologic patterns over time will maintain habitat and therefore fish populations. The combined total number of instream methods expanded rapidly, from about sixteen in 1980 (Wesche and Rechar 1980) to over 200 worldwide by the mid 1990’s (Tharme 1996, Dunbar et al. 1998). Most of the different methods were developed in response to variability in geographic regions, hydrology, species composition, and localized legal, political, and environmental concerns, but often share common characteristics and purposes. Several aspire to be both top-down and bottom-up, such as the European Water Framework Directive (Acreman et al. 2009) and the venerable Instream Flow Incremental Methodology (Bovee 1998).

### STANDARD SETTING INSTREAM FLOW METHODS

### Set Standards Consequences

Using a top-down, hydrology-based, standard setting method such as Tennant, for example, means that once a habitat quality standard is subjectively identified (usually by a resource agency), the flow volume is established and there can be no discussion of other flows. If a lower flow quantity were to be argued on say, economic or balanced-use grounds, then by definition the resource agency would have to accept a lower habitat quality standard. They are loath to do this, as it can be seen as a dereliction of their statutory duty to protect habitat. As noted in the table above, however, there are reasons why a standard setting instream flow method might be appropriate, most especially in those instances where a threshold limit to flow diversion might be desirable. One recent case of the need for a standard setting method is the attempt by the California State Water Resources Control Board to establish a limit to winter flow diversion in wine grape producing regions of the state (CSWRCB 2010). In this instance, the multitude of small diversion rights applications could not be handled on a case-specific basis, because the impact of each diversion would be quite small and likely deemed insignificant. In the aggregate, however, total stream flow could be substantially affected and some limit was necessary.

### IFC Information

A very good resource for all types of instream flow issues has been the Instream Flow Council (IFC), “an organization that represents the interests of state and provincial fish and wildlife management agencies in the United States and Canada dedicated to improving the effectiveness of their instream flow programs” (IFC website, [www.instreamflowcouncil.org](http://www.instreamflowcouncil.org)). The IFC has published “*Instream Flows for Riverine Resource Stewardship*” (Annear et al. 2004), which includes an extensive rationale for the establishment of instream flows — based on the “Einstein” (purely scientific) type of riverine ecology assessment. This book lists thirty-five instream flow methods, twelve of which are classified as standard setting, fifteen as incremental, and eight as monitoring/diagnostic. In the western United States, the most common standard setting methods are Tennant, Wetted Perimeter, Toe-of-Bank, and Flow Duration Curve — each of which is briefly described below.

### Assessing Options

Each of these methods (and many others not included here) has its own set of data needs, assumptions, strengths, and weaknesses. The Stalnaker et al. (1995) table shown above compares standard setting and incremental methods and provides a summary of the basics — but the choice of method is often driven by more than just practical, time, or monetary reasons. Here again, the IFC provides considerable expert guidance, covering the applications, assumptions, strengths, limitations and constraints, calibration and validation, and a summary critical opinion (Annear et al. 2004).

#### Tennant Method

##### DESCRIPTION:

After many years of observations of Montana and Great Plains rivers under various flow conditions, Don Tennant, USFWS, created a table specifying percentages of mean annual flow in two seasonal periods and eight narrative descriptions of habitat suitability:

Narrative Description of Flow	April to September	October to March
Flushing or maximum flow	200% of the Average Flow	
Optimum range of flow	60%-100% of the Average Flow	
Outstanding habitat	60%	40%
Excellent habitat	50%	30%
Good habitat	40%	20%
Fair or degrading habitat	30%	10%
Poor or minimum habitat	10%	10%
Severe degradation	10% of Average Flow to Zero Flow	

### Flow & Habitat



## Instream Flow

### Seasonal Flow

### Tennant Adjustments

### Inflection Point

### Riffles & Food Production

#### Tennant Method (continued)

Despite being rather vague (in the Gene Wilder science model) about which of the narrative descriptions should be followed, by the mid-90s the Tennant Method had become the second-most widely applied instream flow method in the United States (Reiser et al. 1989). In practice, a seasonal flow regime of varying percentages was rarely applied, and a simple 30% rule emerged instead. Several modifications of the Tennant Method emerged over the years (Bayha 1978, Tessman 1980, Estes 1984, Estes and Orsborn 1986, Trihey & Associates 1996, Estes 1998), most of which are known as “Modified” Tennant, despite very significant divergence from the original.

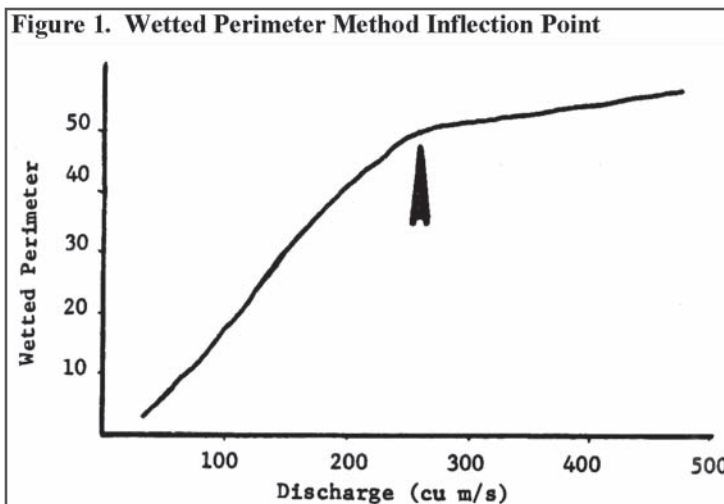
#### APPLICATION:

The Tennant method in its original form should be used to provide a rough yardstick of instream flow needs in the geographic region where it was developed (Nebraska, Wyoming, and Montana). To be applied elsewhere or for more specific instream flow recommendations, the method should be validated and adjustments made as needed based on local hydrology and biology. The method assumes that aquatic habitat in a stream is a function of stream channel geometry and channel geometry is a function of hydrology, and therefore that suitable aquatic habitat can be characterized by a percentage of mean annual flow. While this series of assumptions may appear to be slightly mad, in many cases the Tennant method has been successfully applied and survived challenge, particularly when no other methods have been available.

#### Wetted Perimeter Method

#### DESCRIPTION:

Instream flow recommendations using a Wetted Perimeter Method are derived from physical measurements of stream channel cross-sections, typically across riffles, and the rate at which stream width changes with discharge (Nelson 1984). Several stream cross-sections are surveyed and the stage-discharge relationship is determined for each. (Note: a stage-discharge or rating curve is a plot of flow against water depth. It can be created empirically from numerous measurements of flow and corresponding water surface elevation or computed by linear regression from at least three measurements.) The flow at which the rate of stream width changes rapidly becomes the recommendation (Figure 1). Technically, the wetted perimeter is measured along the stream bottom (see Figure 2), but in practice the wetted width measured along the water surface is used. This “inflection point” represents the flow where riffles — typically the food producing parts of streams — begin to become dewatered. The primary assumption behind this method is that fish populations in streams are related to how much fish food (in the form of aquatic insects) is produced within riffles.



#### APPLICATION:

The Wetted Perimeter Method assumes a relationship between flow and riffle food production sufficient to support fish populations. As flow is reduced, a rapid increase in the rate of reduction in wetted perimeter is the point where riffles begin to dewater and is the recommendation. Where it has been applied, it normally addresses only low flow habitat requirements and not seasonal fish spawning or channel maintenance flow needs. It will not work well in bedrock-controlled streams with parabolic or V-shaped cross-sections, or in very low gradient meandering rivers, since these channel types frequently do not have an inflection point in wetted perimeter — which is required for this method’s flow recommendation.

## Instream Flow

### Stream Width at Toe-of-Bank

### Washington Applications

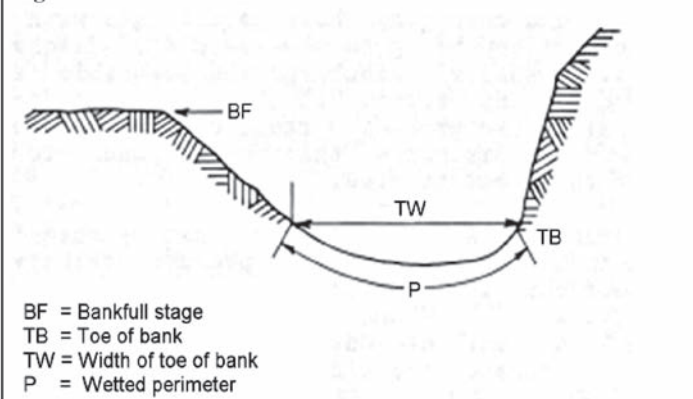
### Streamflow Magnitude

#### Toe-of-Bank Method

##### DESCRIPTION:

The Toe-of-Bank (or Toe-Width) Method is most commonly used in small- to mid-sized gravel-bed rivers in western Washington, where it is a default alternative to more sophisticated approaches. This method's instream flow recommendations are based on regression equations developed from surveys by the US Geological Survey (USGS) and state agencies of optimum suitable salmon/steelhead spawning/rearing habitat area and determination of stream width at the toe (or foot) of the stream bank (Swift 1976; 1979). There are different equations for salmon and steelhead in both the spawning and rearing life stages. The equations appropriate for the target species are applied following field determination of the stream's toe-width from the average of a series of measurements.

Figure 2. Stream Cross Section with Selected Channel Parameters



##### APPLICATION:

The Toe-Width Method assumes a correlation between the flow providing suitable physical habitat for spawning and rearing salmonids and the toe-of-bank created by channel-forming flows. The toe-width for a particular stream is determined from a site visit (Figure 2). This toe-width is entered into the model equation ( $\text{flow} = a \cdot (\text{TW})^b$ ), and the flow recommendation is thus calculated. Since the model equations are derived from correlations to habitat measures, they are subject to some correlation error, although correlation statistics are typically 0.90 or above (quite good). The method is still part of Washington instream flow alternatives (Geller 2009) and has been used to set many state stream flow requirements by statute. However, it has only rarely been applied elsewhere.

#### Flow Duration Curve Methods

##### DESCRIPTION:

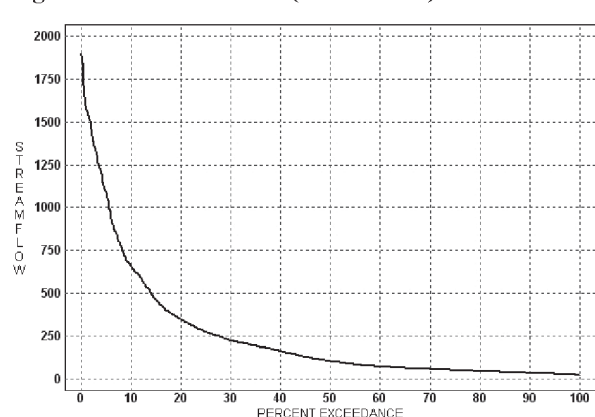
Flow duration curves rank the magnitude of streamflow by percent of time over specified periods from hydrologic records. Each percent of time on the x-axis of the curve corresponds to a flow level on the y-axis that is equaled or exceeded by lower percentages (frequencies), with high flows being rare and infrequent. Flow Duration Curve methods specify recommendations from the percentages, which can be done either annually or parsed into seasons or months. The Hoppe method (Hoppe 1975), for example, specifies the Q17 (the flow equaled or exceeded 17 percent of the time) as a channel maintenance flow, the Q40 as a spawning flow, and the Q80 as a rearing (food production and cover) flow. Other Flow Duration

Curve methods include the Northern Great Plains Resource Program method (NGRP 1974), the Lyon's method (Bounds and Lyons 1979), the Arkansas method (Filipek et al. 1987), and the Texas method (Matthews and Bao 1991).

##### APPLICATION:

The only data needed to apply the various flow duration curve methods is a data set of daily flows for a period of record — typically of at least ten years or more — sorted by percent of time. The basic assumption of the flow duration curve method is that specific flow duration values are appropriate for maintaining aquatic habitat and biota. The values are often derived from limited field studies, so application should be restricted to similar streams with similar hydrology in the geographic region. Considerable variability in geomorphology, biology, water quality, and species composition contributes to differing flow duration values among the several developed methods.

Figure 3. Flow Duration (Exceedance) Curve



## INCREMENTAL INSTREAM FLOW METHODS

Instream  
FlowHabitat  
Suitability  
IndicesSuitability  
of  
Conditions

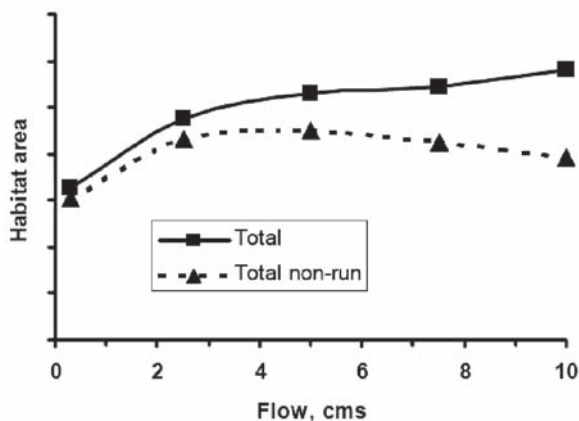
Any instream flow method that produces an index to habitat suitability which varies by discharge can be called incremental, in that any incremental change in flow will produce a corresponding incremental effect on the habitat index. These types of methods can be used either as standard setting (peak of the index) or to evaluate alternative flow regimes over time. The most common incremental methods in the western states include Demonstration Flow Assessment, Expert Habitat Mapping, MesoHABSIM, and Hydraulic Habitat Modeling, each of which is briefly described below.

**Demonstration Flow Assessment Method**

## DESCRIPTION:

The Demonstration Flow Assessment method, also known as the Expert Panel Assessment Method (Swales and Harris 1995), relies on scientific experts and stakeholders using their professional judgment while observing several instream flow conditions to rate or rank the suitability of the conditions according to previously-established criteria (Railsback and Kadvany 2003). The criteria can be related to many variables, including aesthetics, recreation, fishability, and fish habitat by species and life stage. Since each of these variables can be ranked better or worse according to flow, the method produces indexes that can be either combined for a "best flow" or treated individually to describe the effect of flow alternatives.

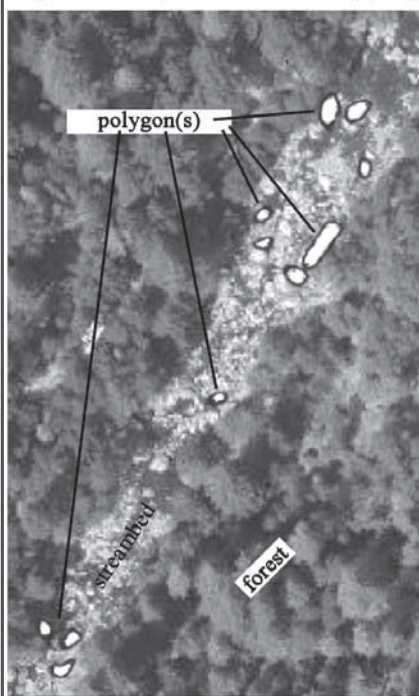
Figure 4. Example DFA Habitat Index for Five Flows



## APPLICATION:

Successful application of a Demonstration Flow Assessment requires a group of experts and/or stakeholders to devote time in preparation of ranking criteria and visiting the stream being assessed multiple times at several different levels of discharge. Better results are obtained if more effort is put into a detailed, objective, and quantitative evaluation system before going into the field. A noteworthy benefit of this method is that participants' understanding of river response to flow is developed at a personal (instead of only an academic) level. Such understanding may lead to more cooperative discussions and ultimate problem resolution. Flow releases and direct observation can also be used as confirmation of flow recommendations made by other methods. A significant limitation is the inability to assess either future channel conditions or unobserved discharges.

Figure 5. Expert Habitat Mapping

**Expert Habitat Mapping Method**

## DESCRIPTION:

Expert habitat mapping is similar to a Demonstration Flow Assessment, but it allocates stream surface area into uniform habitat patches, or polygons, which are individually rated by experts according to habitat suitability criteria (McBain and Trush 2003). Detailed aerial photographs are often used in the method to document and quantify stream surface area (Figure 5). Assessment of the polygons is calibrated as needed with observations or measurements of depth, velocity, substrate, cover elements, and fish density obtained through electrofishing. Once the maps are completed, the polygons are digitized and the total suitable area for each target species and life stage is tabulated and graphed, and the graph of all mapped flows illustrates the relationship between habitat area and discharge.

## APPLICATION:

Expert habitat mapping using polygons to delineate suitable and unsuitable stream areas is one of the more recent instream flow methods and experience with applicability and limitations is relatively limited. Successful implementation depends on the ability of experts to visually (or with some sampling) rate the suitability of the polygons and the ability to accurately relocate the boundaries of established polygons at all flows that are evaluated. The quality and characteristics of the habitat suitability criteria used in the ratings are also quite important. Considerable time and effort is required to look at multiple flows and to evaluate enough stream area for the results to be representative of overall effects. As with the demonstration flow assessment method, expert habitat mapping cannot rate the potential value of channel enhancement projects or be extrapolated to unobserved flows.



## Instream Flow

### Larger Scales

#### MesoHABSIM Method

##### DESCRIPTION:

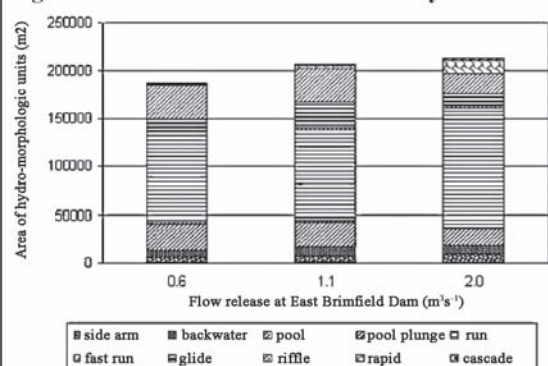
MesoHABSIM is a larger-scale approach to defining incremental flow and fish habitat relationships (Parasiewicz 2001). Instead of using polygons in smaller areas, MesoHABSIM assigns habitat suitability to whole mesohabitat units (i.e., pools, riffles, and runs) (Figure 6). Unit suitability is calibrated by fish abundance or density data usually obtained by electrofishing. The approach is applied over longer stream segments under the assumption that less-detailed habitat evaluation over a large area will produce better results than higher-detailed evaluations in small areas. When applied to more complicated river segments

with side channels, backwaters, and shear zones, MesoHABSIM can further divide the mesohabitat units and become more similar to expert habitat mapping.

##### APPLICATION:

MesoHABSIM is an instream flow approach which assumes that different mesohabitat units provide different hydraulic conditions (and corresponding suitability to aquatic organisms) and that the proportion of units by length or area changes with flow. It is different from expert habitat mapping in that it evaluates much larger stream areas (but at a lower resolution), and uses fish density by mesohabitat type instead of habitat suitability criteria applied within polygons to rank flows. Limitations are the same as for demonstration flow assessment and expert habitat mapping, with the additional need to access all areas of the study stream at all flows and accurately delineate changing mesohabitat unit boundaries.

Figure 6. MesoHABSIM Habitat Area by Flow



## Index Relationships

### Suitability Prediction

### Assumptions

#### Hydraulic Habitat Modeling Method

##### DESCRIPTION:

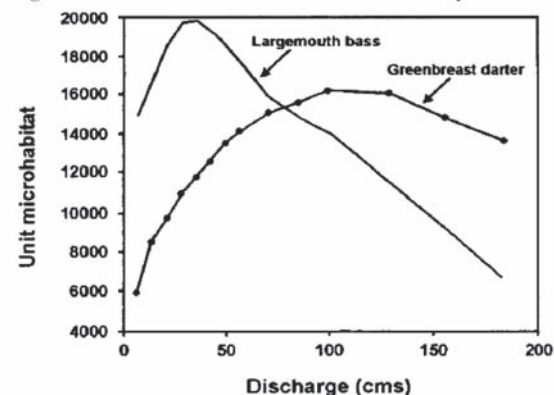
Hydraulic habitat modeling is an instream flow approach that links computer models of stream hydraulics to fish habitat suitability criteria and creates index relationships between stream flow and physical habitat suitability. The original hydraulic habitat modeling program is PHABSIM, for Physical Habitat Simulation, developed by USFWS in the late 1970s (Bovee et al. 1998). The PHABSIM model represents a river with a series of cross-sections, the data points of which can be calibrated to simulate water depths and velocities over a range of flows. The suitability for each cross-section data point is computed at each flow and weighted by the area each point represents. The sum of all weighted data points at any particular flow represents the total suitability of that flow, and a plot of the weighted sums for all flows creates the habitat index (Figure 7). At minimum, PHABSIM simulates water velocity in a single horizontal direction (one dimension). More recent models can simulate water velocity in horizontal directions that may change with flow (two dimensions), or in both vertical and horizontal directions (three dimensions). The two- and three-dimensional hydraulic models (Shen and Diplas 2008) allow the use of more complicated habitat algorithms, including spatial association (e.g., fish using slow-water / rapid-water “shear zones” around boulders for feeding) and velocity shelters (e.g., fish refugia behind boulders). Of all the incremental methods, only hydraulic habitat modeling can predict the potential suitability of unobserved stream flows and physical conditions.

##### APPLICATION:

Hydraulic habitat modeling requires descriptions of stream channel geometry, compatibility with the needs of computer models, and habitat suitability criteria for the fish species, life stages, and activities of interest. The result of modeling is an index relating how the hydraulic conditions at various flows match

up with the criteria. Necessary assumptions include: that streams can be accurately sampled and modeled; that the habitat variables of velocity, depth, and substrate/cover correlate to the biomass or abundance of the targets of interest; and that the algorithms available in the models appropriately link the variables. More ink has been spilled over the merits and demerits of hydraulic habitat modeling than over any of the other existing instream flow assessment methods. Anyone accessing the models has the option of hating them (see just about anything written on the topic by Railsback or Williams), abusing them (such as by not incorporating variable hydrology), or using them in the context for which they were intended (which is the evaluation of alternatives). Limitations include the effort required to collect channel geometry, hydraulic calibration, and habitat suitability criteria data. Strengths include the ability to evaluate the habitat suitability of future channel conditions (two-dimensional models) and unobserved flows.

Figure 7. PHABSIM Habitat Index Simulated by Flow



## Incremental Methods Discussion

## MANAGEMENT GOALS &amp; APPROPRIATE USE

While these various incremental methods may appear to be quite different, they actually have a lot in common, and could even be described as representing points on a sampling scale continuum. All of them sample a river at different scales and then evaluate the samples according to suitability criteria. MesoHABSIM samples at the broadest scale, assessing all mesohabitat units and their proportions as they change with flow within a study segment. (Study segments typically extend for several miles, between major tributaries, for example, or between diversion and powerhouse of a run-of-river hydroelectric project.) Expert habitat mapping samples polygons, sub-samples of mesohabitat units, within a smaller portion of a study segment. These two methods are converging, with MesoHABSIM starting to subsample mesohabitat units and expert habitat mapping starting to sample longer reaches. Next on the sampling scale is one-dimensional hydraulic habitat modeling (e.g. PHABSIM), which samples cross sections either in clusters or spread more widely within a study segment. Two-dimensional hydraulic habitat modeling samples intensively in relatively short “representative” reaches within a study segment. Demonstration flow assessments are typically conducted at the same short reach scale as 2-D or clustered 1-D studies, although with much less precision or detail. Three-dimensional hydraulic habitat modeling samples are at the most intensive scale of all, requiring topographic detail down to the shape of individual boulders.

The sampling scale issue among the methods raises the question about whether better results are obtained from samples with less detail over a broad area or with more detail over a limited area. A similar question was addressed by Hankin and Reeves (1988), who concluded that better estimates of total fish populations in a stream segment could be obtained by snorkeling more reaches selected by a sampling design than by electrofishing fewer reaches selected as being representative. Applying this conclusion to selection of incremental instream flow methods is not as straightforward as estimating total fish populations. In cases where mesohabitat units are well defined and there is a strong relationship between the use of habitat types by fish, it may be preferable to select MesoHABSIM, while in cases where the goal of habitat management is to maximize the number of boulders that could be used as feeding stations by trophy trout, it would be preferable to choose 3-D habitat modeling. The choice of method should consider management goals, the ability to acquire appropriate samples, and the experiences and preferences of the parties involved. While no single method is inherently “better” than another, 1-D hydraulic habitat modeling has been applied far more frequently than any other. Two-D modeling is being used more frequently in recent years, however, mostly due to technological advances in data collection methods and more accessible computing power.

## COMPREHENSIVE INSTREAM FLOW ANALYSIS

## FIVE RIVERINE COMPONENTS

Virtually all of the methods so far discussed — whether standard setting or incremental, bottom-up or top-down — primarily address only fish or aquatic invertebrate flow needs, and typically only during the summer (though there are some limited exceptions, such as the Tennant or Hoppe methods specifying channel maintenance or flushing flows). So as simple (or as complicated) as these methods appear, they are not currently considered sufficient to address all the potential mechanisms of environmental impact from water development projects.

Both the first IFC book (Annear et al. 2004) and a second (Locke et al. 2008) reference five riverine components which contribute to the ecological health of a river: 1) hydrology; 2) geomorphology; 3) water quality; 4) biology; and 5) connectivity. Each is discussed below.

Internationally, there have been a few attempts at comprehensive analysis, such as the South African Building Block Method (King and Louw 1998), the Australian holistic approach (Arthington et al. 1992), and the European Water Framework (EWF 2000). In the United States only the Instream Flow Incremental Methodology (IFIM) has provided explicit guidance for more complete analysis (Bovee 1982, Bovee et al. 1998), although the Integrated Licensing Process of the Federal Energy Regulatory Commission for hydropower projects incorporates many similar elements.

The IFIM is first and foremost an approach to instream flow analysis — i.e., it is not an actual instream flow method, which is why it’s called a methodology. The IFIM approach consists of many elements, including: legal and institutional analysis; project scoping; multi-disciplinary study planning; technical study implementation; explicit linkage between studies; results interpretation in the context of hydrology; flow alternatives analysis; results negotiation; and problem resolution.

Unfortunately, the hydraulic habitat model PHABSIM was created early in the evolution of the IFIM and a nearly-universal misunderstanding is that PHABSIM and IFIM are either one and the same or that PHABSIM is the “heart” of the IFIM. Most of the published criticism of IFIM is misdirected due to this confusion (e.g. Williams 1996, Railsback 2000). Even experienced instream flow specialists contribute to

Instream  
FlowMethods  
Continuum

## Detail v. Scale

## Method Options

Riverine  
Health  
Components

## IFIM

PHABSIM  
Confusion



<div data-bbox="152 178 306 260"><b>Instream Flow</b></div> <div data-bbox="142 300 318 363"><b>Flow Regime Elements</b></div> <div data-bbox="129 615 331 642"><b>Available Flow</b></div> <div data-bbox="142 753 318 781"><b>Historic Data</b></div> <div data-bbox="136 1033 324 1102"><b>Physical Configuration</b></div> <div data-bbox="139 1350 321 1419"><b>Flow Relationships</b></div> <div data-bbox="164 1665 297 1734"><b>Aquatic Resources</b></div>	<p>the problem by using loose language equating IFIM and PHABSIM in publications and communications. The distinction matters because: 1) the useful structure of IFIM can be lost if one simply disagrees with the assumptions and techniques of hydraulic habitat modeling; and 2) the established scientific credibility of the IFIM process can be co-opted by anyone conducting a PHABSIM study any way they choose (i.e., not collaboratively or comprehensively). Examples of the latter can be readily found, most frequently in water rights adjudications where one party unilaterally uses PHABSIM in an attempt to justify their claims — often unintentionally looking like Gene Wilder in the process. These types of claims also often fail to consider the five elements necessary to maintain the structure and function of riverine systems. To quote the IFC, “Flow regimes must also address instream and out-of stream needs and integrate biotic and abiotic processes” (Annear et al. 2004).</p> <p><b>Comprehensive instream flow analysis will include:</b></p> <p><b>Hydrology</b></p> <p>While most of the “top-down” instream flow methods are based on hydrology, none of the “bottom-up” methods do; hydrology must be explicitly incorporated to properly interpret the results. An all-too-common misuse of PHABSIM is to make a flow recommendation based on the peak of a single habitat index curve. This type of recommendation does not consider whether that amount of flow is sufficiently available to result in the desired biological response. For instance, a recommendation for 50 cubic feet per second to maximize an adult rainbow habitat index would be meaningless if such a flow is only present a small percentage of the time in a normal water year. Historic streamflow data are required to make a sensible recommendation and to compare possible alternative flow scenarios. Typically a habitat index will be evaluated with a time series of hydrology, where each flow value is converted to the equivalent habitat index value (Figure 7), and the time series of the habitat index is used in further comparisons. The objective is often to maintain or improve the amount of habitat present over time in relation to existing conditions. In addition, hydrologic records can identify the extent of hydrologic alteration, either existing or proposed, using tools like the Indicators of Hydrologic Alteration (Richter et al. 1996). Linking bottom-up habitat studies with top-down hydrology is what makes IFIM-derived instream flow recommendations more scientifically defensible.</p> <p><b>Geomorphology</b></p> <p>Geomorphology describes the physical configuration of a stream channel, incorporating channel slope, river bed geology, sediments in transport, and the processes that influence the suitability of the channel to provide aquatic and riparian habitat. Elements of geomorphologic studies include: flushing flows that move fine sediments; channel maintenance flows to keep existing channel shape; channel forming flows that promote channel migration and formation of alluvial gravel bars; floodplain connectivity that can allow fish spawning or refuge from high flows; and floodplain maintenance that keeps a river valley dynamic instead of becoming armored. Extensive descriptions of geomorphology-based flow recommendations are presented in Stillwater Sciences (2003) and Locke et al. (2008).</p> <p><b>Water Quality</b></p> <p>The chemical and biological properties of water in relation to flow are important components of any comprehensive instream flow recommendation. While the most obvious water quality property influenced by flow is water temperature, the suitability of a stream to support aquatic life can also be affected by dissolved oxygen and the concentration of suspended solids, salts, organic compounds, metals, nutrients, and pesticides. Water temperature models are relatively common and are used to modify habitat index model results down through a stream segment. For example, when a flow release results in either warming or cooling over distance, the total stream habitat index value can be increased or decreased by water temperature suitability. Similar modifications can be made to habitat index evaluations with the results of other water quality parameter studies, as dictated by the situation.</p> <p><b>Biology</b></p> <p>Most of the instream flow recommendation methods developed to date are based on the rearing or spawning needs of fish, mostly because fish are valuable economic, recreational, or aesthetic resources. However, many other aquatic resources are affected by flow and should be considered in a comprehensive analysis. These include: macroinvertebrates; aquatic vegetation; aquatic vertebrates; riparian vegetation; and mussels — many of which have been explicitly included in existing methods like PHABSIM but also less directly in Tennant, wetted perimeter, and demonstration flow assessments. PHABSIM habitat index models for species other than fish and macroinvertebrates are poorly supported by linkage between the model variables and species abundance, and should be used with caution. Other types of biological models available to develop flow recommendations include: fish passage models to assess upstream salmonid migration (Thompson 1982); riparian recruitment models for seedling establishment (Lytle and Merritt 2005); and more complex fish population response models such as Individual Based Models (Railsback et al. 1999), the SALMOD salmon population model Bartholow et al. 1993), and the Oak Ridge Chinook Salmon model (Jager and Rose 2003).</p>
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## Instream Flow

### Connectivity

The final element in a comprehensive instream flow analysis is the consideration of connectivity between the multiple aspects of a watershed. Interruptions to riverine connectivity affect the flow of energy, materials, and aquatic life up, down, across, and within the river environment. Effects of water diversion and storage can include: limitations on upstream and downstream fish movement; access to tributary and sidechannel rearing habitat; access to high flow refugia; sub-surface water movement and seasonal storage; and the invertebrate food productivity of sub-surface (hyporheic) habitats. There are few models available to specifically evaluate elements of riverine connectivity (other than groundwater models), but the negative effects of interruptions are well known (Annear et al. 2004).

### CONCLUSION

#### THE FUTURE OF INSTREAM FLOW ANALYSIS

So what is the current state of science/art of instream flow analysis? The brief listing of issues and examples above shows that while much has been done, much more remains to be done. Those looking for the answer to “How much water do fish need?” are destined for disappointment, in the first place because it’s like asking “How high is up?” in that the question is too vague and undefined. In the second place, biological and riverine systems are dynamic and instream flow recommendations can provide no single answer without variability over time. Not to mention the fact that humans are constantly competing to use some, much, or all of the same water and habitat. Identified future needs include: educating the public about their responsibility to appreciate the issues and necessary tradeoffs; training scientists to use all the potential tools at their disposal and to better explain the scientific rationale behind their recommendations; and developing a better scientific understanding of the linkages between hydrology, physical habitat, individual organisms, populations, and communities (Locke et al. 2008).

While the IFIM has always provided a pathway to comprehensive analysis and improved understanding, it has been hindered by false impressions and a lack of readily available computer software that would guide instream flow practitioners through the process. This latter is being addressed at least in part by a new program called SEFA – System for Environmental Flow Analysis (AHA 2011) that incorporates, in a single package, most of the principal parts of the IFIM. Users of SEFA can readily see what types of studies should most commonly be performed, what study options are available, and how they might make choices and design an appropriately comprehensive analysis depending on the type of proposal being evaluated.

This leaves us with the question of whether instream flow analysis is an art or a science? My own answer from over thirty years of experience in many places around the world, is that it is a science-based art, where success is measured by the degree of progress towards protecting aquatic habitat and acceptance that the “right” answer can rarely be achieved all at once.

The most suitable image that comes to mind as an appropriate symbol for instream flow science is Dobie Gillis — a nice person, well-meaning, but a little naïve.

[See [http://en.wikipedia.org/wiki/The\\_Many\\_Loves\\_of\\_Dobie\\_Gillis](http://en.wikipedia.org/wiki/The_Many_Loves_of_Dobie_Gillis)]

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**Thomas Payne** is a Senior Associate at Normandeau Associates Incorporated’s Arcata, California office. Mr. Payne is internationally known for his extensive experience in the evaluation of instream flow needs and the assessment of water resource development impacts to fishery resources. Mr. Payne has worked for nearly 30 years with numerous instream flow methods, specializing in the Instream Flow Incremental Methodology (IFIM). In addition to 1D and 2D habitat modeling for the IFIM, Tom has helped develop habitat suitability criteria for a wide variety of aquatic species, monitored riverine fish population abundance, written software for and conducted water temperature network modeling, and applied habitat evaluation procedures for multiple species. Tom has implemented, managed, or reviewed approximately five hundred instream flow studies on proposed and existing hydroelectric and irrigation projects and other water rights issues. Work conducted or directed by Mr. Payne includes: fish population sampling; habitat mapping and typing; hydraulic measurements; habitat use determinations; computer simulations; water temperature modeling; water quality studies; macroinvertebrate studies; license application preparation; agency negotiations; post-project analysis; and expert witness testimony. Mr. Payne has conducted workshops in the use of IFIM to state and federal agencies, taught graduate-level courses as an Adjunct Professor of Fisheries at Humboldt State University, made numerous presentations before professional societies, testified before hearings boards and in other legal proceedings, and published several papers relating to the science of instream flow analysis. Mr. Payne is a Certified Fisheries Scientist and has B.S. and M.S. degrees in Fisheries Biology from Humboldt State University.

**Normandeau Associates Inc.** is an employee-owned company with regional offices in 11 states offering science-based environmental consulting, environmental assessment, and permitting facilitation. See [www.normandeau.com](http://www.normandeau.com)

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## Tribal Water Settlements

### Symposium

### Settlement Elements & Challenges

### Benefits

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## NEGOTIATING INDIAN WATER RIGHTS CLAIMS



TWELFTH BIENNIAL SYMPOSIUM ON THE SETTLEMENT OF INDIAN RESERVED WATER RIGHTS CLAIMS  
A SUMMARY OF PROCEEDINGS

by Dan Killoren, (Phoenix, AZ)

### OVERVIEW

This article summarizes the major themes that emerged from the Twelfth Biennial Symposium on the Settlement of Indian Reserved Water Rights Claims held in Billings, Montana on August 23-25, 2011. Speakers addressed: the preparation to begin settlement negotiations; information needs and technical expertise required during negotiations; elements of a successful settlement; federal agency participation; the Congressional approval process; and post-settlement implementation. The final day of presentations focused on the outlook for settlements during the 112th Congress and beyond.

### INTRODUCTION

On August 23, 2011, the Western States Water Council (WSWC) and the Native American Rights Fund (NARF) commenced the twelfth biennial symposium on Indian reserved water rights, an event that is regarded as one of the most comprehensive forums on the subject in the country. Elected officials, federal and state representatives, water managers, and attorneys from around the West and other parts of the country traveled to Billings, Montana for the three-day event. Attendees included those who are actively negotiating settlements as well as individuals who participated in numerous successful settlements. Since NARF and WSWC co-hosted the first symposium in 1991, the meeting has provided an opportunity for tribal, state, and federal officials to exchange ideas and discuss shared priorities. The active participation of federal representatives and Congressional staff also makes the symposium one of the best opportunities to assess the future outlook for Indian water rights settlements.

The symposium derives much of its value from a format that focuses on the process elements and challenges involved in negotiating Indian water rights settlements. This article adopts much the same structure in summarizing the speakers' advice and recommendations regarding the preparation and considerations involved with the decisions of states and tribes to negotiate, the information needs and technical expertise required during the negotiating process, the role of the federal government — both in negotiating and implementing settlements — and the Congressional approval process.

### PREPARING FOR NEGOTIATIONS

The decision to enter negotiations may be one of the most important actions a water manager will ever make. Water rights settlements provide Indian communities with the opportunity to receive federal funding for infrastructure and secure a guaranteed water supply. Non-Indian water users use settlements to resolve uncertainty regarding their future water supplies and forge stronger partnerships among water users in their region.

The benefits of settlement also come with heavy responsibilities for tribal communities. A tribe may only have one chance to assert federal reserved rights claims and secure sufficient water supplies for the future needs of their reservations. **[Editor's note:** When the federal government reserves land for a specific purpose, such as a national forest or a wilderness area, it also reserves sufficient water for the stated purpose of the reservation.]

Pueblo of Taos Water Rights Coordinator, Gilbert Suazo, Jr., spoke about the tremendous responsibility placed on the tribal representatives who negotiate water rights settlements. He noted that obligations to future generations should drive decision making for settlement negotiators — because it is future generations that will be the most affected by these present-day agreements. In relating his experiences in helping to secure Congressional passage of a water rights settlement for the Taos Pueblo in 2010, Suazo stated that the prospect of extended litigation over his pueblo's historic claims was the major motivating factor in bringing Taos representatives to the negotiating table. Many tribal communities find themselves in a similar position and decide to enter settlement negotiations not only because of the potential benefits but also the lack of attractive alternatives. For most Western water users, negotiation is the only means to reduce long and costly litigation in statewide water rights adjudications that have proceeded slowly over the last several decades. **[Editor's note:** An adjudication is a judicial proceeding in state court resulting in a decree that describes the water rights and determines their priority date. The older the right, the more senior the right (usually referred to as "first in time, first in right").]

The need to resolve tribal claims outside the courts was a major theme of several presentations. Snell and Wilmer attorney and WSWC member William Staudenmaier offered a brief overview of Arizona's general stream adjudication, which has proceeded slowly since the 1970s. This adjudication, which is the

<b>Tribal Water Settlements</b>	<p>state's largest, is aimed at determining rights to the Gila River system and now encompasses approximately 85,000 claims by 30,000 separate claimants. The sheer magnitude of the claims has placed a significant burden on the court system and led many water users to realize that negotiation was a much more viable and cost-effective method for resolving tribal claims. It becomes incumbent on water users to decide their own water futures when courts are unwilling or unable to resolve water disputes quickly and effectively. Veteran water rights attorneys Scott McElroy, with the firm McElroy, Meyer, Walker &amp; Condon, and John Stroud, representing the State of New Mexico, discussed their experiences litigating and negotiating water rights claims in New Mexico, including recent work on the Taos and Aamodt settlements. They noted that the adjudication of the pueblos' water rights proceeded slowly after they were filed in the mid-1960s, with little progress made prior to settlement negotiations. The lack of unappropriated water that could be dedicated to new uses in New Mexico — a situation now common to most Western states — made it imperative that water users get together and divide up existing water supplies. Such endeavors require settling parties to consider not only their own water needs, but also the needs of all water users in a region.</p>
<b>Magnitude of Claims</b>	<p>The federal government's role in settlement negotiations was also a major focus of discussion.</p>
<b>Federal Role</b>	<p>McElroy said it was important that federal officials be dedicated to the settlement process. Stroud concurred, saying that federal representation was a crucial component in establishing the early structure of a settlement. However, both agreed that much of the work of establishing priorities and navigating difficult issues in the negotiations must be tackled by the settling parties themselves. McElroy encouraged those who are considering whether to enter settlement negotiations to not become discouraged by the process and to seek support from federal representatives early in the process.</p>
<b>Patience &amp; Creativity</b>	<p>Staudenmaier and Bob Brauchli, a water rights attorney for the White Mountain Apache Tribe of Arizona, offered several guiding principles for negotiation that were echoed by speakers throughout the course of the symposium. First and foremost is patience. Negotiations can remain dormant for many years before resuming. Negotiators need to remain committed to the settlement process even during periods of inactivity or litigation. Second, flexibility is crucial to effective negotiating. Third, creativity is essential as negotiations often require parties to devise new and creative ways to "locate" water supplies and funding.</p>
<b>"Carrots &amp; Sticks"</b>	<p>Finally, a "carrots and sticks" approach can be effective in many instances. As discussed in greater detail below, tribes often have significant breach of trust claims against the federal government for failing to protect their water rights. Generally, as part of a settlement, tribes will waive these claims and a portion of their claimed water rights in consideration for federal funding needed to construct drinking water infrastructure, water supply projects, and tribal fishery restoration projects. These projects are one of the primary "carrots" for tribes because they provide the "wet water" needed to preserve their cultural values and realize economic development goals, as opposed to the "paper" water rights they would receive in litigation. At the same time, settlements enable states to secure protections for existing non-Indian uses and provide additional certainty for state water management efforts. Settlements also minimize federal litigation costs and decrease the United States' legal exposure to tribal breach of trust claims. For all settling parties, the inherent uncertainty associated with litigation is the largest stick that pushes them to pursue settlement despite its challenges.</p>
<b>Technical Data</b>	<p style="text-align: center;"><b>INFORMATION NEEDS / THE ROLE OF EXPERTS</b></p> <p>After the decision is made to initiate negotiations, participants are faced with the formidable task of compiling detailed technical information that will be used to guide settlement discussions. A significant commitment of time, personnel, and resources is required on the part of the settling parties, which, depending on the experience of the participants, can entail a major learning curve. A panel comprised of federal, state, and tribal representatives addressed the elements involved in gathering technical information and utilizing technicians and advisors in negotiations.</p>
<b>Information Sharing</b>	<p>The panelists emphasized that quality technical data, particularly hydrologic data, is absolutely critical to settlement discussions. Since technical data is often costly and time-consuming to produce, panelists recommended that settlement participants work together wherever possible to share costs and expertise. The sharing of information can be facilitated by the formation of a technical committee comprised of experts from the various settling parties, which works to compile data that is then presented to the main negotiating group.</p>
<b>Expert Review</b>	<p>Forming a technical committee and exchanging information can help minimize the differing levels of technical expertise and resources that often exists between settling parties. However, Rich Schilf, a Senior Water Resource Planner with Dowl HKM Engineering, emphasized that even if a technical committee is formed, it is important for tribes to build their own in-house technical capacity to provide an independent assessment of technical data. This point was similarly echoed by Jay Weiner, an attorney with the Montana Reserved Water Rights Compact Commission, who stated that having in-house state technical support builds expertise and trust that states can use for multiple settlements.</p>

## Tribal Water Settlements

### Data & Policy Roles

A major challenge faced by many settlement participants is personnel turnover during the course of negotiations that may stretch over decades. Though this situation is often hard to prevent, panelists encouraged negotiating parties to invest in their technical staff in order to retain institutional knowledge.

No matter the quality of the technical expertise, the ultimate decisions that will guide settlement priorities must be made by the appropriate stakeholder representatives. A technical committee can work to ensure that everybody is working from a common source of information, but without clear direction from the key negotiators settlement discussion can break down. Several panelists commented that the role of technical experts is to advise and educate policy makers and not to serve as decision makers in their own right. Policy goals must be developed by the proper decision makers so that the final outcome reflects the priorities of the various settling parties.

To facilitate the flow of information from technical experts to policy makers and the public it is important that data be present in an understandable format. Suazo emphasized that information needs to be clear to both tribal leaders and tribal members to ensure clarity about the goals and outcomes of a settlement. Those outside the negotiations may be reluctant to ask questions or raise concerns if a settlement is perceived as too complex. The negotiating committee is ultimately responsible for conveying the components of a settlement to the various stakeholders in a manner they can understand.

### FEDERAL ROLE

### Trust Duties

The federal government holds Indian water rights in trust for the benefit of the tribes and is joined as a party in all water rights adjudications involving tribes. This means that the federal government has a fiduciary duty to protect tribal water rights and has a major responsibility (particularly the Department of the Interior) to help tribes adjudicate their rights and ensure that settlements are funded and implemented. For instance, Duane Mecham, an attorney with the Department of the Interior Solicitor's Office, explained that this responsibility applies to the legal defense of federal reserved rights claims in water rights adjudications and other cases. (*See Mecham, TWR#83*)

Beyond its legal responsibility the federal government also has an interest in protecting the environment and in supporting economic stability and development on Indian reservations and surrounding communities. Negotiated settlements are attractive because they provide both a confirmation of a tribe's right along with other benefits and protections that ensure a tribe's continued access to water supplies guaranteed by a settlement.

### Enforceability

In their trustee role, federal attorneys work to assert and protect tribal claims and ensure that any court decree makes claims protectable and enforceable. The federal government carries these same priorities into settlement negotiations. However, Mecham made it clear that federal attorneys may have a narrower focus than tribal representatives and therefore it is up to the tribe to establish the broader priorities that will guide settlement discussions. Additionally, Congress has a responsibility for appropriating federal funds from the Treasury, adding a further dimension to the federal role.

### Current Federal Teams

The roles and responsibilities of federal negotiating teams was an issue discussed by Letty Belin, Counselor to the Deputy Secretary of the US Department of the Interior (Interior) and Chair of Interior's Working Group on Indian Settlements. Belin discussed the federal Administration's current policy on tribal settlements, saying that it is committed to being involved early and often in the settlement process. Interior's Working Group consists of all the Assistant Secretaries and the Interior Solicitor who are responsible for making decisions about when new teams are established. The team members are then responsible for much of the work that gets done as part of the settlement negotiations.

Interior currently has eighteen negotiation teams, some very active and others that only meet infrequently. Teams have recently been established for the Hualapai, Havasupai, and others. Interior also has approximately seventeen implementation teams working on settlements already approved by Congress.

### Dwindling Funding

While the Administration remains committed to the settlement process, limited federal funding and resources can adversely impact the Administration's settlement efforts. For example, Belin noted that Interior's Indian Water Rights Office has received several pending requests for new settlement negotiation teams but that Interior lacks the resources needed to provide teams for each request. Further, Principal Deputy Assistant Secretary for Indian Affairs Donald "Del" Laverdure warned that discretionary federal spending is shrinking, which will require settling parties to engage in additional work and collaboration to implement past settlements and secure funding for future ones.

The current Administration's approach to Indian water rights settlements was also articulated by US Bureau of Reclamation Commissioner Mike Connor in a keynote address to open the symposium's second day. Connor reiterated the Administration's commitment to Indian settlements and pointed out the progress that has occurred since the last symposium in August 2009, with four settlements having been passed by the last Congress and a total of six settlements during President Obama's administration.

### Reclamation Role

Connor focused much of his attention on what he called Reclamation's emerging role in Indian Country. Reclamation wants to support economic development in Indian Country and the infrastructure projects that are often contained in water rights settlements further that end. The lack of access to basic domestic water services and the disproportionate health impacts is a major issue on Indian reservations.



## Tribal Water Settlements

### Job Creation

Connor stated Reclamation's commitment to deliver clean water to Indian communities through new infrastructure projects.

Connor also noted the added benefit of job creation on reservations and adjacent communities that accompanies infrastructure projects. He reported that 10,300 jobs have resulted from Recovery Act funding. Reclamation is looking to invest an additional \$600 million in Indian Country as part of its 2012 budget, with \$445 million coming in the form of mandatory funds made available by the Claims Resolution Act of 2010. Connor closed his remarks by encouraging settlement negotiators to continue to emphasize the value of settlements by showing the jobs impact and other economic benefits to tribes and neighboring communities that result from water rights settlements. Reclamation will do its part to finish projects under budget and ahead of schedule.

### CROW NATION WATER RIGHTS SETTLEMENT

The selection of Billings, Montana as the symposium site was done in part to discuss the recent success of the Crow Nation in gaining passage of their water rights settlement. Several speakers addressed the process used to produce the successful outcome, including Cedric Black Eagle, Chairman of the Crow Nation, who commented that the resulting settlement was a "win-win" that would help the tribe's economy.

The tribe started negotiations with the belief that they owned the water on the reservation. There were many tribal members who were reluctant to enter into settlement negotiations. However, in light of a number of court cases and other factors, the tribe soon realized that they needed to craft a position that could lead to a negotiated outcome. This required tribal negotiators to engage in an extensive internal education process to work with opposing factions within the tribal community to secure support for the settlement. The tribe formed a water rights team that included all of the communities on the reservation. The technical and legal teams were tasked with coming up with a water budget, settling on a priority date, addressing allottee issues, and drafting the compact. **[Editor's Note: An Indian allottee is a member of an Indian tribe who was allotted land from the reservation land base. Additional issues come into play if the land is later transferred to a non-Indian owner, who may be entitled to "Walton" water rights that retain the priority date as the date the Indian reservation was created. See *Colville Confederate Tribes v. Walton*, 647 F.2d 42 (9<sup>th</sup> Cir. 1981).]**

The settlement turned a corner when two additional issues were brought into the discussions: an outstanding land dispute and the state coal severance tax. Tribal and state representatives were able to agree on a water compact and a resolution to the coal severance tax issue in the late 1990s, which helped propel efforts to secure federal legislation. The settlement ultimately approved in 2010 gives the Crow an entitlement to 500,000 acre-feet (AF) of natural flow from the Bighorn River, along with 300,000 AF of storage capability behind Yellowtail Dam. The tribe also will have a negotiated entitlement to all groundwater under the reservation. The tribe secured \$460 million in federal funding that will be used for operation and maintenance, domestic water systems, and to improve the Crow Irrigation Project. The tribe will also have an exclusive right to develop hydropower below Yellowtail Dam. Black Eagle closed by saying that the settlement opens the door for the economic future of the tribe, which could not have taken place without a water rights settlement.

Chairman Black Eagle was followed by a panel comprised of federal, state, and tribal officials who provided additional background on the settlement negotiations. Faye Bergen, former legal counsel with the Montana Reserved Water Rights Compact Commission, explained that the coal severance tax issue served as the external driver that helped to push the water and land issues forward. When the tribe approached the Montana Attorney General about addressing the coal severance tax issue, the land and water disputes were incorporated into a global settlement. The broad focus of the negotiations allowed the parties greater flexibility in devising creative ways to address the multiple issues at stake.

### CONGRESSIONAL PROCESS

Those who are new to the settlement process often find it difficult to navigate a Congressional environment that can change on a daily basis. The Congressional process was a matter of considerable discussion throughout the symposium and one that was even more pertinent given the current fiscal climate in Washington DC. A panel comprised of current and former Congressional staff sought to clarify the process by discussing what Congress considers in deciding whether to approve a settlement.

Since settlements often require the appropriation of federal funds as well as commitments by federal officials and agencies, settlements must be authorized by Congress and approved by the President to become effective. In a perfect world, Congress comes into the picture after a settlement is negotiated amongst the various parties. However, changes are often required during the process of turning a negotiated agreement into federal legislation. The authorization process begins with introduction of a bill, requiring settling parties to find a sponsor in the House or Senate. The bill is then assigned to a committee. After a committee receives a bill, it will review the bill, hold hearing(s) and then produce a markup — where changes are made to the bill. Much of the review goes on behind the scenes between staff. If the committee approves the bill, it moves to consideration by the whole House or Senate.

### Tribal Organizations

### Settlement Benefits

### Coal Severance Tax Impetus

### Focus & Flexibility

### Changes at Congress

## Tribal Water Settlements

### Packaged Bills

### Discretionary Funding

### "Pay Go"

### Earmarks Issue

### Importance of Champion

### Implementation Teams

### Future Funding Needs

A settlement bill can move forward as a single bill, but often in the Senate, it has been packaged with several other bills to increase its chances of passage. The Arizona Water Settlements Act of 2004 moved forward as single bill, which was only possible because of the broad support and political influences of elected officials from Arizona and New Mexico. A more common outcome was the 2009 Omnibus Public Lands Bill, a collection of over 100 pieces of legislation that included two large Indian settlements. The most recent Claims Resolution Act of 2010 included four Indian settlements for the White Mountain Apache Tribe, Crow, Aamodt, and Taos. This Act also resolved the Cobell Indian trust funds case and a discrimination case involving African American farmers.

Ryan Smith, an attorney with Browstein Hyatt Farber and Schreck and former staff to Senator Jon Kyl of Arizona, provided more detail on 2010's Claims Resolution Act. All of the bills were initially introduced separately, but specific Senators would not allow one settlement through without the others. As a result, broad bipartisan support developed for the package. The major hurdles to passage of the legislation centered on the issue of federal spending. Smith explained that most settlements authorize discretionary spending, which is subject to budgetary rules and limitations and must go through the annual appropriations process. In other words, a settlement bill with discretionary funding only authorizes an appropriation, which means that Congress must still appropriate the necessary funds before they can be made available.

In addition to authorizing discretionary settlement funding, Smith also explained that the Claims Resolution Act included "mandatory appropriations" or direct spending that provided immediate settlement funding not contingent on the annual appropriations process. In order to comply with "Pay-As-You-Go" (Pay Go) budgetary policies, which require that such funding not increase the federal deficit, these mandatory appropriations were offset by commensurate reductions in existing federal direct spending programs and/or increased revenue to the US Treasury. Another issue that arose during the consideration of the Claims Resolution Act was the question of whether settlements should be considered earmarks, which set aside funding for a specific region or project. Although some elected officials believe that settlements are earmarks and should therefore be restricted, settlements are not earmarks because they represent serious trust (and moral) obligations of the United States. In particular, the obligation to fund resulting settlements is analogous to, and no less serious than the obligation of the United States to pay judgments rendered against it because settlements involve a quid-pro-quo in which tribes receive federal funding in exchange for waiving tribal water-related claims against the federal government. Therefore, authorizing and funding settlements avoids decades of legal expenses and court-ordered judgments against the US that could exceed the total costs of settlement, thereby decreasing costs for federal taxpayers. *See Smith, TWR #90.*

Regardless of the form settlement legislation takes when introduced, it will likely look different at the end of the Congressional process. Legislation can take several years to advance, requiring settling parties to remain patient and recognize that the negotiation process does not end when legislation is introduced, but continues until congressional enactment. Thus, settling parties need to engage with their Congressional delegation early and often, reaching out to both political parties and both houses of Congress. Adjustments and further legislative "fixes" may also be required once settlement implementation begins.

Speakers also discussed the need for settling parties to find a "champion" within their Congressional delegation or elsewhere in Congress who can work with them to set realistic expectations for their congressional negotiations and help secure passage of settlement legislation. In order to be effective, such champions often need to have some level of seniority or have key leadership roles that allow them to influence their colleagues. For example, Navajo Nation Attorney Stanley Pollack and other speakers opined that it is unlikely that Congress would have passed the Claims Resolution Act without the support and efforts of Senate Minority Whip Jon Kyl. At the same time, Kyl's pending retirement at the end of the 112th Congress has underscored the need for settling parties to cultivate relationships with other possible champions to help shepherd settlement legislation through Congress.

### SETTLEMENT IMPLEMENTATION

Once a settlement is completed and approved by Congress, settling parties face the sizable task of implementing the provisions of the federal statute and the settlement agreement. Pamela Williams, Director of Interior's Indian Water Rights Office, discussed the role of Interior's twenty implementation teams working throughout the West. The teams combine federal interests inside and outside Interior. Members are not solely representatives of their agencies, but they work together on all aspects of implementation.

The primary purpose of the implementation teams is to conform the settlement agreement to the federal statute. The statute often changes a settlement agreement, which means that the implementation team has to go back and resolve any differences, a process that can take a year or more. Team members also must finalize water contracts, court decrees, and other elements required to make a settlement agreement enforceable. Implementation can extend beyond the enforceability date of a settlement if new issues arise and in the past some settlements have needed amendments that require Congressional approval.

A major responsibility of the implementation team is to remind federal agency representatives of future funding needs so they can work to secure future appropriations. The implementation process takes on

## Tribal Water Settlements

### Infrastructure

### Budget Importance

### Post-Settlement Legal Steps

average less than five years but it can vary, and if major construction is required it can take ten to fifteen years. Williams urged those working on settlements to focus on securing all the sources of water needed to complete their settlement. Language should also be as clear and explicit as possible in order to avoid issues with interpretation later in the process.

Implementation often includes an infrastructure component and Rick Ehat, Project Engineer for the US Bureau of Reclamation's (Reclamation's) Four Corners Construction Office, related his experiences working on the Animas-La Plata/Navajo San Juan project. Ehat explained that funding is only the beginning of a massive construction effort. It is important to track costs over the course of the project to see how it aligns with original estimates and appropriations. There is an implicit requirement from Congress to bring projects in at the budgeted amount. This is especially important so that future settlements are not hurt by large cost overruns on existing settlement construction projects.

There are also significant legal steps that are required once a settlement is approved. Candace West, chief legal counsel for the Montana Department of Natural Resources, discussed the process in Montana. West explained that in Montana settling parties go jointly to the state water court to incorporate the terms of a settlement into a decree. Notice is then served to effected parties and hearings are held to discuss the decree and the potential impacts to water users outside the settlement. Once objections are heard, the parties move for summary judgment on the consent decree. Ultimately, orders and opinions are issued for each settlement decree. The court does not address the factual issues of the settlement or the merits of the specific provisions, but the applicability of the decree and its fairness for all parties.

Additionally, tribes need to ratify settlements after they have been approved by Congress and educational outreach is often needed to address tribal concerns. For instance, Heather Whiteman Runs Him, Joint Lead Counsel for the Crow Nation Executive Branch, explained that a number of tribal members had concerns about the Crow settlement after it had received Congressional approval. To address these concerns, the tribe engaged in an extensive education effort that made qualified experts available to discuss the need for the settlement, as well as answer questions and address concerns from tribal members. Ultimately, the tribe ratified the settlement with a 72% majority vote.

### FUTURE PROSPECTS

Given the current fiscal and political climate in Washington, DC, it was fitting that the symposium ended with a consideration of the future prospects for advancing settlement legislation through Congress. Securing federal and other funding for settlements has long been the single biggest obstacle to settlements and will likely become an even more significant challenge in the future. In addition to increased efforts by Congress to reduce federal spending, current budgetary policy (Pay Go) requires water rights settlement funding to be offset by a corresponding reduction in some other discretionary program. For example, David Mullon, Jr., the Minority Staff Director and Chief Counsel for the Senate Committee on Indian Affairs, explained that the money found to pay for the Arizona Water Settlements Act and the Claims Resolution Act was offset with real spending cuts. Those offsets will be more difficult to find in upcoming years as competition for funding increases and traditional sources of offset funding are reduced or eliminated. Consequently, it is more important than ever for settlement stakeholders to devise comprehensive funding strategies as part of their deliberations.

Given the competition for federal resources, there is an even greater need to develop new funding mechanisms during a period of diminishing resources. Stanley Pollack, water rights attorney for the Navajo Nation, stated that settlements can only be supported if they can be justified as a savings to taxpayers in terms of litigation risk and the federal government's ongoing obligations to Indian communities. Donald Pongrace, an attorney with Akin Gump Strauss Hauer & Feld, also encouraged those pursuing settlements to be realistic about their goals. Settling parties need to approach settlement as a campaign and include political scoping as part of their strategy. Though the current fiscal climate looks bleak, Pongrace said that 2012 may be a jobs year and settlements could fulfill the desire by Congress to invest in job creation. Tribal leaders and advocates need to be flexible and adaptive about the legislative process.

### CONCLUSION

The importance of flexibility and adapting to present conditions was a consistent theme throughout the symposium and one that was particularly prescient given the significant fiscal and political uncertainty on the state and national levels. Despite the difficult climate, many speakers remain optimistic and encouraged those pursuing settlement legislation to remain persistent and not become discouraged by setbacks. This feeling was encapsulated by Donald Pongrace, who said, "Just because the stars aren't aligned when you begin, doesn't mean they won't align later." The passage of several settlements in 2010, despite significant challenges, should motivate those pursuing settlements to remain committed to the process.

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## Irrigation Adaptation

## Irrigation Organizations

## Reform Options

## Ag Water Trends

# COLORADO RIVER BASIN IRRIGATION

THE FUTURE OF IRRIGATION ORGANIZATIONS IN THE COLORADO RIVER BASIN

by Dr. Ron Griffin, Texas A&M University and Mary Kelly, Parula, LLC, (Austin, TX)

"The best reformers the world has ever seen are those who commence on themselves."  
George Bernard Shaw

### INTRODUCTION

Irrigated agriculture has a long and productive history in the Colorado River Basin. Development of widespread irrigation infrastructure began in the late 1800s and expanded rapidly with the advent of federal reclamation efforts. A vast number of private, quasi-governmental, and governmental entities — which for purposes of this article will be collectively referred to as "irrigation organizations" — form the bedrock of irrigated agriculture throughout the basin.

Ranging from small, private "ditch companies" covering only a few hundred acres to large, legislatively created, quasi-governmental units covering hundreds of thousands of acres, these irrigation organizations manage the majority of surface water rights to Colorado River water. Until recently, most irrigation organizations in the Colorado River Basin could focus on providing reliable water to farmers and ranchers, and maintaining and operating their irrigation infrastructure. However, the context in which these irrigation organizations operate has changed drastically in many areas of the basin, and the drivers of that change are getting stronger.

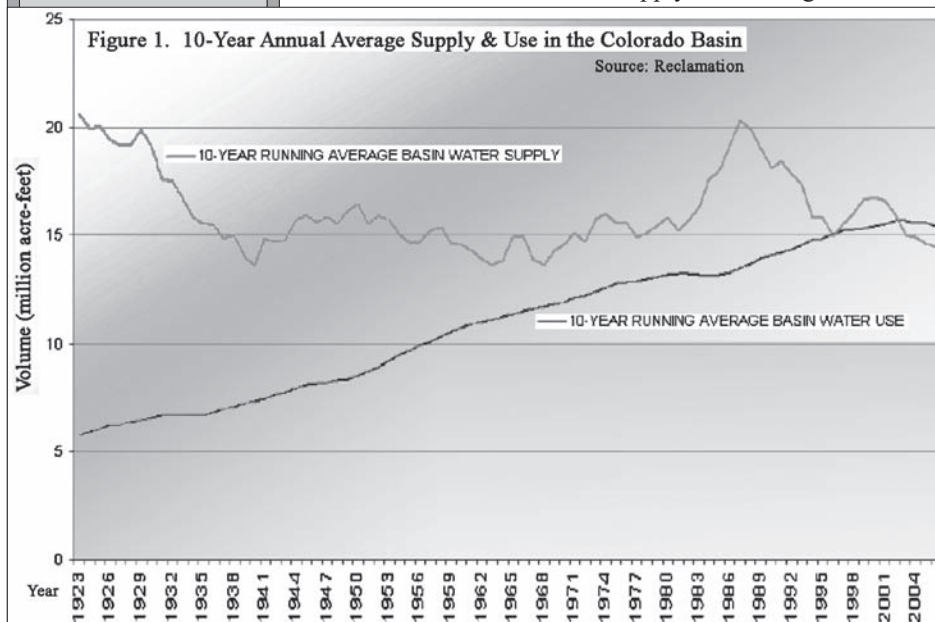
This article briefly explores key changes and pressures and what they might mean for the future of irrigation organizations in the Colorado River basin. It also discusses how irrigation organizations might prepare for the future in ways that will accommodate changing water demand and supply patterns while either sustaining or transforming local agricultural economies.

Irrigation organizations with substantial control over their water rights have an important window of opportunity to determine their future in a way that helps sustain viable agricultural communities, while adjusting to shifting water demand patterns and other forces affecting irrigated agriculture in the basin. Using a proactive, business plan approach to explore various reform options is likely to be preferable to reactive approaches, especially in areas where municipal demand is putting near-term pressure on agricultural water use. Options for reform range from the irrigation organization itself negotiating water contracts or sales with non-agricultural buyers in a way that benefits irrigator's bottom lines; to allowing individual irrigators to do so under a plan that maintains the viability of the organization; to the more bold option of fully decoupling water rights from infrastructure.

Over the last few decades, several factors have affected the availability, use, and economic conditions of water currently permitted for irrigation. All of these forces are at play in the Colorado River Basin, where average annual use already exceeds annual average supply (Figure 1).

#### TRENDS WITH THE MOST PERVASIVE EFFECTS ON AGRICULTURE INCLUDE:

- Competition for water from rapidly growing urban areas dependent on Colorado River water or looking to the Colorado as a source of supply for future growth



- Suburbanization that is fragmenting previously contiguous areas of farmland served by irrigation organizations, posing new challenges for irrigation system management and maintenance
- Aging irrigation infrastructure and the associated high costs of repairs, combined with decreasing federal and state funding for such work
- Aging farmer and rancher population
- Growing proportion of farmers and ranchers that depend on off-farm income
- Water supply uncertainty associated with climate change-induced variability, including potentially longer droughts
- Growing public support for ensuring that rivers have healthy instream flows for recreation, fish and wildlife
- Potentially reduced federal funding for farm subsidies, conservation programs, and disaster payments

## Irrigation Adaptation

### Pressures

Any one of these factors has significant implications for irrigated agriculture. Combined, they promise an uncertain and volatile future, where pressures exterior to irrigation organizations will cause internal policy change. Urban areas and conservation interests are going to increasingly be looking to lease or buy water from agriculture; irrigation organization budgets are going to be facing increased stress as repair needs mount and operational issues become more complex; aging farmers may be looking to “cash out” by releasing their land and water for development, further fragmenting farm and ranchland; and persistent drought may affect the continued viability of marginal farm and ranch operations, especially if there is less federal funding for disaster assistance.

In the face of these changes and uncertainties, irrigation organizations themselves will be at the center of a potential storm. Many irrigation organizations are the actual owners of surface water rights, and have the authority to decide whether those rights can be leased or sold and under what terms and conditions. In other irrigation organizations, especially mutual ditch companies, farmers themselves have more say about the disposition of rights. Because irrigation organizations are charged with maintaining their infrastructure, the budget challenges — and pressures to raise fees on members or farmers within the organization — will fall on organizations’ governing boards if other sources of funding are not available.

For many reasons, however, many irrigation organizations have yet to take a strategic view of their operations, including how they might benefit from more active participation in voluntary, compensated transactions of surface water rights.

#### FACTORS THAT HAVE PREVENTED FORWARD-LOOKING PLANNING TO DATE INCLUDE:

- Short-term operational and maintenance tasks that fully occupy the small staff and volunteer boards that administer many irrigation organizations
- Reluctance to wade into water transfer issues where frank discussions can initiate discord among irrigators or alarm local businesses dependent on irrigated crop production
- Managers and directors whose tenures and experiences developed under an earlier and different set of challenges
- Lack of resources to engage in mid- and long-term business plan development that could evaluate how the organization’s clients would best benefit from the economic value of its water rights
- Wariness about developing new relationships with conservation groups offering to help cost-share infrastructure improvements that can meet both operational needs and enhance stream flows
- Complex federal and state laws and rules governing water transfers
- Regulations or policies internal to the irrigation organization that make transfers difficult

There are exceptions, of course, as some larger irrigation organizations have confronted these issues sooner and had more resources to deal with them. (PVID side bar).

In general, however, there appears to be much more room for irrigation organizations to take the lead in developing new models for approaching these serious challenges to the future of irrigated agriculture.

### THE CASE FOR LEADERSHIP

Most Colorado Basin irrigation organizations are several decades old. At the time of their creation, water storage and delivery infrastructure was in high demand. Developing this infrastructure required cooperation among landowners and often with government agencies. This is true of the early private organizations, later organizations created by state legislatures (with taxing, eminent domain and other authority), and those established to carry out the distribution and irrigation functions of US Bureau of Reclamation (Reclamation) projects.

The basin’s irrigation organizations were generally established when there were few to no constraints on water availability, except the lack of infrastructure to store and deliver it. There was little significant competition for water from cities. The water itself, granted via permits from the state, was essentially free. However, the capital investments to obtain this water were costly.

Thus, most irrigation organizations were designed as nonprofit ventures to sponsor construction and operation of infrastructure. Their focus has remained on financing and repayment of debt incurred for this construction and on raising sufficient funds — either through water rates, taxes, or a combination — to operate these irrigation works.

### Planning Impediments

### Storage & Delivery

### Historical Requirements

#### Palo Verde Irrigation District (PVID)

One example of a larger, pro-active district is the Palo Verde Irrigation District (PVID), which is located along the main stem of the Colorado River. In 2005, PVID secured a 35-year deal with the Metropolitan Water District of Southern California (MWD) to lease between 30,000 and 120,000 acre-feet of water per year when needed by MWD. Both farmers and PVID itself receive payments from MWD. In individual contracts with MWD, farmers received an upfront payment of \$3,120/acre and receive \$700/acre when they fallow land to provide water requested by MWD. Participation by farmers is completely voluntary, but annual fallowing is capped at 30% of PVID’s acreage. The District itself receives some funding from MWD to cover costs associated with the fallowing program. MWD also invested \$6 million into a community improvement program which is managed by a local community organization. (For more information, see [www.westgov.org/initiatives/water/373-water-papers](http://www.westgov.org/initiatives/water/373-water-papers), presentation of Bill Hasencamp, MWD, October 28, 2011).

## Irrigation Adaptation

### Valuable Assets

### Water Markets

### System Repairs

Now, however, the relative scarcity of infrastructure and water are reversed. Infrastructure abounds, though much of it is in need of serious and expensive repairs, but water is increasingly scarce, as rivers become fully appropriated, demand in the municipal and environmental sectors grows, and extended droughts reduce available supply. That means that the water rights held by irrigation organizations or their individual members have greatly increased in value. These rights can and should be managed as a valuable asset for the benefit of the organization and its members. It is the irrigation organization itself that is best positioned to move forward with internal reforms that create the flexibility necessary for it and its members to realize the full value of their water rights.

Short-term, it might seem easier for irrigation organizations to resist reform in order to avoid internal controversy or roil relations with nearby businesses depending on irrigated agriculture. That outlook may not serve the organization or its members well. Municipal areas are growing and hold the bulk of political and economic power in all the basin states. State and federal decision-makers are ultimately unlikely to deny the water demands of these cities, even if they do impose strong conservation measures to reduce consumption. Many irrigation organizations, however, lack a proactive approach to initiating participation in water marketing. This means they are foregoing opportunities to design a positive future for themselves.

There is still time for irrigation organizations to get ahead of the game, but that window is beginning to close. In fact, the higher value of increasingly scarce water resources is already generating change. Thirty years ago, there were very few transactions among agricultural water right holders and municipal or conservation buyers. Now, water law and policy have evolved to open the door to transfers, both temporary and permanent. Water rights transfers are happening throughout the West at large and small scales, both to satisfy changing local demand patterns and, in some cases, to move water from an irrigation area to a city *outside* the irrigation area boundary. In the Colorado River Basin, most of the transfer activity to date, with some notable exceptions, has been focused in the Lower Basin, but more and more the role of voluntary, market-based transfers and options such as water banking are under discussion in the Upper Basin as well.

Another factor generating interest in transfers is that valuable water rights — managed well — can help generate funds for system repairs. In many of the basin's older, smaller irrigation organizations, funding these repairs is beyond the reach of farmers themselves. Moreover, substantial funding is not likely to be forthcoming from deficit-ridden federal and state governments in the foreseeable future. So, for example, temporary or long-term leasing of some water to municipalities for instream flow purposes may generate revenues for infrastructure and efficiency repairs that can benefit the irrigators' bottom line.

#### Lower Arkansas Valley Super Ditch Company

A desire to get ahead of the game is one of the core motivations behind the Lower Arkansas Valley Super Ditch Company (Super Ditch Company). Assisted by funding from Colorado's innovative Agricultural Transfers program (<http://cwcb.state.co.us/LoansGrants/alternative-agricultural-water-transfer-methods-grants/Pages/main.aspx>), irrigators in the Lower Arkansas River basin initiated this cooperative effort in 2008 after a period of aggressive efforts by municipalities to acquire irrigation rights under a "buy and dry" model (i.e. cities buy up irrigated lands and transfer the water rights to municipal use). The Super Ditch Company is managed by a board of directors elected by participating irrigators (participation of irrigators is voluntary). The Super Ditch Company is empowered to negotiate water leases, helping both to increase irrigators' negotiating leverage with municipalities and ensuring that irrigators all get a fair deal in terms of compensation. In forming the Super Ditch Company, irrigators cited PVID's example as a model. The first pilot lease for the Super Ditch Company will be for 500-acre feet with the City of Fountain. (For more information, see [www.westgov.org/initiatives/water/373-water-papers](http://www.westgov.org/initiatives/water/373-water-papers), presentation of Peter Nichols, October 27, 2011).

### Fiscal Integrity

### Public Policy

### "Implied Values"

#### REFORM GOALS

What principles should be observed in designing optimal reform options for irrigation districts?

First, preservation of fiscal integrity is important. It is necessary to generate revenue sufficient to cover operation and maintenance costs, plus basic planning and administrative functions. Second, the infrastructure should provide for the most practicable efficient delivery and use of water, including adequate monitoring of diversions and use. Third, each organization's policy should encourage irrigators to make production and water use decisions that maximize their opportunity to make a profit. These decisions include, among other things, type of crops grown, whether to fallow or not, irrigation technology and water application rates.

In addition to these considerations, which are internal to the irrigation organization itself, there are public policy considerations relevant to design of reform options. From a societal and overall economic perspective, it would be generally desirable to achieve a better balance among urban, agricultural, and environmental water values. That is, it may not be desirable over the long-term to have vast differences in "implied values" of natural water used for different purposes. (Implied value is obtained by subtracting value-adding conveyance and processing costs from rates charged to clients. Failure to equalize implied value is analogous to a gas station having different fuel pumps for different classes of customers: i.e. one pump with a fuel price based on free crude oil and the other pump with fuel price based on crude's market value.) This objective is not met when irrigators served by irrigation organizations are experiencing a zero implied value for natural water, as is common, while urban entities are paying large sums to develop additional supplies.



**Irrigation  
Adaptation****Preservation  
Values****Redesign  
Potential**

Conversely, housing and commercial growth should not be incentivized by undervalued water, especially in areas where preservation of agricultural water provides for food production, environmental goods, quality of life, and other benefits.

Lastly, given the already extensive alteration of many of the natural stream and river systems in the Colorado Basin, it has to be acknowledged that water for environmental flows has significant economic value. Preserving and restoring healthy flows helps maintain robust fish and wildlife populations, which in turn generate economic benefits in the form of preservation values, recreation, and tourism. These flows and their benefits are sometimes easier to provide in tandem with maintaining agricultural operations and open space than if the water is taken off the lands for use in subdivisions or commercial or industrial developments. Convergent agricultural and environmental interests can be a motivating factor for many conservation organizations to enter into water market transactions with irrigators.

Given that a “clean slate” situation for redesign or reform of irrigation organizations is not politically realistic, how much room is there for advancing these principles, and how might irrigation organizations go about analyzing whether various reforms in water rights transferability are appropriate for their particular situation?

**FIRST STEPS TO DETERMINING ORGANIZATIONAL REDESIGN POTENTIAL ADDRESS TWO QUESTIONS:**

- 1) What constraints currently exist on the irrigation organization’s ability to transfer water rights?
- 2) What are the pros and cons of various reform options to increase flexibility for transfers — from minor to more aggressive — for the organization itself and for its members/water users?

**CONSTRAINTS**

Water rights management in Colorado River Basin irrigation organizations is constrained by state law, each organization’s legislative charter and internal rules and, for those receiving water from Reclamation projects, the terms of their federal contracts. In all cases, transfers of water rights from one use or place of use to another generally have to be reviewed by the state water agency and statutory conditions are in place to govern such transfers.

The irrigation organizations that are the most likely candidates for near-term reform are private mutual companies, where irrigators own clear shares of water rights. Decisions in such organizations are generally made by majority vote, making it easier to modify water management rules. Given that many mutual districts are small and may not have sufficient staff or resources to examine the pros and cons of more flexibility on water right transfers, working together within watersheds to conduct the relevant analyses could be helpful.

Second in line for reform are those irrigation organizations where the state has not statutorily restricted transferability of the water rights held by the organization. In these cases, it is often the internal rules or charter of the organization that imposes the most constraints on transferability. Ultimately, the organization’s board (which is often elected by farmers and other landowners within the district’s boundary) can change those rules and charters once they become so inclined.

Third in line would be irrigation organizations that face restrictions on transfers as a consequence of the state law by which they were created. In these cases, state legislative action may be required to alter the restrictions, potentially a more arduous and time-consuming, though not impossible, process.

Fourth in line are likely to be those irrigation organizations that receive water under contract from Reclamation. **[Editor’s Note:** For Reclamation situations, the authorization under which the particular federal project was created governs how the water is used, generally including specific provisions that set forth the “authorized” uses.] Some Reclamation projects have been reauthorized to allow the water to be used for multiple purposes beyond irrigation and to set out specific procedures for transferability of project water (e.g. the Central Valley Project Improvement Act of 1992) and there are some areas where Reclamation has sanctioned unique transfers (usually among irrigators or for leasing of water for instream flows). However, achieving flexibility in irrigation organizations that depend solely on federal project water can be a complex, controversial and time-consuming undertaking. Successful approaches developed in less complex situations (i.e. non-project irrigation organizations) could provide good models, however, for eventual reform in Reclamation project areas.

**REFORM OPTIONS**

There are several types of reforms that would add flexibility for market-based transfers of water rights currently held by irrigation organizations and/or their members. Most options fall into two broad categories: (1) the irrigation organization itself negotiates transfers with nonagricultural buyers and pursues various measures for finding transferable water within the organization’s domain; or (2) the irrigation organization assigns water rights to their clients and allows these right holders to transfer their water to other parties under terms and conditions set by the irrigation organization. In some situations, the irrigation organization may be faced with a dynamic of rapidly declining irrigation and booming suburbanization. In these instances, there might be an opportunity for the organization to evolve into a broader water supply utility.

**Transfer  
Constraints****Internal Rules****Reclamation  
Authorization****Transfer  
Options**

## Irrigation Adaptation

### Incentives

**Ron Griffin** is professor of water resource economics at Texas A&M University, where he has been a researcher and teacher for thirty years. He is the author of *Water Resource Economics: The Analysis of Scarcity, Policies, and Projects* and the editor of *Water Policy in Texas: Responding to the Rise of Scarcity*. He is currently a co-editor of the journal *Water Resources Research*. He specializes in water studies pertaining to demand, rate setting, marketing, and cost-benefit analysis.

**Mary Kelly**, of Parula LLC in Austin Texas, has 25 years of experience as an environmental lawyer, having worked in private practice and the not-for-profit sector. Before forming her own private consulting firm in July 2010, she served as Senior Counsel for Rivers and Deltas for the Environmental Defense Fund, managing EDF projects to protect and restore habitat, rivers and coastal deltas across the US. She has specialized in water law and U.S./Mexico binational water management during much of her career. Ms. Kelly joined Environmental Defense Fund in 2002, after many years as the Executive Director of the Texas Center for Policy Studies. Previous to that, she was a partner in the firm of Henry, Kelly & Lowerre and various predecessor firms, representing citizens and local governments in a wide variety of environmental matters. She is a frequent speaker at state and national legal conferences.

Other, more aggressive reform options would include selling the entire district or dividing the irrigation organization in two parts: one to operate the existing irrigation infrastructure and the other to manage and engage in transactions with the water rights. The appropriate option will, of course, be highly situation-specific.

In the first category, irrigation organizations could provide incentives to farmers to conserve water using on-farm strategies, either by charging for water on a volumetric basis under a structure sufficient to encourage efficient water use or contracting with farmers for a fixed amount of water that can be put in a transfer pool.

A *volumetric pricing approach* would require an assessment of the market value of the water (i.e. the price would not be based just on recovery of costs for basic irrigation system operation and maintenance as is currently the case in most irrigation organizations.) While this would mean that each farmer would likely pay more per unit of water, it would also provide incentives to the farmer to be efficient and, if the irrigation organization could then lease or sell that conserved water for its market price, it could generate significant funds for maintaining infrastructure or distributing dividends (independent of water use). One important limitation to this is the ability to lease or sell “conserved water” under state law (see for example, Oregon’s laws that allow this to occur: [www.oregon.gov/OWRD/mgmt\\_conserved\\_water.shtml](http://www.oregon.gov/OWRD/mgmt_conserved_water.shtml)). Such transactions are more difficult under Colorado law, for example.

Alternatively, *farmers could “bid” on how much water they would conserve* (by on-farm efficiency measures, deficit irrigation, or even fallowing) and offer a price for that conserved water. The irrigation organization would review all the bids received and select the low-cost options, from the organization’s vantage, for generating water it would then lease or sell to outside buyers, likely at a price higher than it paid the farmers. The extra revenue could then be used to defray costs or distribute dividends.

Among the advantages of the latter approach is the irrigation organization can amass larger volumes of rights than individuals, providing better leverage in negotiations with potential buyers.

Under the second category, individual farmers would be empowered to lease or sell their rights outside the district as they desired, within a set of conditions designed to protect the operation and maintenance of the irrigation organization itself over the long-term. These conditions might include a requirement that buyers pay a price that covers the farmer’s legitimate share of irrigation infrastructure operation and maintenance costs (and that the irrigation organization would receive that money, either directly or from the farmer). They might also include a requirement that only a certain percentage of an irrigator’s right is transferrable in order to account for overall system storage and conveyance losses.

A bolder approach might involve decoupling the irrigation infrastructure from the water rights. That is, the infrastructure would be maintained and operated by one entity, and a separate entity would hold the water rights. The water right entity would be expected to produce a profit for its shareholders (the irrigators), selling water to both irrigators within the infrastructure organization and other users, on either a temporary or permanent basis. If the water right entity’s administrative overhead stays relatively small, irrigators as shareholders in the water right entity should be able to turn a reasonable profit by engaging in conservation and smart water use on their own fields to minimize their water cost and then benefitting as shareholders from the “outside the organization” transactions of the water right entity. Obviously, this kind of approach may only be appropriate in limited situations, such as where there is high demand from outside buyers and the irrigators themselves have the wherewithal to hold down their own water consumption via low-water use crops, high efficiency irrigation, or other means.

### MOVING FORWARD

Irrigation organizations and their farmer and rancher members are an essential component of the economic base, quality of life, and heritage of the Colorado River Basin. But the Colorado Basin, like many others throughout the world, is not static. Farmers and ranchers face a host of challenges that are persistent and intensifying. Building the basin’s extensive irrigation infrastructure took enormous vision and courage. Sustaining irrigated agriculture in the face of increasing competition for water, suburbanization, climate change, restricted budgets, an aging farm population and other factors will take the same kind of vision and courage. Irrigation organizations, with their capacity to manage water rights and understand the needs of their client members, are ideally positioned to lead the reform efforts.

Reform won’t be easy, and there are constraints that cannot be addressed solely by the irrigation organizations. State water laws need to become flexible enough to efficiently facilitate high value, consensus-based market transfers of water, especially where such transfers provide multiple benefits such as meeting critical water demands, protecting or restoring healthy river flows, and keeping agricultural production viable. Policy mechanisms to reduce or mitigate the potential negative effects of transfers on surrounding rural communities also need to be improved. All these policy changes are likely to better reflect the interests of agriculture, though, if irrigation organizations are helping lead the way.

#### FOR ADDITIONAL INFORMATION:

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## WATER BRIEFS

**EXEMPT WELL DECISION WA  
STOCKWATER EXEMPTION UNLIMITED**

On December 22, the Washington Supreme Court (Court) upheld a lower court decision that an unlimited amount of groundwater used for “stock-watering” purposes is exempt from the requirement to apply for a water right permit. Basing its decision on statutory interpretation, the Court held that, “We conclude that, under the plain language of the statute, withdrawals of groundwater for stock-watering purposes are not limited to any particular quantity by RCM 90.44.050.” *Five Corners Family Farmers, et al. v. State of Washington, et al.*, No. 84623-4 (Dec. 22, 2011) at page 2.

For non-lawyers, the decision provides an illuminating example of how courts “interpret” and decide the plain meaning of long, convoluted statutory provisions. The majority opinion and the dissenting opinion come to completely opposite conclusions even though they are discussing what the majority found to be clear language with only one reasonable interpretation.

In the 6-3 split decision, the Court decided that the language of the statute which governs exempt wells in Washington was not ambiguous and there was “only one reasonable interpretation of...[the] exemption clause” — resulting in the stockwater exemption being allowed for a 30,000 head cattle feedlot with an estimated stock drinking requirement of between 450,000 to 600,000 gallons/day. Appellants had sought a ruling that the stockwater exemption was limited to 5,000 gallons/day and maintained that the exemption was certainly not intended to be available to a large, industrial feedlot.

The Washington Attorney General’s Office, which argued on behalf of the state in support of the unlimited exemption, issued a press release quoting AG Rob McKenna: “The Legislature exercised its policy prerogative to provide this particular permit exemption, without further acreage or gallon limitation, and only the Legislature can adjust this policy by amending the statute. Farmers and ranchers need certainty when it comes to water rights requirements and this decision provides that certainty.”

The three dissenting judges, on the other hand, felt that the statute was ambiguous and that the “legislature intended to limit the exemption to 5,000 gallons per day.” The dissenting opinion noted, “The purpose of requiring a permit for groundwater use is to protect senior water rights and the public welfare.” The opinion then went on to conclude that by

contrast, when a groundwater exemption is proposed, “the legislature never intended that RCW 90.44.050 would allow Easterday [feedlot] to use between 450,000 and 600,000 gallons of water per day with no inquiry whatsoever into whether existing rights may be impaired or the public welfare may be harmed.” Dissenting Opinion, p. 1. The dissenting opinion also went into detail about two provisos in the statute that suggested a “legislative intent to limit the exemption to 5,000 gallons per day. The reference to ‘any such small withdrawal’ in the first proviso is particularly suggestive of legislative intent in light of the fact that two of the exemptions to which it refers are unquestionably limited to 5,000 gallons per day, and the other to one-half acre of lawn. In this context, it is illogical to consider 450,000 to 600,000 gallons per day to be a ‘small withdrawal.’” Dissent at p. 10.

Exempt wells have come under scrutiny throughout the West due to the impact that existing water users maintain adversely affect their water senior water rights. See Bracken, *TWR* #74. The decision, at least for those states that have unclear statutory provisions, provides a warning about possible statutory interpretations. In the West, exempt wells are generally thought to be for “de minimus” withdrawals or small amounts. The Water Report is unaware of any “exempt use” in the western US (previously) that exceeded 15,000 gallons/day, as opposed to the unlimited amount for stockwater allowed by the Court’s decision in this case.

**For info:** Case available at: [www.atg.wa.gov/pressrelease.aspx?id=29258](http://www.atg.wa.gov/pressrelease.aspx?id=29258); Depart. of Ecology website: [www.ecy.wa.gov/programs/wr/rights/easterday.html](http://www.ecy.wa.gov/programs/wr/rights/easterday.html)

**STREAM ADJUDICATION OK  
TRIBAL LAWSUIT SPURS STATE**

The on-going controversy in Oklahoma over the purchase of water in Sardis Lake is heating up and has spawned the potential for a general stream adjudication. On December 14, the Oklahoma Water Resources Board (OWRB) gave its authorization to file a comprehensive stream-wide adjudication “in order to protect citizens’ rights to the waters which the Tribes seek. The authorization simply puts the State in the position to file the adjudication if necessary based on the Tribes’ actions,” according to OWRB’s statement (revised). OWRB voted to authorize its legal counsel, in their discretion, to file a comprehensive adjudication of the rights to the waters in the Kiamichi River, Muddy Boggy Creek, and Clear Boggy

Creek basins. Fact Sheet: Oklahoma General Stream Adjudication Process (revised December 14, 2011).

OWRB noted that their action was in response to a lawsuit filed by the Chickasaw and Choctaw Nations (Nations). See Moon, *TWR* #79, #80 and #91; Greetham, *TWR* #82. The Nations’ filed an amended complaint in federal court on November 10, 2011. In a press release dated November 12, the Choctaw Nation noted: “Lawyers for the Nations said the amended complaint was necessary to address a request by defendants to delay negotiations and set aside the federal court lawsuit so that they could file a separate action in state court. Tribal attorneys assert that the federal court already has jurisdiction over the issues and a separate state court action would serve only to delay resolution.”

OWRB’s Fact Sheet goes on to state that, “In their lawsuit: The Tribes claim that they have a right to regulate 100 percent of the water in over 22 counties — not just the right to regulate water located on their patches of Indian Country. The Tribes claim that Oklahoma City’s pipeline from Atoka County, which supplies the bulk of Oklahoma City’s water, violates federal law, and that Oklahoma City has ‘no right to use’ that pipeline to transport water to its citizens. The Tribes claim that the OWRB cannot take action on permits for water from the Kiamichi River, Muddy Boggy Creek and Clear Boggy Creek basins until a comprehensive adjudication of all water rights within those basins is completed.”

The Fact Sheet also contains a list of “Frequently Asked Questions” that addresses general stream adjudications. One question/answer provided by OWRB is of particular interest: “Who is threatening my water rights? The only present threat to your valid water rights comes from claims made by the Chickasaw and Choctaw Nations, who claim that their water rights and regulatory authority are ‘prior and paramount’ to any water rights or regulatory authority claimed under State law in the 22 counties that make up southeastern Oklahoma. In short, the Tribes seek to have sole regulatory authority over all the water in those 22 counties, to the exclusion of the State and the OWRB. In response to these claims, the OWRB intends to vigorously defend its right to regulate the waters in the basins, and will defend the validity of state law governing water rights, so that those with valid rights retain those rights.”



## WATER BRIEFS

In response to the question “If I receive notice, will I be required to hire a lawyer to have my claim recognized?” the Fact Sheet answered “No. The process will allow those noticed to file claim through use of forms accompanying the notice. Some claimants might decide to hire a lawyer if their claim is disputed by someone like a neighbor or an Indian Tribe.” The advocacy group Oklahomans for Responsible Water Policy had a different view of the potential stream adjudication under a web posting entitled “Will the state water board threaten your private property rights?” (December 15th: [www.orwp.net/](http://www.orwp.net/)): “The Oklahoma Water Resources Board (OWRB) voted unanimously this week to authorize its attorneys to file a suit or suits to determine water rights in Southeastern and Southern Oklahoma. Oklahomans for Responsible Water Policy decries this move on the part of the water board. Such a suit could launch a decades-long, generational battle that would pit Oklahomans against Oklahomans and could cause thousands of Oklahomans to hire lawyers to protect private property rights we already have.”

**For info:** OWRB Fact Sheet at: [www.owrb.ok.gov/](http://www.owrb.ok.gov/); Choctaw Nation: 580/924-8280 x2249 or [www.choctawnation.com/news-room/water-policy](http://www.choctawnation.com/news-room/water-policy)

#### TRIBAL INSTREAM RIGHTS OR KLAMATH ADJUDICATION

An Administrative Law Judge (ALJ) in Oregon’s Klamath Basin Adjudication issued six Proposed Orders on December 2 quantifying the Klamath Tribes’ water rights for claims to water bodies that flow through its homeland area. ALJ Joe Allen confirmed the tribes’ claims for six water bodies located in the former Klamath reservation area, ruling in favor of the Tribes on their instream flow claims for hunting, fishing, trapping, and gathering rights on former reservation land, while reducing the amounts of water initially sought. The claims involved have a priority date of “time immemorial” based on the Tribes’ aboriginal rights to hunt, fish, trap, and gather. With a priority of time immemorial, the rights are senior to all other water rights in the Klamath Basin. “The Tribes’ aboriginal rights apply to those species of fish, fowl, wildlife, and plants traditionally or historically relied upon by the Tribes for subsistence, cultural, and religious practices.” Proposed Order, Case No. 277, Williamson River (Dec. 2, 2011), p. 40.

The December 2nd rulings dealt largely with the quantification of the amount of the instream water rights. The ALJ stated that “This case presents a classic ‘battle of experts’ with regard to the hydrologic, as well as physical and riparian habitat calculations.” *Id.* at 4. The rulings, however, also included decisions on other issues involving the instream claims, including a decision on the Tribes’ claims to instream flows *outside* the boundaries of the former reservation: “Claimants’ are entitled to claim instream flows outside the boundaries of the former reservation in order to fulfill the purposes of the reservation.” *Id.* at page 28. Some procedural issues concerning updated and amended claims in the adjudication process were also decided by the ALJ.

Another issue decided by the ALJ in Case No. 277 concerned the quantification standards and the application of the “moderate living” standard articulated by the Ninth Circuit in *United States v. Adair*, 723 F. 2d 1394 (1983) (*Adair II*). The ALJ rejected the moderate living standard — ruling that it was “inapplicable to this adjudication.” Proposed Order (Case No. 277), page 29. The ALJ cited and relied on the “instructive guidance” of Judge Panner from *Adair III* (*United States v. Adair*, 187 F.Supp.2d 1273 (2001)), even though that opinion was later vacated on ripeness grounds: “[T]he assertion that the tribes are entitled only to some ‘minimum amount’ of water is an incorrect statement of the law. In quantifying the right under *Adair I*, the Tribe is entitled to ‘whatever water is necessary to achieve’ the result of supporting productive habitat.” ALJ Allen then went on to find that “Judge Panner correctly points out that application of the moderate living standard might be appropriate, but only *after* the adjudicator has quantified the Tribes’ water rights. As such, I believe this is an issue for resolution by the United States District Court or other court of general jurisdiction, not this tribunal.” Proposed Order (Case No. 277) at 30 (emphasis in original).

Walter Echo-Hawk Jr. of the Oklahoma law firm Crowe & Dunlevy, who represented the tribes and served as the trial litigator, called the decisions a “complete victory.” Crowe & Dunlevy’s press release stated: “Allen’s rulings accomplish what the Klamath Treaty of 1864 entailed and awarded the tribe(s) sufficient instream flows and water levels necessary for a productive habitat for animals, plants, and fish so the tribe can fulfill its treaty rights of

hunting, fishing, trapping and gathering.”

The Proposed Orders encompass the Williamson, Sycan, Sprague, and Wood Rivers and many of their tributaries, as well as the Klamath Marsh and springs scattered throughout the former Klamath Reservation. Other tribal claims involving the Klamath River and Upper Klamath Lake are expected to have decisions issued in the spring of 2012.

**For info:** Oregon Water Resources Dept. Adjudications: [www.wrd.state.or.us/OWRD/ADJ/index.shtml](http://www.wrd.state.or.us/OWRD/ADJ/index.shtml); Walter Echo-Hawk Jr., 918/ 592-9874 or [walter.echohawk@crowedunlevy.com](mailto:walter.echohawk@crowedunlevy.com)

#### CAL/EPA ENFORCEMENT CA 2010 REPORT RELEASED

The California State Water Resources Control Board (SWRCB) recently released the 2010 Cal/EPA Enforcement Report. The SWRCB and its nine Regional Water Quality Control Boards assessed \$13 million in penalties for 8,300 violations receiving enforcement in 2010; that compares with 2009 when \$20 million in penalties were assessed for 6,668 violations. For the NPDES Wastewater Program, for the 1,897 facilities regulated 88% had no documented violations. In the Stormwater Program (NPDES), 16,741 facilities were regulated and there were 1,186 facilities with one or more violations. Report, page 113.

**For info:** [www.calepa.ca.gov/Enforcement/Publications/EnforceRpt.htm](http://www.calepa.ca.gov/Enforcement/Publications/EnforceRpt.htm)

#### FRACKING POLLUTION WY EPA DRAFT REPORT

On December 8, EPA’s Office of Research and Development released a 121-page draft report entitled “*Investigation of Ground Water Contamination Near Pavillion, Wyoming*” (Report) that concluded that hydraulic fracturing (“fracking”) was the cause of deep groundwater contamination. EPA is also conducting a comprehensive study on fracking and its potential impacts on drinking water, with initial research results expected in late 2012. See Orford, *TWR* #85; Baizel, *TWR* #90.

The Pavillion investigation draft is already stirring up controversy, with the Wall Street Journal, Sen. James Inhofe, and environmental groups lining up to provide their view of the study.

EPA’s study was initiated in response to complaints in 2008 by several domestic well owners regarding objectionable taste and odor problems in their well water under authority of the federal Comprehensive Environmental

## WATER BRIEFS

Response, Compensation, and Liability Act (CERCLA). “The objective...was to determine the presence, not extent, of ground water contamination in the formation and if possible to differentiate shallow source terms (pits, septic systems, agricultural and domestic practices) from deeper source terms (gas production wells)...Detection of high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons in ground water samples from shallow monitoring wells near pits indicates that pits are a source of shallow ground water contamination in the area of investigation.” Report, p. xi. At least 33 pits were previously used for storage/disposal of drilling wastes, produced water, and flowback fluids in the area of investigation.

The Report also studied fracking impacts on deeper groundwater, ultimately finding, “Alternative explanations were carefully considered to explain individual sets of data. However, when considered together with other lines of evidence, the data indicates likely impact to ground water that can be explained by hydraulic fracturing.” Report, page xiii. In the Conclusions section, the Report noted at page 39 that, “A lines of reasoning approach utilized at this site best supports an explanation that inorganic and organic constituents associated with hydraulic fracturing have contaminated ground water at and below the depth used for domestic water supply.”

The Conclusions of the Report ended with the following recommendation: “Finally, this investigation supports recommendations made by the U.S. Department of Energy Panel (DOE 2011a, b) on the need for collection of baseline data, greater transparency on chemical composition of hydraulic fracturing fluids, and greater emphasis on well construction and integrity requirements and testing. As stated by the panel, implementation of these recommendations would decrease the likelihood of impact to ground water and increase public confidence in the technology.”

**For info:** EPA Draft Report at: [www.epa.gov/region8/superfund/wy/pavillion/EPA\\_ReportOnPavillion\\_Dec-8-2011.pdf](http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf)

**TAKINGS DECISION****US****CASITAS CASE**

Judge Weise of the US Court of Federal Claims (Court) recently dismissed a takings case because is was not ready (“ripe”) for a legal determination of whether or not a takings

had occurred. *Casitas Municipal Water Supplier v. United States*, Case No. 05-168L (Dec. 5, 2011). The Court concluded “that plaintiff’s takings claim is not ripe” and directed the clerk to “dismiss plaintiff’s complaint without prejudice, to be refilled...if and when plaintiff’s cause of action accrues consistent with this decision.”

The Court’s decision began with the “question of whether plaintiff indeed possessed a compensable property interest in the lost water.” Slip Op. at 2, footnote 2. The Court set forth the two issues addressed in the case: “first, the nature of plaintiff’s property right and the extent to which background principles of state law impose limitations on that right, and second, the appropriate method for calculating potential damages, in particular by determining the quantity and value of the water lost.” *Id.* at 2-3.

The Court held that the only compensable water right that can be obtained under California law is a right to beneficial use — there is no absolute right to divert or even store water without beneficial use. “The holder of an appropriated water right, in other words, receives nothing more than this right to beneficial use and possesses no legal entitlement to water that is diverted but never beneficially used. Indeed, by the very terms of its water license, Casitas is limited to the beneficial use of 28,500 acre-feet of water per year. Accordingly, we hold that plaintiff must demonstrate an interference with that beneficial use in order to establish a Fifth Amendment taking of its property.”

The second area addressed by the Court concerned the issue of whether the plaintiff’s property right was taken, plus examine the plaintiff’s and defendant’s assertions and models concerning damages. *Id.* at 28. The Court rejected plaintiff’s damages calculations based on “safe yield” and instead noted that, “If Casitas is never forced to deny a water request as a result of the new operating criteria (either from an actual or potential customer), it will have suffered no compensable injury. The impact on beneficial use thus requires an assessment of demand.” *Id.* at 41. This rationale was followed by the key factual findings: “The evidence before the court suggests that there has been no encroachment on plaintiff’s beneficial use to date. Since the issuance of the biological opinion in 2003, plaintiff has not reduced water deliveries to any of its existing customers, has not turned away any prospective customers (and has in fact both added new customers

and eliminated its wait list), has not changed how it allocates water to its customers, has not purchased alternative water supplies, has not instituted any mandatory water conservation measures or changed its drought contingency measures, and has not increased the price of the water due to the biological opinion...As to future water supply, defendant notes that plaintiff’s own damages model indicates that the available supply will continue to exceed the anticipated demand in all future scenarios except in the event of a reoccurrence of the most extreme drought on record, and even then, only if Matilija Dam is removed as a supplementary water source.” *Id.* at 41-42.

Summing up its two relevant findings the Court stated, “Because the relevant property interest is plaintiff’s right to beneficial use, that right cannot be taken until defendant’s action encroaches on plaintiff’s ability to deliver water to its customers. Since that condition has not occurred, plaintiff’s cause of action is not ripe.” *Id.* at 42.

The case also includes a detailed discussion of the public trust doctrine, the takings defense identified in the *Lucas* case, considerations involving the federal Endangered Species Act versus state principles of law, and the issue of when a cause of action accrues for purposes of the statute of limitations. The case is recommended for a thorough reading of its 53 pages since this article only touches on the areas covered.

**For info:** Case available at: [www.uscfc.uscourts.gov/sites/default/files/WIESE.CASITAS120511.pdf](http://www.uscfc.uscourts.gov/sites/default/files/WIESE.CASITAS120511.pdf)

**ROTATIONAL AGREEMENT CO  
NO CHANGE IN WATER RIGHTS**

On December 12, the Colorado Supreme Court (Supreme Court) reversed a water court decision that voided a rotational no-call settlement agreement titled the “Beardsley Decree.” The water court decided that the 1908 agreement was an improperly noticed change in water rights and on that basis declared it void. The Supreme Court, however, held that the “Beardsley Decree is a valid rotational no-call agreement because, by its plain language, it does not sanction a change in water rights.” *LoPresti v. Brandenburg*, Case No. 10SA191, p. 3 (Dec. 12, 2011).

The case provides in some ways a microcosm of western water law. “The Beardsley Decree prevented litigation over water rights decreed to the Four Ditches for almost eighty-eight years. But long-running disputes between water



## WATER BRIEFS

rights owners on the over-appropriated stream system finally spawned this litigation.” *Id.* at 7.

The case sheds light on the Supreme Court’s view on the legality of such agreements. “As previously discussed, the Decree is a settlement agreement that rotates the ability to call for water between senior rights holders on a heavily over-appropriated stream system. This arrangement allows the available water supply to be shared between those water rights holders in priority, and often enables delivery at a higher flow rate to those who are receiving water at the time. It neither *changes* a junior right holder’s priority on the stream system, nor does it *permit* diversion of more water than is decreed to a point of diversion. The Decree also does not permit the use of diverted water on un-decreed land. Rather, the Decree’s language is in line with our decisions that ‘have repeatedly affirmed the ability of a holder of a senior right to enter into a no-call agreement with the holder of a junior right.’ *City of Englewood*, 235 P.3d at 1066 (citing cases).” (emphasis in original).

The opinion also discusses the difference between contractual water rights and decreed water rights. “While parties to a contract may obtain certain water rights, only the owner of a decreed right can obtain a change in water rights. *Id.* at 340 (citing *Bd. of Cnty. Comm’rs v. Upper Gunnison River Water Conservancy Dist.*, 838 P.2d 840, 855 (Colo. 1992)). Contracting away the ability to apply for a change in water rights can only be done expressly. *Public Service*, 132 P.3d at 341.” *Id.* at 21.

**For info:** Case available at: [www.courts.state.co.us/Courts/Supreme\\_Court/opinions/2010/10SA191.pdf](http://www.courts.state.co.us/Courts/Supreme_Court/opinions/2010/10SA191.pdf)

## EFFLUENT GUIDELINES US COMMENT PERIOD EXTENDED

On October 20, 2011, EPA published its final 2010 Effluent Guidelines Program Plan, as required by the federal Clean Water Act, which identified new or existing industrial dischargers selected for effluent guidelines rulemaking and provided a schedule for such rulemakings. The notice also solicited data and information for EPA’s 2011 Effluent Guidelines Program Reviews. The 2010 Plan includes a schedule to develop standards for wastewater discharges produced by natural gas extraction from underground coalbed and shale formations.

In response to comments and requests, EPA has re-opened the comment period and will accept public

comments on the Plan and data and information for the 2011 reviews, for an additional 60-day period upon publication of the notice, or from December 27, 2011, in the Federal Register.

**For info:** <http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/index.cfm>

## PCB TMDL GUIDANCE US EPA RELEASE

EPA has issued a technical document titled Polychlorinated Biphenyl (PCB) Total Maximum Daily Load (TMDL) Handbook, which provides EPA regions, states, and other stakeholders with updated information for addressing Clean Water Act section 303(d) waters impaired by PCBs. PCBs rank sixth among the national causes of water quality impairment in the country, and of the 71,000 waterbody-pollutant combinations listed nationally, over 5,000 (eight percent) are PCB-related. This handbook identifies various approaches to developing PCB TMDLs and provides examples of TMDLs from around the country, complete with online references. It aims to help states complete more PCB TMDLs and ultimately restore those waters impaired by PCBs.

**For info:** Handbook available at: [http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/pcb\\_tmdl\\_handbook.pdf](http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/pcb_tmdl_handbook.pdf).

## AG NUTRIENT STANDARD US USDA REVISION

The US Department of Agriculture (USDA) has revised its national conservation practice standard on nutrient management to help producers better manage the application of nutrients on agricultural land. The USDA Natural Resources Conservation Service (NRCS) uses this conservation practice to help farmers and ranchers apply their nutrients more efficiently. Proper management of nitrogen and phosphorus, including the use of organic sources of nitrogen such as animal manure, legumes and cover crops, can save producers money. The nutrient management standard provides a roadmap for NRCS’s staff and others to help producers apply available nutrient sources in the right amount, from the right source, in the right place, at the right time for maximum agricultural and environmental benefits.

Key changes in the standard include expanding the use of technology to streamline the nutrient management process and allowing states more flexibility in providing site-specific

nutrient management planning using local information when working with producers. NRCS staff offices will have until Jan. 1, 2013 to comply with erosion, nitrogen and phosphorus criteria for their state nutrient management standard.

**For info:** USDA website: [www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/crops/npnm](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/crops/npnm)

## THERMAL TRADING OR WQ TRADING TO MEET TEMP STANDARDS

The Oregon Department of Environmental Quality (ODEQ) has approved the Medford regional water reclamation facility’s thermal credit trading program and renewed the facility’s permit. Now the regional facility can move forward with efforts to plant riparian shade in the Rogue River basin. The vegetation and tree plantings will help keep temperatures cool and ideal for wildlife in the Rogue and adjacent tributaries. The cooler water will also more than offset warmer effluent discharged from the region’s water reclamation facility. This is the first water quality trading program in the Rogue Basin.

The restoration project is an alternative approach to meeting state and federal standards for water temperature. Instead of installing giant chillers, which are expensive to construct and maintain, or constructing ponds to store treated water for release during cooler weather, thermal credits can be earned through projects that often cost significantly less while providing equal or better results. This alternative approach is known as water quality trading or thermal credit trading.

The project will plant almost 40 miles of riparian shade in the Rogue River basin over the next 20 years to obtain 400 million kilocalories of thermal credit in late fall.

### PROGRAM BENEFITS :

- Approximately \$10 million in reduced compliance costs over the first 20 years when compared to other options (like chillers or holding ponds)
- Enhancement of wildlife habitat
- Landowner and community engagement
- Streamside improvements effective throughout the year
- Prevention of greenhouse gas emissions – approximately 25 to 150 metric tons of carbon dioxide per year

### For info:

Jon Gasik, DEQ, 541/ 776-6010  
Medford Trading Report: [www.deq.state.or.us/wr/permits/MedfordTCTP.pdf](http://www.deq.state.or.us/wr/permits/MedfordTCTP.pdf)  
ODEQ-WQTrading: [www.deq.state.or.us/wq/trading/trading.htm](http://www.deq.state.or.us/wq/trading/trading.htm)



**MANAGING STORMWATER IN THE NORTHWEST**

**MARCH 8 2012**

**TACOMA WASHINGTON**

**Presented by the Northwest Environmental Council**  
For Agenda & Registration Information: [www.nebc.org](http://www.nebc.org)

**January 17 OR**  
Conservation Easements/Water Quality & Toxics Seminar, Baker City. Sponsored by Water for Life & Schroeder Law Offices. For info: Helen Moore, WFL, 503/ 375-6003 or [helen.moore@waterforlife.net](mailto:helen.moore@waterforlife.net)

**January 17-18 WA**  
Certified Erosion & Sediment Control Lead Training Course, Issaquah. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**January 17-18 MT**  
Montana 2012 Invasive Species Summit, Helena. Montana Wild Ctr. Coordinated by Montana's Dept. of Fish, Wildlife & Parks. For info: [www.mtweed.org/docs/agenda-2011-1-17.pdf](http://www.mtweed.org/docs/agenda-2011-1-17.pdf)

**January 18 AZ**  
Cornerstones Report: Market-Based Responses to Arizona's Water Sustainability Challenges (Brownbag), Tucson. WRRRC, 350 N. Campbell Ave., 12-1:30pm. Sponsored by Water Resources Research Center. For info: Jane Cripps, WRRRC, 520/ 621-2526 or [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu)

**January 19 AK**  
6th Annual Permitting Strategies in Alaska, Anchorage. Anchorage Convention Ctr. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

**January 19 WA**  
Collecting & Handling of Water Samples for Trace Metal Analysis, Issaquah. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**January 23 OR**  
Fundamental Chemistry: Refresher Course for Working Professionals, Portland. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**January 23-24 AZ**  
Urbanization, Uncertainty & Water: Planning for Arizona's Second Hundred Years: WRRRC 2012 Annual Conference, Tucson. Student Union Memorial Ctr. Pre-Conf. Workshop 1/23/11. For info: Jane Cripps, Water Resources Research Center, 520/ 621-2526, [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu) or [cals.arizona.edu/AZWATER/programs/conf2012](mailto:cals.arizona.edu/AZWATER/programs/conf2012)

**January 24 WA**  
Elwha Dam Removal (Student Mixer), Seattle. UW Waterfront Activities Ctr., 3900 Montlake Blvd. NE, 5:30pm. Sponsored by AWRA-WA Section; RSVP Requested. For info: [www.wa-awra.org](http://www.wa-awra.org)

**January 24 WA**  
MTCA Spreadsheets Workshop, Kirkland. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**January 24-25 NV**  
Indian Water Rights & Water Law Class, Las Vegas. For info: [www.falmouthinstitute.com](http://www.falmouthinstitute.com) or 800/ 992-4489

**January 24-25 OR**  
Environmental Chemistry & Contaminant Remediation Approaches Course, Portland. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**January 25 AZ**  
Water Efficiency: Making the Link to Watershed Health Seminar, Tucson. WRRRC, 350 N. Campbell Ave., 12-1:30pm. Sponsored by Water Resources Research Center. For info: Jane Cripps, Water Resources Research Center, 520/ 621-2526, [jcripps@cals.arizona.edu](mailto:jcripps@cals.arizona.edu) or [cals.arizona.edu/azwater](mailto:cals.arizona.edu/azwater)

**January 26 OR**  
Impacts of FEMA Floodplain Mapping: Regulatory Changes & Implications for Local Jurisdictions & Property Owners Seminar, Portland. World Trade Center. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

**January 26 CA**  
CEQA & Climate Change: An In-Depth Update Course, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

**January 26-27 WA**  
Endangered Species Act Seminar, Seattle. Grand Hyatt. Live Webcast. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

**January 26-27 DC**  
Natural Resources Damages Seminar, Washington. Capital Hilton Hotel. For info: Law Seminars Int'l, 800/ 854-8009, email: [registrar@lawseminars.com](mailto:registrar@lawseminars.com), or website: [www.lawseminars.com](http://www.lawseminars.com)

**January 26-27 BC**  
Water Gathering: Collaborative Watershed Governance in BC & Beyond - Solutions Forum, Vancouver. Sponsored by Pacific Business & Law Institute and The Summit Institute. For info: [www.pbli.com/conferences/overview?itemid=40](http://www.pbli.com/conferences/overview?itemid=40)

**January 26-27 CA**  
Planning in California: Overview & Update Course, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

**January 27-29 CO**  
Downstream Neighbor Water Symposium: South Platte Watershed, Denver. Colorado Heights University. For info: [www.downstreamneighbor.org](http://www.downstreamneighbor.org)

**January 30 CO**  
Unheard Voices of the Colorado River Basin: Bringing Mexico & Native American Tribes to the Table (Speaker Series), Colorado Springs. Colorado College. Bidtah Becker & Osvel Hinojosa, Speakers. For info: [www2.coloradocollege.edu/stateoftherockies/speakerseries.html](http://www2.coloradocollege.edu/stateoftherockies/speakerseries.html)

**January 30 OR**  
Oregon Source Control: Stormwater & Contaminated Sediment Conference, Portland. World Trade Center. For info: Holly Duncan, Environmental Law Education Center, 503/ 282-5220, [hduncan@elecenter.com](mailto:hduncan@elecenter.com) or [www.elecenter.com](http://www.elecenter.com)

**January 30-Feb. 2 FL**  
The Water & Wastewater Utility Management Conference 2012, Miami. Hyatt Regency. For info: Water Environment Federation, 800/ 666-0206 or WEFTEC website: [www.weftec.org](http://www.weftec.org)

**January 30-Feb. 3 WA**  
11th Annual Stream Restoration Symposium, Skamania. Skamania Lodge. For info: River Restoration Northwest: [www.rnw.org](http://www.rnw.org)

**February 1 WA**  
Impacts of FEMA Floodplain Mapping Seminar, Seattle. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

**February 1-3 WA**  
EPA's Unified Guidance: Statistical Analysis of Groundwater Data Course, Seattle. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**February 2 CA**  
CEQA Update, Issues & Trends Course, Sacramento. Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

**February 2-3 AZ**  
Water Rights & Trading Regional Summit, Scottsdale. Montelucia Resort & Spa. Sponsored by WestWater Research & American Water Intelligence. For info: [jmc@globalwaterintel.com](mailto:jmc@globalwaterintel.com)

**February 6 CO**  
Healthy Forests for the Colorado River Basin (Speaker Series), Colorado Springs. Colorado College. Harris D. Sherman, Speaker. For info: [www2.coloradocollege.edu/stateoftherockies/speakerseries.html](http://www2.coloradocollege.edu/stateoftherockies/speakerseries.html)

**February 7-10 TX**  
RCRA Compliance Workshop, San Antonio. Saint Anthony Wyndham. For info: EPA Alliance Training Group, 713/ 703-7016 or [www.epaalliance.com](http://www.epaalliance.com)

**February 8-9 CO**  
Hydraulic Fracturing: Regulatory Perspectives & Achieving More ROI Conference, Denver. Sponsored by Electric Utility Consultants, Inc. For info: [www.euci.com/events/register.php?ci=1523&t=R#7658s435582Kt0108](http://www.euci.com/events/register.php?ci=1523&t=R#7658s435582Kt0108)

**February 8-9 WA**  
Floodplain Management Course, Issaquah. For info: NWETC, 503/ 244-4294 x208 or [www.nwetc.org](http://www.nwetc.org)

**February 8-10 OR**  
Low-Cost Remediation Strategies for Contaminated Soil & Groundwater Course, Portland. Red Lion on the River. Sponsored by National Ground Water Ass'n. For info: NGWA: [www.ngwa.org](http://www.ngwa.org)

**February 9-10 OR**  
Urban Water Resources: Stormwater Management, Groundwater Recharge & LID Course, Portland. Red Lion on the River. Sponsored by National Ground Water Ass'n. For info: NGWA: [www.ngwa.org](http://www.ngwa.org)

**February 10 CA**  
GIS for Watershed Analysis: Advanced Course, Davis. 1137 Plant & Enviro Sciences Bldg., UC Davis. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

**February 10-11 OR**  
Pacific Northwest Ground Water Exposition, Portland. Red Lion on the River. For info: NGWA: [www.ngwa.org/Events-Education/conferences/6031/Pages/6031feb12.aspx](http://www.ngwa.org/Events-Education/conferences/6031/Pages/6031feb12.aspx)



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## CALENDAR

(continued from previous page)

### **February 15-16** **FL**

**Sustainable Water Resources - Nutrient Dynamics, Policy & Management in Watershed: 3rd Water Institute Symposium, Gainesville.** J. Wayne Reitz Union. Sponsored by University of Florida Water Institute. For info: <http://waterinstitute.ufl.edu/symposium2012/index.asp>

### **February 16** **GA**

**Wetlands & Water Law Update Seminar, Atlanta.** TENTATIVE. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

### **February 21-22** **OR**

**Reservoir System Modeling Technologies Conference, Portland.** DoubleTree by Hilton Hotel, 1000 NE Multnomah. Sponsored by Bonneville Power Administration. For info: BPA: [www.bpa.gov/corporate/business/innovation/](http://www.bpa.gov/corporate/business/innovation/)

### **February 21-23** **OR**

**Northwest Hydroelectric Ass'n 2012 Annual Conference, Portland.** Marriott Hotel Waterfront. For info: [www.nwhydro.org/default.htm](http://www.nwhydro.org/default.htm)

### **February 27-28** **DC**

**NGWA's 15th Annual Groundwater Industry Legislative Conference, Washington.** Holiday Inn Capitol. For info: [www.ngwa.org/flyin/Pages/default.aspx](http://www.ngwa.org/flyin/Pages/default.aspx)

### **February 27-28** **TX**

**Emerging Issues in Groundwater Conference, San Antonio.** St. Anthony Riverwalk Wyndham Hotel. For info: NGWA: [www.ngwa.org/Events-Education/conferences/5013/Pages/5013feb12.aspx](http://www.ngwa.org/Events-Education/conferences/5013/Pages/5013feb12.aspx)

### **February 27-29** **ND**

**North Dakota Water Quality Monitoring Conference: State of Our Research, Information & Knowledge, Bismarck.** For info: Mike Ell, [mell@nd.gov](mailto:mell@nd.gov), 701/ 328-5210, or [www.ndwatermonit.org](http://www.ndwatermonit.org)

### **February 28-March 1** **DC**

**ACWA 2012 Washington, D.C. Conference: Bringing California Water Conversations to D.D., Washington.** Washington Court Hotel. For info: Ass'n of California Water Agencies, [www.acwa.com/content/event-registration](http://www.acwa.com/content/event-registration)

### **February 29-March 1** **TX**

**NGWA Phytoremediation of Common Groundwater Contaminants Conference, San Antonio.** St. Anthony Riverwalk Wyndham Hotel. For info: NGWA: [www.ngwa.org](http://www.ngwa.org)

### **March 1** **WA**

**Solar Power Seminar, Seattle.** TENTATIVE. For info: The Seminar Group, 800/ 574-4852, email: [info@theseminargroup.net](mailto:info@theseminargroup.net), or website: [www.theseminargroup.net](http://www.theseminargroup.net)

### **March 1-2** **NV**

**Law of the Colorado River - 14th Annual Conference, Las Vegas.** Planet Hollywood Resort. For info: CLE International, 800/ 873-7130 or website: [www.cle.com](http://www.cle.com)

### **March 1-2** **CA**

**Sea to Sierra Train Tour: Rolling Seminar on California Water Issues, San Francisco.** California Zephyr. Sponsored by Water Education Foundation. For info: [www.watereducation.org/toursdetail.asp?id=2214&parentID=821](http://www.watereducation.org/toursdetail.asp?id=2214&parentID=821)

### **March 1-4** **OR**

**30th Annual Public Interest Environmental Law Conference: New Frontier - The Political Crossroads of Our Environmental Future, Eugene.** University of Oregon. Sponsored by the Environmental & Natural Resources Law Program (UO Law School). For info: [www.pielc.org](http://www.pielc.org)

### **March 2** **CA**

**Annual Land Use Law Review & Update Course, Sacramento.** Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

### **March 5-6** **NV**

**2012 Lake Mead Symposium, Las Vegas.** Tuscany Suites & Casino. In conjunction w/Nevada Water Resources Ass'n Annual Conference. For info: Tina Triplett, NWRA, 775/ 473-5473 or [www.nvwra.org](http://www.nvwra.org)

### **March 7** **CA**

**ACWA's 2012 California Legislative Symposium, Sacramento.** Convention Ctr. For info: Ass'n of California Water Agencies, [www.acwa.com/content/event-registration](http://www.acwa.com/content/event-registration)

### **March 8** **WA**

**Managing Stormwater in the Northwest Conference, Tacoma.** Sponsored by Northwest Environmental Business Council. For info: Sue Moir, NEBC, 503/ 227-6361, [sue@nebc.org](mailto:sue@nebc.org) or [www.nebc.org](http://www.nebc.org)

### **March 8** **CA**

**Climate Change Adaptation Planning Course, Sacramento.** Sutter Square Galleria, 2901 K Street. For info: UC Davis Extension, 800/ 752-0881 or [www.extension.ucdavis.edu/landuse](http://www.extension.ucdavis.edu/landuse)

### **March 9** **WA**

**CERCLA & MTCA: Advanced Sediment Conference, Seattle.** For info: Holly Duncan, Environmental Law Education Center, 503/ 282-5220, [hduncan@elecenter.com](mailto:hduncan@elecenter.com) or [www.elecenter.com](http://www.elecenter.com)

### **March 14-16** **DC**

**Western States Water Council Spring Water Policy Roundtable, Washington.** L'Enfant Plaza Hotel. For info: WSWC, [www.westgov.org/wwsc/](http://www.westgov.org/wwsc/)