The Water Report™

Water Rights, Water Quality & Water Solutions in the West

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THE PERIPHERAL CANAL

SAN FRANCISCO BAY - DELTA ESTUARY PROPOSALS

by Dante Nomellini (Nomellini, Grilli & McDaniel: Stockton, CA)

Editors' Introduction: Whether it is referred to as the Sacramento-San Joaquin Delta, the San Francisco Bay-Delta Estuary or just the Bay Delta, this central California area has become a flashpoint of California water concerns. Covering more than 738,000 acres, the Delta is the largest estuary on the West Coast. Its primary sources of fresh water are the Sacramento and San Joaquin Rivers. Approximately 50 percent of all of California's total average annual streamflow flows to the Delta. Its position as the hub of California's water infrastructure has come under intense scrutiny due to endangered delta smelt and a subsequent court decision to drastically curtail pumping of water in aid of smelt protection. The ramifications of that decision have been felt throughout California, and arguably throughout the US due to the impacts on that state's widely distributed agricultural output.

The Delta's principal water management system is comprised of the pumping facilities of both the California State Water Project (SWP) and federal Central Valley Project (CVP) in the south Delta (near the town of Tracy) that have a maximum pumping capacity of 10,300 **c**ubic **f**eet per **s**econd (cfs) and 4,600 cfs, respectively. These facilities' combined capacity, pumping into both the SWP and CVP aqueducts, therefore approximates 15,000 cfs.

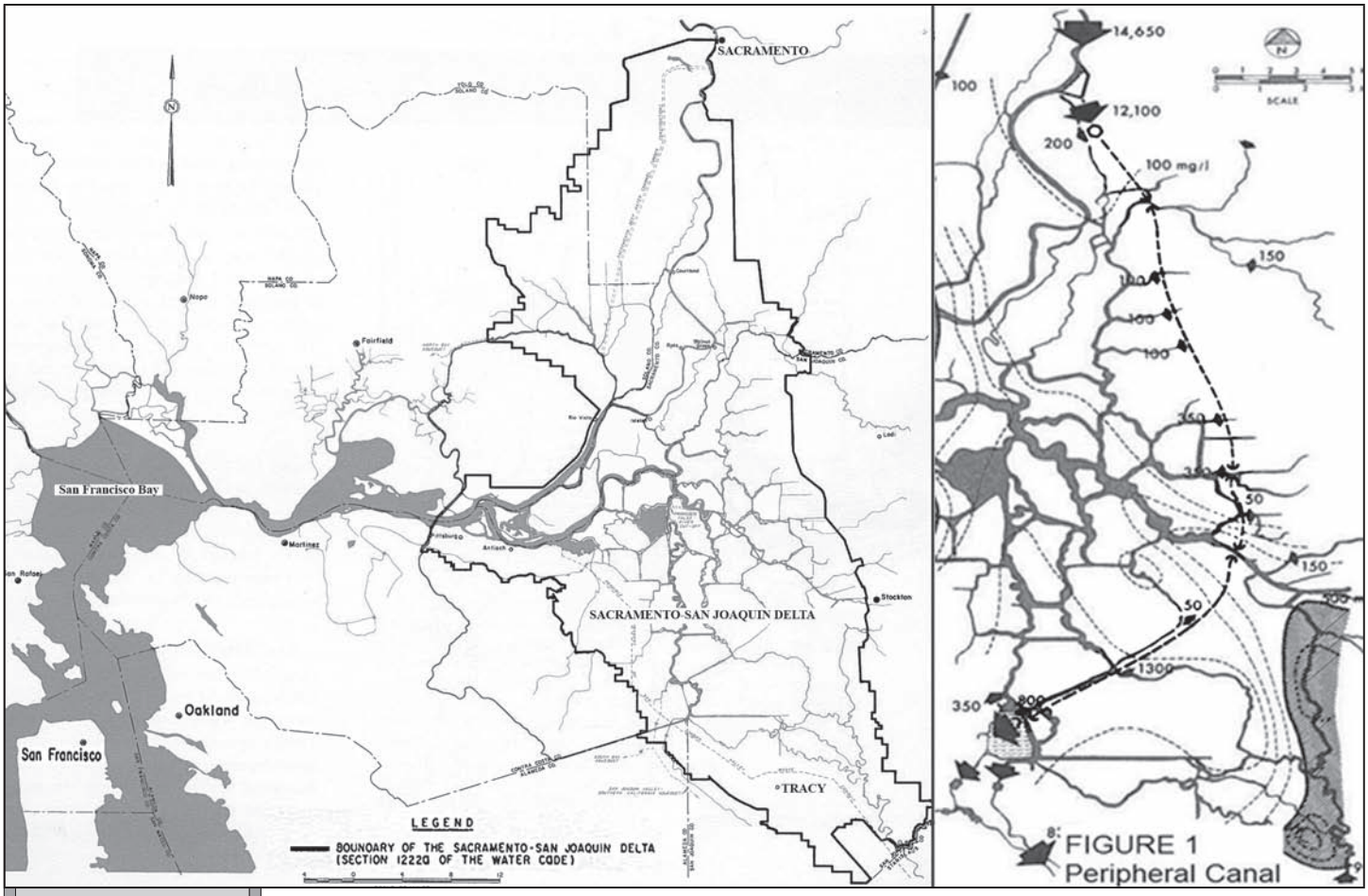
An estimated 23 million people, two-thirds of all Californians, obtain at least some of their water from the Delta making the Sacramento-San Joaquin Delta the single largest source of California's water (CALFED Bay Delta Program website). The SWP and CVP also provide water to more than 4 million acres of irrigated farmland in the State, primarily in the San Joaquin Valley. Within the Delta itself, more than 500,000 acres currently are in agricultural production.

The Delta supports more than 750 plant and animal species, including 130 species of fish — it supports an estimated 25 percent of all warm water and anadromous sport fishing species, and 80 percent of California's commercial fishery species live in, or migrate through, the Delta. The Delta also provides habitat for a number of species that are protected by the federal Endangered Species Act, including the Sacramento winter-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and the noted delta smelt.

In a recent development, the California Department of Water Resources released its operational assessment of a "Dual Conveyance System" as requested by the Delta Vision's Blue Ribbon Task Force on June 16, 2008. That report is focused on the factors of the combined operation of through-Delta (current system) and isolated facility improvements (peripheral canal) for the purposes of water supply reliability and ecosystem sustainability. [See CDWR website: www.water.ca.gov/news/archive/; additional Delta information is available at: www.water.ca.gov/deltainit/]

On June 20, the California State Water Resources Control Board (SWRCB) staff released a draft plan of activities related to solving problems in California's important Bay-Delta area. This draft plan identifies how the State Water Board will achieve Bay-Delta commitments the Governor identified for it in his February 29, 2008 letter to legislative leaders. The draft was scheduled to be considered on July 15 by SWRCB. The draft plan is available at: www.waterrights.ca.gov/baydelta/strategic_workplan.htm.

The debate over possible options to address the many ongoing issues facing California's water system — including the Peripheral Canal proposal discussed in the following article — promises to be long and passionate. The following article presents one highly informed view shaped by years of involvement in the Peripheral Canal controversy. Additional perspectives will appear in future articles.



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BAY-DELTA BACKGROUND & ONGOING ISSUES

The term "peripheral canal" has been applied to canals of a variety of sizes that would connect the Sacramento River to the federal Central Valley Project (CVP) and State Water Project (SWP) water export pumping plants near Tracy, California. These pumping plants export water to agricultural and urban areas south of the Delta. The term "isolated transfer facility" would perhaps be a more descriptive term than "peripheral canal." The critical and most distinguishing feature of such a facility would be the separation or isolation of the Sacramento River water from the Delta pool as it traverses to the export pumps.

The peripheral canal, as formerly and presently proposed, would traverse the eastern edge of the Delta from Hood to Clifton Court Forebay. Figure 1 depicts the peripheral canal as generally proposed at the time of the 1982 referendum. The 1982 referendum defeated legislation (SB 200) that would have authorized its construction.

The Delta (legally defined in California Water Code 12220) is an essential part of the San Francisco Bay-Delta Estuary. It is the area where the fresh waters of the Sacramento and San Joaquin River systems meet and mix to repulse Bay salinity and form a fresh water pool. The Delta channels are tidally connected to the Pacific Ocean through San Francisco Bay. There are two high tides and two low tides in each 25-hour period. Without fresh water flows into and through the Delta, the quality of water in the Delta pool would gradually deteriorate and become salty like the Bay. The greater the flow of fresh water into and through the Delta, the better the water quality. Although historically in late summer months of the driest years salinity would intrude well into the Delta, water quality in the western Delta previously was better on average than it is today. Figure 2 depicts the extent of Historical Salinity Incursion into the Delta for years 1920-1960. Even in years of the greatest intrusion of salt water the flushing action of spring flows of fresh water kept the Delta pool fresh well into summer.

Salinity control is a key element in protecting Delta water quality. Salinity intrusion from the Bay is a major contributor to water quality degradation adversely affecting all beneficial uses of Delta water. The CVP and SWP are obligated to provide salinity control for the Delta. However, both projects have aggressively resisted additional Delta outflow requirements, which would reduce the amount of water available for export to Southern California. Inadequate outflow may be a substantial factor in the pelagic organism decline.

Peripheral Canal

Salinity Control

Salinity control for the Delta, which protects both in basin and out of basin uses, is one of the major tension points in an on-going North/South water struggle. Although intended to provide significant enhancement, there is serious concern that the present level of salinity control fails even to mitigate the impacts of federal and State of California (State) actions, including the operations of the SWP and CVP.

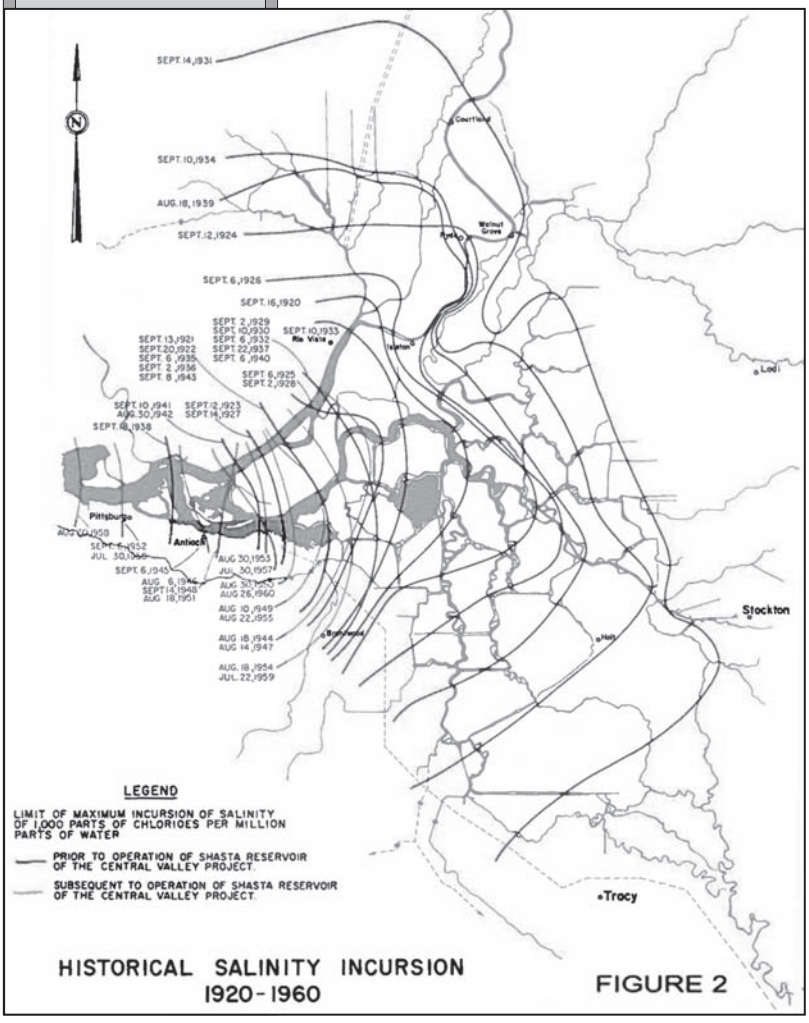
To avoid the detrimental impacts of salinity in the Delta, the CVP and SWP included plans to release stored water for salinity control. California Water Code section 11207, added by Statutes of 1943, specified "Salinity control in the Sacramento-San Joaquin Delta" as one of the primary purposes of Shasta Dam. Salinity control is currently achieved by allowing unregulated river flow, supplemented by releases of water from upstream reservoirs, to flow into and out of the Delta in sufficient quantities to constitute a hydraulic barrier to Bay salinity. The fresh water flow into the Delta comes from essentially two river systems: the Sacramento River on the north and the San Joaquin River on the south.

River Water Quality

The Sacramento River on average provides about seventy-three percent (73%) of the fresh water inflow to the Delta and the San Joaquin River about eleven percent (11%). In contrast to the Sacramento River, the San Joaquin River water quality is quite poor. The need for a solution to drain saline water emanating from water applied to the west side of the San Joaquin Valley has long been recognized. Upstream diversions to areas outside the watershed and the lack of a drainage solution for the hundreds of thousands of acres of irrigated land and wetlands along the west side of the San Joaquin Valley are the principal causes of the poor San Joaquin River water quality.

Drainage Needs

The San Luis Act of June 3, 1960 Public Law 86-488, 77 Stat. 156, precluded construction of the San Luis Unit without a master drainage outlet and disposal channel for the San Joaquin Valley. This federal mandate has been ignored. Millions of **a**cre-**f**eet (AF) of San Luis Unit water have been delivered to federal service areas. In 2007, major deliveries of about 928,000 AF went to Westlands Water District, about 70,000 AF to San Luis Water District, 45,000 AF to Panoche Water District and 17,000 AF to the Kern National Wildlife Refuge. The San Luis Unit has resulted in the leaching of selenium and other salts from the naturally highly saline soils along the west side of the San Joaquin Valley, which add to the salt load in the delivered water. These salts presently, and for many years to come, will degrade the quality of the San Joaquin River by discharge of runoff and accretion. Without San Joaquin River restoration, the Delta will continue to be degraded. Salinity standards have not been set for points upstream of Vernalis and the problem has continued for years without resolution.



The State and federal flood control projects for the Sacramento River system, the Sacramento Ship Channel and the Stockton Ship Channel have all enlarged channels in the western Delta, which result in greater Bay salinity intrusion into the Delta. SWP and CVP actions — including upstream water use, project direct diversions and diversions to storage during spring and summer months, operation of export pumps with insufficient outflow, and other project actions such as operation of the Montezuma Slough gates and Delta cross-channel gate closure — all resulted in greater salinity intrusion into the western Delta. Project related water use (both SWP and CVP) in areas draining into the Delta, particularly along the west side of the San Joaquin Valley, also greatly increases the salinity concentration in water entering the Delta.

Water protected for Delta outflow, including that which is needed for salinity control, is water which cannot be exported for use in Southern California. Delta outflow, however, is viewed by those water exporters as water that is simply "wasting" to the ocean, as opposed to usefully meeting their needs. The difference between Delta outflow, which is crucially needed to control salinity, and the outflow of flood water which occurs somewhat infrequently (on the order of once every five to ten years) is conveniently overlooked.

Peripheral Canal

Delta Pool Water Quality

Without a peripheral canal, the Delta serves as a common pool of freshwater for diversion by both in-Delta and export water users. Reductions in salinity control results in increased salinity in the Delta pool and also the salinity of the water exported. This creates a common interest in preserving Delta water quality, at least to the level preferred by the water exporters. A peripheral canal, however, will eliminate the common interest in protection of water quality in the Delta pool and the exporters' real interest will then be water quality *only* at the intake of the peripheral canal. Water export contractors, the California Department of Water Resources (CDWR) and the US Bureau of Reclamation (Reclamation) have all been steadfast in their efforts to reduce Delta outflow to the minimum level necessary to meet the salinity objectives specified in their export contracts regardless of the impact on other uses. If a peripheral canal intake at Hood is constructed, much greater Bay salinity intrusion in the Delta pool could be allowed before it will affect exported water quality. Improved water quality for export is one of the principal reasons given for urban exporters' support for a peripheral canal. However, improving export water quality by removing fresh water inflow to the Delta pool will unfortunately degrade the quality of water in the Delta pool.

Competing Interests

There is strong evidence that protection of the Bay-Delta ecosystem, maintenance of the Delta as a fresh water system, and maintenance of Delta lands will be abandoned in favor of greater exports. This evidence includes: the failure of the SWP to develop the five million AF of supplemental water from North Coast Rivers; the compromised condition of pertinent regulatory processes; and past conduct of the water exporters, the State and the nation (see discussion below). If this trend continues, the Delta will become an inland Bay of saline water with dramatic, negative results. Land surfaces within the Delta islands, in the portions which would constitute the new bay, are below sea level and are protected from inundation by levees. The land surface varies in elevation. Levee remnants could wash away and, primarily because of oxidation of organic soils, the depth of a new, saline bay would be on the order of 10 to 20 feet. The saline bay water will infiltrate and contaminate adjoining fresh groundwater basins and seep into adjoining levees and lands. Wind waves generated across miles of open water will crash into surrounding area levee systems, including the banks of the peripheral canal. Fish and other species in search of fresh water will move upstream and concentrate in the areas of good quality, which will be the area of the intake to the peripheral canal.

Salinity Impacts

INADEQUATE WATER SUPPLY

The force behind the current water conflict is demand that is greater than supply. The consumptive use of water increases with the number of people, plants and animals and the surface area of waterbodies (including ponds, lakes and swimming pools). Consumptive use also increases in areas where temperatures are higher. When irrigated lands are converted into urban development, the consumptive use of water per acre is roughly the same. When arid lands are developed or put under irrigation, though, a totally new demand for water is created. The amount of arid land remaining in California that can potentially be developed — if water is available — far outstrips even the most optimistic possibility of potential supply.

Undeveloped Supply Projects

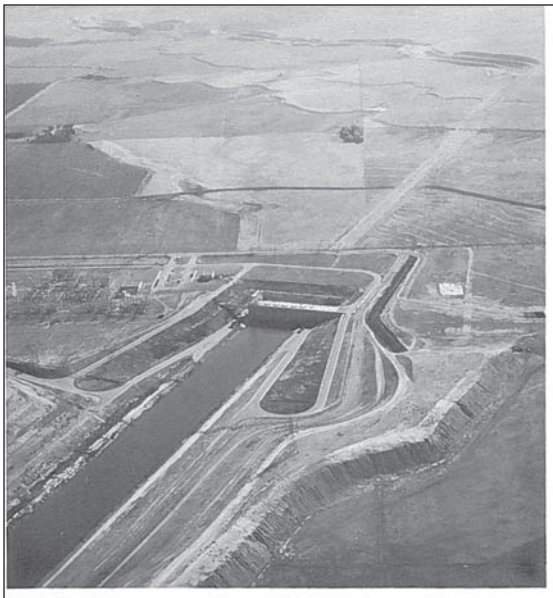
The current water supply crisis is primarily due to the failure of the SWP to develop various projects on North Coast rivers (North Coast Projects) to annually supplement the water supply in the Delta. In a report to the State Legislature by the California Department of Water Resources (CDWR) on "Delta Water Facilities" it was stated that "...economical development of water supplies will necessitate importation of about 5,000,000 acre-feet of water seasonally to the Delta from north coastal streams for transfer to areas of deficiency." CDWR Bulletin No. 76, *Preliminary Edition Report to the California Legislature on the Delta Water Facilities* (December 1960) p. 13. Figure 3 is a copy of page 11 from Bulletin No. 76. It discusses the plans for development, water sources and uses. Figure 4 from page 13 of Bulletin No. 76, shows that by the year 2000, the entire five million AF of water that was to be developed from the North Coast Projects would be required. Wild and Scenic River legislation, increased environmental concerns and the cost of water development appear to be the factors that discouraged construction of the North Coast Projects. It is important to recognize that for the year 2000 — when due to the lack of North Coast water development it was expected that there would be no water for delivery by the SWP — the Water Education Foundation *Layperson's Guide to the State Water Project* (updated 2008) reported: "SWP delivers 3.5 million acre-feet of water, highest total since project began operations."

Water Export v. Delta Needs

The continuing shortage of SWP water supply and the cost to SWP contractors of replacing the undeveloped North Coast supply create a tremendous incentive for exporters to simply take water that is needed within the San Francisco Bay-Delta Estuary for environmental protection and consumptive use in the area. An isolated transfer facility or peripheral canal will clearly facilitate the export of water to Southern California, but it would export water that is *not* surplus to the needs of the Delta. If an isolated transfer facility becomes a reality, it is reasonable to assume that the present pressure to reduce northern California water diversions, increase restrictions on discharges, and reduce environmental protection will continue to intensify.

Peripheral Canal

Supply Issues



Tracy Pumping Plant

Full demands on the State Water Resources Development system can be met until about 1981 from surplus water in and tributary to the Delta with regulation by the proposed Oroville and San Luis Reservoirs. However, upstream depletions will reduce the available surplus supplies and water will have to be imported from north coastal sources after that year. It is anticipated that coordinated operation of the State Water Resources Development System and the Federal Central Valley Project will afford a limited increase in usable surplus Delta supplies beginning in 1981. As indicated in the chart, upstream depletions will continue to decrease the available surplus supplies.

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The coordinated use of surplus water in and tributary to the Delta and of regulated or imported supplements to this supply, as required, is referred to as the Delta Pooling Concept. Under this concept of operation the State will ensure a continued supply of water adequate in quantity and quality to meet the needs of export water users. Advantage will be taken of surplus water available in the Delta, and as the demand for water increases and the available surplus supply is reduced by further upstream uses, the State will assume the responsibility of guaranteeing a firm supply of water, which will be accomplished by construction of additional storage facilities and import works. At the same time, the water needs of the Delta will be fully met.

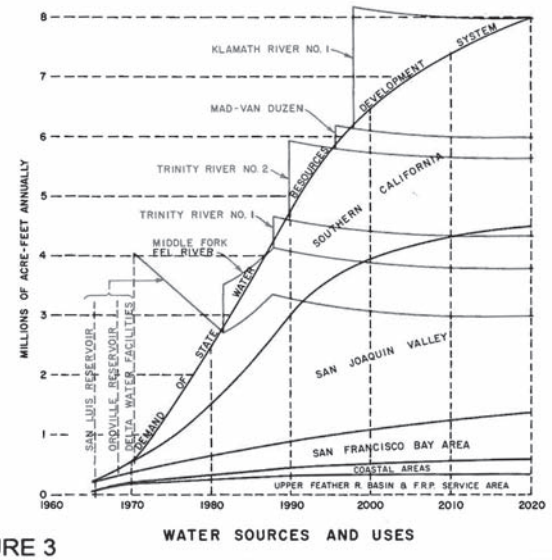
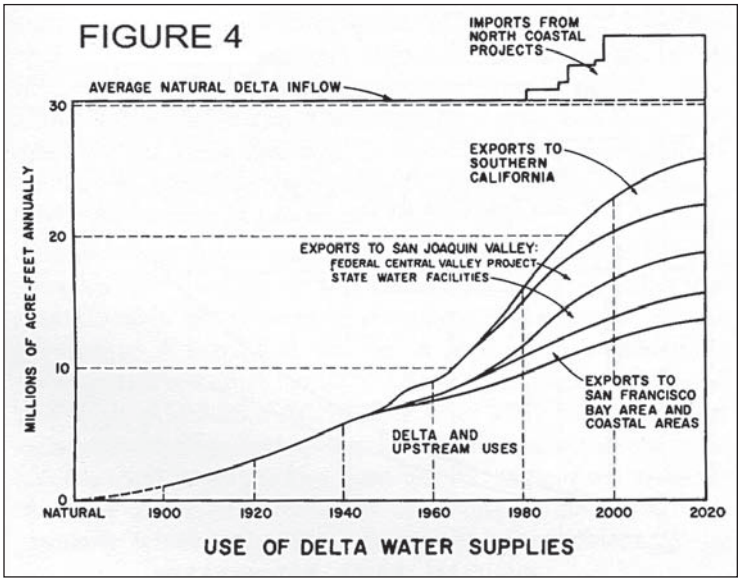


FIGURE 3 WATER SOURCES AND USES

Dry Cycle

If hydrology similar to the dry period of 1928 through 1934 reoccurs, even the areas from which the water originates will be substantially short of water. Without the supplemental five million AF from the North Coast rivers, the reliability of water for export cannot be provided from surplus water in the Sacramento and San Joaquin Rivers Watershed — with or without a peripheral canal. During such a dry period the reliable yield of the watershed is about 17 million AF, which is far short of even the expected 25 million AF for local needs. Figure 5 (next page) contains charts from the Weber Foundation Studies reflecting the data used in the planning for the State's water project. The 1928 through 1934 period, sometimes referred to as the six or seven year dry cycle, is the critical period. During such a period, reservoirs will empty and not be refilled. Substantial local water development, including: conjunctive use; surface and groundwater storage; water reclamation; desalination and stringent conservation will all be needed to address such severe shortage even in the areas of origin. Environmental needs have proven to be greater than originally anticipated and will further reduce the amount of surplus water available for export from the Delta.

Export Options



Development of self-sufficiency in the areas dependent upon exports from the Delta is the most obvious solution to the problems described above. For urban areas, local interties or interconnections between water suppliers, water conservation, water reclamation and desalination will be required.

Peripheral Canal

Delta Protection

REPUDIATION of PROMISED PROTECTION

The cornerstone to the export of water from northern California to the San Joaquin Valley and Southern California was the promise that only water which existed in surplus to the present and future needs of the north would be exported.

SACRAMENTO VALLEY WATER NEEDS WERE EXPLICITLY PROTECTED:

"On October 12, 1948, Secretary of the Interior Krug, in a public speech at Oroville, stated: 'Let me state, clearly and finally, the Interior Department is fully and completely committed to the policy that no water which is needed in the Sacramento Valley will be sent out of it.' He added: 'There is no intent on the part of the Bureau of Reclamation ever to divert from the Sacramento Valley a single acre-foot of water which might be used in the valley now or later.' (Staff 9, p. 799 & SRDW 19)."

(See SWRCB D 990, p. 70 & 71.)

WEBER FOUNDATION STUDIES

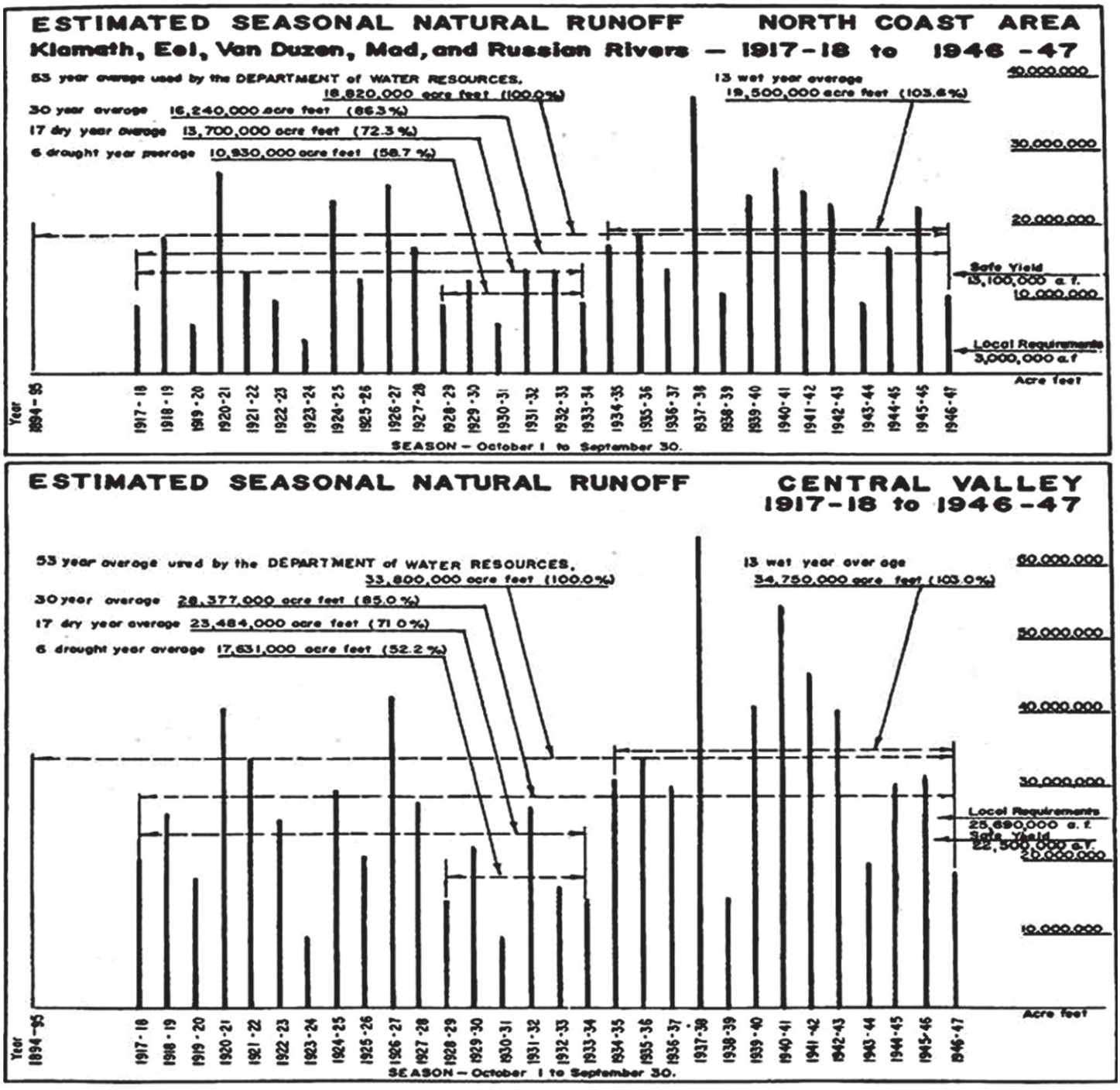


FIGURE 5

Peripheral Canal

State Policy

The promised protection is memorialized in California statutes. The Watershed Protection Act, Water Code section 11460 et seq. and The Delta Protection Act, Water Code section 12200 et seq., establish the priority for salinity control and an adequate water supply for the Delta and other areas of origin. Included in these rights is the right to recapture water back from the export projects.

Of particular relevance to a peripheral canal proposal is Water Code section 12205, which provides:

> §12205. Storage of water; integration of operation and management of release of water
> It is the policy of the State that the operation and management of releases from storage into the Sacramento-San Joaquin Delta of water for use outside the area in which such water originates shall be *integrated to the maximum extent possible* in order to permit the fulfillment of the objectives of this part [i.e. the objectives of salinity control, an adequate water supply and maintenance of the common pool]. (*Added by Stats. 1959, c. 1766, p. 4249, ' 1.)*" (emphasis added)

Salinity Controls

This promise specifically included instituting effective salinity controls. Measures were to be taken to eliminate the historically infrequent naturally occurring intrusions of salinity from the Bay into the Delta. Measures were to also mitigate for the salinity intrusion caused by State and federal flood control channel projects as well as impacts from project-induced diversions both upstream and downstream from the Delta. The interior of the Delta was to serve as a "common pool" — i.e. serving both in-Delta diverters as well as the exporters. Although imperfect, this common pool resulted in a common interest for Delta preservation. If the water quality is bad for the in-Delta users, it will be bad for the exporters as well.

Areas of Origin Protection

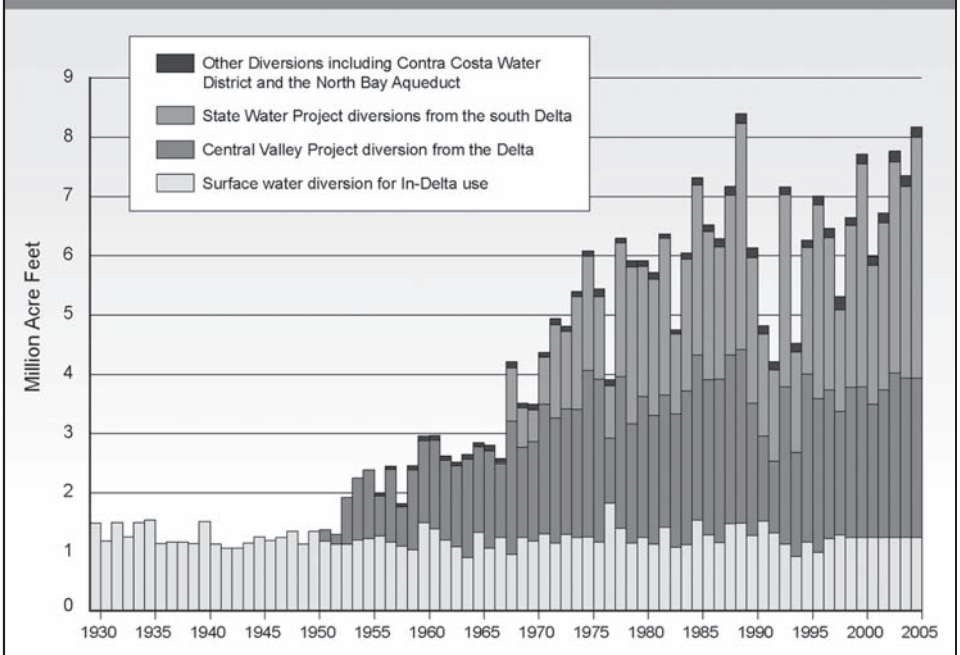
CDWR and five of the 29 SWP export contractors met in Monterey in 1994 and agreed to amend certain parts of their SWP contracts. Through the "Monterey Agreement" they tried to eliminate the standard provision in SWP contracts which spells out the priority protection for areas of origin. CDWR, Reclamation and the export contractors have also attempted to integrate the premise that reliable supply for export is a co-equal goal to that of protection of the Delta and other areas of origin into the current State "Delta Vision" process and the State and Federal Bay-Delta Conservation Plan process.

COMPROMISED REGULATORY PROCESSES

Conflicts of Interest

CVP is a federal project operated by Reclamation. SWP is a State project operated by the California Department of Water Resources (CDWR). With the US and the State both operating the projects to serve contractors with water exported from the Delta, a critical and debilitating conflict of interest was created with the other federal and State departments and agencies which have a duty to protect the environment, fish and wildlife resources, and the public trust. Even within Reclamation and CDWR there is a conflict between the responsibility to serve the contractors and the duty as public officials to protect the public interest and public trust, while also meeting the common law duty to avoid deprivation of honest services (including honest and impartial government).

FIGURE 6 **Historic Diversions from within the Delta**



Source: Measured, calculated and modeled from an array of data sources as compiled by Tully & Young, Inc.

The Resources Agency of the State of California, the California Department of Fish and Game (CDFG), the California State Water Resources Control Board (SWRCB) and CDWR have in the past failed to protect the Delta. Their primary focus has been — and still appears to be — avoiding any loss to exports of water from the Delta. Since at least August of 1978, when SWRCB issued its Decision 1485, it was clearly recognized that, "To provide full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps." (SWRCB D-1485, p. 13) Figure 6 shows SWP and CVP exports (excluding Friant-Kern Canal) from the Delta from 1950 through 2005. With full knowledge of the detrimental impact to fish, the exports of water nevertheless steadily increased.

Peripheral Canal

Court Intervention

As a result of the increase in water exports the courts have now intervened. In *Natural Resources Defense Council et al. vs. Dirk Kempthorne (Secretary of the Interior) et al.*, United States District Court, Eastern District of California, Case No. 1: 05-CV-01207 OWW (TAG), Judge Wanger ordered SWP and CVP to curtail export pumping of water to the San Joaquin Valley and Southern California in order to protect Delta Smelt. See TWR #47 and #51.

Agencies' Relationships

The State regulatory agencies are ill equipped to regulate the CDWR, especially when political influences are considered. Prior to 1994, the US Environmental Protection Agency (EPA) and US Fish and Wildlife Service (USFWS) made some efforts which appeared to be directed at serious regulation of the two projects. Such efforts, however, have recently all but disappeared. Thus, an appropriate arms-length relationship between the regulators and the regulated now appears weak to non-existent.

These conditions persist even though the 1994 Framework Agreement which created CALFED — the region's current intergovernmental water project management agreement — formalized certain environmental responsibilities. ["CAL" includes the Governor's Water Policy Council which included the California Department of Fish & Game, CDWR and the SWRCB. "FED" includes US Fish & Wildlife Service, National Marine Fisheries, EPA and Reclamation. See CALFED website: http://calwater.ca.gov/index.aspx]

CALFED Framework

Under CALFED, the regulators, including the SWRCB (the adjudicator of water rights), and the export project operators, agreed to jointly facilitate the coordination of water project operations with regulatory requirements and undertake a joint long-term solution finding process.

The 1994 agreement, in part, states:

> 5. We agree that it is essential for the State and Federal agencies with regulatory and resources management responsibilities in the Bay-Delta Estuary to reach *consensus*, consistent with applicable procedural limitations, *on the appropriate level of protection* to be achieved for the Bay-Delta Estuary.

Framework Agreement 1994 (emphasis added.)

"Environmental Water Account"

Countering CALFED's environmental commitments, the "Delta Accord" (sometimes referred to as the December 15, 1994 Principles Agreement) included an agreement that no reduction to water exports were to occur as a result of endangered species requirements, so long as anticipated SWRCB water quality standards were met. This "no net loss" for exported water agreement was made even though these water quality standards were inadequately protective according to previous biological opinions and EPA requirements. Establishment of the "Environmental Water Account" in October of 2000 by the CALFED Bay-Delta Program, where fishery protection could not be required unless water was available from other sources to make up for export losses, added to the erosion of protection of the environment and turned the concept of exporting only "surplus" water on its head. [Editor's Note: The Bay Institute of San Francisco, in its *First Annual State of the Environmental Water Account Report* of September 2001 noted that the Environmental Water Account "was intended to provide a buffer for endangered species by acquiring water that would be immediately available for fish protection while longer-term arrangements were being made between the resource agencies and the water project operators. This concept was adopted by CALFED and export water users and transformed into a mechanism for providing fish protections without ever impacting project supplies."] The Bay Delta Conservation Plan — which is the vehicle for implementing the peripheral canal — is yet another joint regulator and regulated process constrained by the need to sustain exports from the Delta.

ESA Impacts of Export

There is little evidence to support an assumption that State and federal regulatory agencies will be able to adequately assert themselves to restrain exports in favor of protection of the San Francisco Bay-Delta Estuary. It remains to be seen whether the ongoing court proceedings before Judge Wanger will result in meaningful relief from export impacts on endangered species. Lawyers for export contractors have expressed their confidence that neither the SWRCB nor the courts would impose restrictions on SWP or CVP exports to enforce the promised protection for protection of the Delta and other areas of origin.

Striped Bass

The results of the regulatory failures are graphically depicted by the impact on Striped Bass. Although an introduced species, it is common knowledge that Striped Bass were viewed as the indicator of the health of the San Francisco Bay-Delta Estuary. Figure 7 shows the Striped Bass Index for the years 1962 through 2005. When the index dropped below the level critical to sustainability, the index was ignored and the existence of Striped Bass was criticized as being a detriment to other fish species. There was even a lawsuit filed by export contractors on January 29, 2008, to remove catch limits on Striped Bass to further reduce their numbers (Copy of Complaint available at: www.sustainabledelta.com/legal.html). Striped Bass and other species thrived in the Delta before the late 1960's when the SWP commenced Delta operations and the San Luis Unit came on line. Even the federal agencies, which have a mandate under the Central Valley Project Improvement Act to double the population of Striped Bass, have ignored the law and failed to protect Striped Bass. The canary in the coal mine is dying and the regulators are looking the other way.

Editor's Note: Striped bass may prey on several species listed under the federal and state Endangered Species Acts (ESAs): winter-run Chinook salmon, spring-run Chinook salmon, steelhead, delta smelt, and splittail. The California Department of Fish & Game (CDFG) negotiated with the US Fish and Wildlife Service and the National Marine Fisheries Service to stock striped bass. These negotiations resulted in a Striped Bass Management Program Conservation Plan and associated Incidental Take Permit under the federal ESA "Section 10" permit obtained in June 2000. This allowed CDFG to stock striped bass as long as population estimates stayed under 912,000. If the population estimate reached this point, then DFG is required to initiate discussion with the Federal agencies. The population estimate exceeded this number in 2000 and CDFG initiated discussions with the federal agencies. These discussions led to reduced stocking in 2001 and a hold on additional stocking until the striped bass population estimate dropped. (Information from CDFG's website)

Peripheral Canal

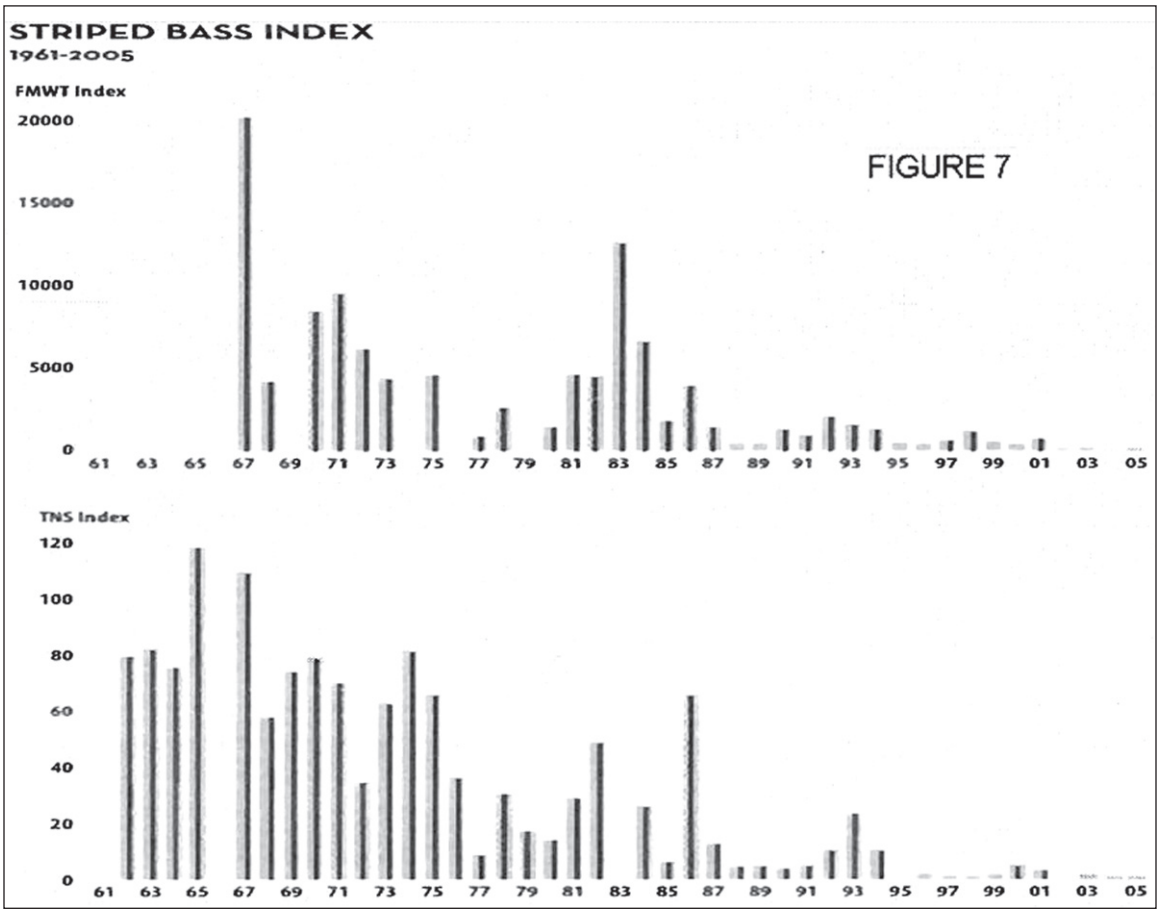


FIGURE 7

Emergency Drought Authority

Even assuming that a regulatory process can be rehabilitated through massive changes in personnel and leadership, the prospect of using emergency powers to circumvent Delta protection is real. The 1976-77 and 1991-92 droughts were the subject of emergency declarations and although current conditions are not as critical, emergency authority is being applied.

ADVERSE IMPACTS TO DELTA WATER QUALITY

Delta Pool Impacts

Any isolated transfer facility, even if operated properly, will remove Sacramento River water that would otherwise flow into and through the Delta pool. Removal or separation of such water will increase the temperature of Delta waters and will degrade the water quality. Temperature is important for salmon migrating back to the rivers to spawn. Increased temperature in the Delta could degrade the vitality of the salmon eggs and thus jeopardize reproduction. Similarly, removal of the good quality Sacramento River water from the Delta pool will result in less dilution and less assimilative capacity. Higher concentrations of contaminants will result. Degraded Delta water quality will not only adversely impact in-Delta surface water uses but will degrade groundwater both within and outside the Delta.

Peripheral Canal

Proposed Intake

Intake Impacts on the Sacramento River

The relocation of the intakes for the SWP and CVP to the Sacramento River would also adversely impact greater numbers of fish. The Sacramento River contains a far greater number of fish than the San Joaquin River and therefore the potential for damage is much greater. The effectiveness of screening and protecting fish, eggs and larvae will depend somewhat on the size of the diversion but in any event the damage will be great. For the sizes of diversions contemplated, the effectiveness of screening has not been demonstrated. Use of an isolated transfer facility will degrade Delta water quality, thus it is likely that more fish, including Delta Smelt, will follow the good quality water to the intake on the Sacramento River, thereby exacerbating adverse impacts.

Additional Impacts

Stranding of In-Migrating Salmon

Salmon depend upon olfactory senses to find the spawning grounds from which they originated. With an isolated transfer facility, releases, leakage, or seepage of Sacramento River water at various locations across the Delta could result in stranding of salmon at or near the facility where their passage to the Sacramento system is blocked.

Loss of Agricultural Land and Seepage Into Urban Areas

The peripheral canal will require thousands of acres of rights of way, most of which would be located on highly productive agricultural land. There will be additional impacts to agricultural lands outside the rights of way from leakage and seepage. In addition to loss of agricultural production due to seepage from the canal, there is the potential for seepage damage to the nearby levees and residential areas.

Disruption of Roads and Utilities

The routing along the eastern rim of the Delta would intersect and potentially disrupt numerous local roads and utilities, two major highways, the Burlington Northern Santa Fe Railway, the East Bay Muncipal Utility District aqueducts, major fuel and gas transmission lines, the Stockton Ship Channel and a number of high voltage power lines.

Interference with Flood Flows

The proposed facilities will likely interfere with the free passage of flood waters and drainage from east to west and south to north. The capacity for passage must anticipate climate change and sea level rise. If flood waters escape the natural channels, the canal embankments could cause the flood waters to rise and/or flow into areas not otherwise flooded, some of which could be highly developed.

Delta Future?

YIELD – WATER SUPPLY

Obviously, the peripheral canal would not in and of itself increase water supply. It is rather a question of how the available water is used and the consequences of that usage.

Constructing such a canal would result in an increase in the area of surface water subject to evaporation. Some water would seep or leak into unusable saline groundwater. If Delta water quality is maintained, there will be no saving of Delta outflow. If the Delta is maintained as a fresh water area and Delta islands are allowed to flood, there will be a significant loss of fresh water. Evaporative losses from waterbodies and wetlands is much higher than from farmed lands. The additional loss varies depending upon the crop being displaced but on average is about two AF per acre. If 400,000 acres of the approximately 700,000 acres in the Delta is allowed to become flooded, the annual shortage of water supply will be increased by about 800,000 AF. With so much rhetoric about the potential catastrophic failure of Delta levees, it would appear that the plan is to allow the Delta to become a saline bay. When the Delta is abandoned, there will be some loss in yield due to loss of storage in the Delta pool.

CONCLUSIONS

In order for a peripheral canal to actually increase water supply for the exporters, the Delta would have to be turned into a saline bay and water otherwise needed in the Sacramento River Watershed taken for export. Currently, water transfers are the method used to obtain Sacramento River water. Ultimately, acquisition and retirement of land is likely. These methods may secure profits for the individual sellers but ultimately the economy and environmental values of the region will be significantly impacted, much like what occurred in the Owens Valley from the City of Los Angeles' actions (portrayed in the movie *Chinatown*).

Peripheral Canal

A peripheral canal is purely and simply a tool for another "water grab." The past conduct of the State and federal agencies and the export water contractors indicates that the San Francisco Bay-Delta Estuary, including its fish, wildlife, waterfowl, agricultural and recreational uses, will not be protected.

Agencies' Conduct

Various agencies' conduct includes:

- Failing to develop the 5 million AF of supplemental water for the Delta (North Coast Projects)
- Failure to reduce exports to protect fish in 1978 when it was clear that mitigation of project impacts required such reduction
- Not providing sufficient outflow into Suisun Bay to protect the fisheries and Suisun Marsh and instead constructing the Montezuma Slough Gates
- Failing to require the SWP and CVP to comply with State and federal endangered species laws
- Not curtailing delivery of water to the San Luis Unit until a drainage solution was in place
- Neglecting to address San Joaquin River salinity upstream of Vernalis
- The "no net loss" to exports deal in the "Delta Accord"
- The Monterey Agreement's elimination of the protection for areas of origin provisions in the SWP contracts
- Ongoing pressure on Delta diversions and Delta diverters' water rights
- Increasing regulation of in-Delta and upstream discharges

What seemingly amounts to a campaign for an unsustainable Delta reveals a movement to turn the Delta into a saline bay and steadily take more and more water from the Sacramento and San Joaquin Rivers Watershed.

Levee Upkeep

The Delta is sustainable. Levee systems are already in place and can be improved over time. If necessary, primary levees can be improved to higher standards and channel closure structures incorporated to better withstand sea level rise and shorten the time for restoration in the event of levee failure.

The emphasis on export reliability based on the potential for catastrophic earthquake failure of Delta levees is misplaced. The hundreds of miles of canals and pipelines and related pumping facilities located along the active earthquake fault lines running north and south are far more vulnerable to earthquakes, terrorism and other catastrophes than Delta levees. True reliability is dependent on local self-sufficiency.

The public interest would be better served with alternative courses of action.

Alternative Solutions

Realistic efforts should focus on:

- Developing self-sufficiency — especially in the areas which import water — with particular support for water conservation, water reclamation of municipal wastewater and desalting of brackish groundwater
- Supporting local water development throughout the State including interties, conjunctive use of surface and groundwater, and groundwater banking
- Improving Delta levees to the Corps of Engineers' agricultural levee standards with improved capability for emergency response and rapid restoration
- Honoring the promised protection and priority for the present and future needs of the Delta and other areas of origin, including the environmental needs.

A peripheral canal would dramatically alter the San Francisco Bay-Delta Estuary and provide no significant benefit to the cause of meeting California water needs. It is simply a tool to take water needed in the north, to serve west side San Joaquin Valley agribusiness and development interests in Southern California. The solution to California's water needs is not water exported from the Sacramento River and San Joaquin River watersheds but rather is in areas outside those watersheds, including areas now importing water from the Delta.

Destroying one area of the State to benefit development in another is shortsighted. The goal should be to meet the needs of the entire State without harm to any part. The threshold policies and promises of the SWP — that no water will be exported from any area unless it is truly surplus to the present and future needs of such area — are sound and should be honored.

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Washington Water Law

WASHINGTON STATE'S MUNICIPAL WATER LAW

LANDMARK LAW PARTIALLY INVALIDATED IN TRIAL COURT DECISION

by Jeff B. Kray, Marten Law Group PLLC (Seattle, Washington)

Uncertain Future

Introduction

In Washington State, a King County trial court has invalidated portions of Washington's landmark, highly contentious, 2003 "Municipal Water Supply — Efficiency Requirements Act" SESSHB 1338 - Chapter 5, Laws of 2003 (MWL or Act). MWL was enacted as a compromise between municipal and other water users (see Kray, TWR #44). The future of that compromise is now uncertain and, consequently, Washington water supply planners and developers face an uncertain future.

The June 11, 2008 ruling decided a pair of lawsuits that environmental groups, small-boat fisherman, individuals, and tribes filed against Washington State's Department of Ecology (WA/Ecology) and Department of Health (WA/Health) in late 2006: *Lummi Indian Nation v. State of Washington,* and *Burlingame v. State of Washington.* In both of these cases, it was alleged that MWL is unconstitutional. The Washington Water Utilities Council (Utilities Council), an association of over 100 Washington water utilities including cities, **p**ublic **u**tility **d**istricts (PUDs) and water districts (which collectively own and operate water systems serving approximately eighty percent of Washington's population) intervened in the suits as a defendant, as did the Cascade Water Alliance and Washington State University. The ruling rested on complex legal arguments that will have significant impact on developers, PUDs, and municipal water rights holders, water conservation, and future water availability. One practical result is that until the courts fully resolve MWL's meaning water rights holders and other parties will once again have difficulty ascertaining the extent and availability of their water rights for various purposes.

Key Definition Nullified

"Municipal Water Supplier"

Trial Court Ruling Overview

The trial court ruled that the Washington Legislature violated the state constitution by including private developers in the definition of "municipal water supplier." This definition is a key part of MWL. Unlike other types of water rights — such as those used for agricultural irrigation or industrial purposes — Washington protects municipal water rights from being relinquished, or forfeited, back to the state if they are not used for five years. This protection allows municipal utilities to meet community needs as they change and grow over time. For the first time in state law, MWL specifically defined which types of water systems qualify as municipal water suppliers and included in this definition privately owned systems serving at least 15 residential connections (which can include developer built systems for residential subdivisions).

Inchoate Rights

The court also overturned portions of the MWL that allowed developers to hold final "certificated" rights for water that they have not yet put to use. Washington has routinely granted these "inchoate" water rights on the basis of a water system's capacity to withdraw and distribute water — based on a system's "pumps and pipes" — without the water being put to actual use. The trial court ruled unconstitutional that MWL part that protected as "rights in good standing" the certificated municipal water rights for unused, inchoate amounts of water that were granted to utilities before MWL took effect in 2003. The Legislature had enacted this part of MWL in response to a Washington Supreme Court decision, *Theodoratus v. Ecology*, which held that state law does not allow WA/Ecology to grant water rights based on water system capacity. The trial court said the Legislature's actions were unconstitutional because they violated the separation of powers between the courts and the Legislature.

Washington's Pre-MWL Water Law

Forfeiture Exemption

Recognizing municipalities' distinct role in supplying water to the state's citizens, Washington has long provided water rights claimed for "municipal water supply purposes" with an exemption from the relinquishment (forfeiture) statute. Pre-MWL, WA/Ecology issued water right certificates for municipal uses once the main withdrawal and distribution works had been constructed for using the water, but before all of the water was actually put to use. RCW 90.14.140(2); *R.D. Merrill Co. v. PCHB*, 137 Wn.2d 118, 969 P.2d 458 (1999); *See* Final Bill Report, 2E2SHB 1338. Under this philosophy, a municipality could establish unused "inchoate" water rights with priority over subsequent water rights and develop its actual use over time.

Despite the municipal water supply exemption from forfeiture, the law remained unclear on such issues as the appropriate place of use for municipal water rights and the nature and extent of municipal water rights where the certificated volume was not historically put to beneficial use. The Washington Supreme Court's (Court's) *Theodoratus* decision brought these issues into sharper focus and increased uncertainty

Washington Water Law

***Theodoratus* Case**

for municipal water suppliers and other users. In that case, the Court held that state statutory and common law do not allow WA/Ecology to determine beneficial use or issue a vested water right based on water system capacity. However, *Theodoratus* did not involve a municipality, and the Court expressly declined to "address issues concerning municipal water suppliers in the context of this case." Indeed, the Court specifically recognized that under Washington's statutes there are significant differences between municipal and other water uses. At the same time, the Court created uncertainty by *implying* that municipal water suppliers could not rely on system capacity to validate inchoate water rights. The Court also suggested that the municipal water supply exemption from statutory relinquishment may not provide a basis for defining beneficial use differently for municipalities.

2003 MWL

2003 Legislation

In addition to responding to the *Theodoratus* decision, the Legislature passed MWL to address several issues that municipal water suppliers and other state and local agencies believed would benefit from clarification.

MWL includes provisions that:

- Allow municipal water suppliers to use their water rights anywhere within their service areas, up to the full amount of water specified in their water rights, as long as they remain in compliance with their state-approved water system plans
- Establish new water conservation standards for municipal water utilities and those who use their water, and impose a fee to fund conservation activities
- Require consistency with land use plans and set forth a duty to provide retail water service
- Impose on municipal water suppliers a duty to provide water service to all new connections within their retail service area, if they can do so in a "timely and reasonable" manner according to WA/Health and have sufficient water to meet the request, and if the request is consistent with approved land-use plans
- Establish criteria for changing or transferring municipal water rights
- Allow use of water for environmental goals and pilot watershed agreements

King County Trial Court Decision

The trial court decision affirmed many of the MWL's provisions by denying certain of the plaintiffs' motions in its "Order Granting in Part and Denying in Part Plaintiffs' Motions for Summary Judgment; Granting in Part and Denying in Part Defendants' Motions for Summary Judgment," ("Order on Summary Judgment").

The court denied Plaintiff's motions for summary judgment as follows:

- MWL's "water system plan" provisions codified in RCW 90.03.260(4) and (5) do not facially violate procedural or substantive due process under the state and federal constitutions.
- MWL's "service area" provisions codified in RCW 90.03.386(2) do not facially violate procedural or substantive due process under the state and federal constitutions.
- MWL's "water right transfer" provisions codified in RCW 90.03.330(2) do not facially violate procedural due process under the state and federal constitutions.

Order on Summary Judgment at 6.

Retroactive Statutes

However, the court concluded that the MWL's definitions of "municipal water supplier" and "municipal water supply purposes" are "retroactive statutes that unconstitutionally attempt to reinstate water rights that were invalidated by the Washington Supreme Court in [*Theodoratus*]." June 11, 2008, *Verbatim Report of Proceedings* at 9. Those key definitions run throughout the Act and, by invalidating them, the trial court decision restores to Washington water law much of the uncertainty about the scope of the municipal water right exemption that led the Legislature to enact MWL in the first place.

Specifically, the court granted Plaintiffs' motions for summary judgment as follows:

- "[MWL's definitions of "municipal water supplier" and "municipal water supply purposes" codified in] RCW 90.03.015(3) and (4) violate the separation of powers under the state constitution because they have retroactive effect and attempt to overrule an interpretation of the Water Code in *Department of Ecology v. Theodoratus*, 135 Wn.2d 582, 957 P.2d 1241 (1998)."
- "[MWL's "pumps and pipes" provision codified in] RCW 90.03.330(3) violates the retroactive effect and attempt to overrule an interpretation of the Water Code in *Department of Ecology v. Theodoratus*, 135 Wn.2d 582, 957 P.2d 1241 (1998)."

Washington Water Law

Expansion of Rights

Municipal Rights Definition

Planning & Conservation

Efficiency Rules

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Rulings on plaintiffs' motions (continued from previous page)

- "Alternatively, even if one were to accept the state's interpretation of the statute that it addresses only valid inchoate water rights (or rights 'in good standing') (which this Court does not), then RCW 90.03.330(3) violates the separation of powers under the state constitution because it purports to make a legislative determination of adjudicative facts concerning the 'good standing' of particular water rights."

Order on Summary Judgment at 5-6.

Moreover, in announcing its decision, the trial court stated that:

"…it appears to this Court that in significantly recasting the substantive and procedural rights and roles of those who hold water rights in this state in 2003, the legislature overreached unconstitutionally by attempting to restore water rights to certain parties holding pumps and pipes certificates and expanding the number of parties holding such rights to include Mr. Theodoratus."

June 11, 2008 *Verbatim Report of Proceedings* at 13.

MWL defined "municipal water rights" by defining a "municipal water supplier" as "an entity that supplies water for municipal water supply purposes." RCW 90.03.015(3). Then, in turn, MWL defined "municipal water supply purposes" to include traditional residential, commercial, industrial, landscape irrigation, and fire flow uses, but also broadly includes the use of water "for any other beneficial use generally associated with the use of water within a municipality." RCW 90.03.015(4). This definition was not limited to uses by cities, towns, PUDs, or other public utilities, but included any beneficial use of water to serve 15 or more residential connections, the threshold at which water systems must comply with federal regulations under the federal Safe Drinking Water Act.

MWL also has another other key element — increased water system planning and conservation. These aspects had undisputedly increased water supply planning in Washington, putting it in the top tier of states taking aggressive steps toward water conservation and efficiency. (Kray, TWR #44). These MWL provisions require municipal water suppliers to: forecast and collect data about water use; set goals for improving the efficiency of water use and report on their performance in meeting these goals; and limit leakage from distribution systems to ten percent or less of total water supplied to its customers.

Soon after MWL was enacted WA/Ecology and WA/Health, which have slightly overlapping and complementary roles, began to implement the Act. As of September 2005, more than 17,000 drinking water systems in Washington provided water to more than five million residents, most of whom received their household water from water systems regulated under the Safe Drinking Water Act (SDWA). Most Washington residents receive water from fewer than 200 large Group A community systems, all of which serve more than 1,000 homes. Many of the rest are served by a large number of smaller systems — including nearly 13,000 Group B systems that serve an average of eight people each and do not meet MWL's definition of a municipal water supply system.

WA/Health's new Water Use Efficiency Rules took effect on January 22, 2007. The rules affect all "municipal water suppliers."

The new Water Use Efficiency Rules address key MWL elements as follows:

- Water Use Efficiency Planning Requirements: municipal water suppliers are required to collect data, forecast demand, and evaluate leakage and water use efficiency measures (including rate structures that encourage water use efficiency) as part of a water system plan or small water system management program.
- Distribution Leakage Standard: municipal water suppliers are required to meet a state leakage standard of 10% or less in order to minimize loss of water from distribution system leakage. Municipal water suppliers must install source meters and service meters on all connections by January 22, 2017.
- Water Use Efficiency Goal Setting and Reporting: municipal water suppliers are required to set water efficiency goals through a public process and report their performance to WA/Health and the public.

Under MWL, a municipal water supplier could only expand its water right's place of use if it is complying with the terms in its water system plan, including water conservation requirements. Therefore, as a practical matter, municipal water right holders must ensure that their water system plans are complete prior to seeking a water right change or risk losing potential water rights.

As noted above, under MWL, a municipal water supplier also has a duty to provide water service to all new connections within its retail service area if it meets four threshold factors.

The MWL municipal water supplier threshold factors include:

- Service is available in a timely and reasonable manner as defined by guidance from the WA/Health
- Sufficient water rights to provide service
- Sufficient capacity to serve water in a safe and reliable manner
- Service requested is consistent with local comprehensive growth plans and development regulations

Washington Water Law

Water System Plans

Washington's water system plan approval process has become increasingly complex as WA/Health and WA/Ecology implement MWL. There are three key components to obtaining WA/Health's approval for a water system plan and this process requires water system operators to actively manage their plans.

Key water system plan components include:

- Approvals are required from both WA/Ecology and WA/Health
- Plans must be consistent with local land use planning
- The water system's governing body must approve the plan

Unintended Consequences

The Plaintiffs did not challenge MWL's provisions regarding water use efficiency and conservation. However, by invalidating MWL's key definitions, the trial court's decision limits the number of water suppliers required to comply with the conservation provisions and, as a result, may significantly limit the state's water system planning and conservation efforts. The decision is also likely to put increased pressure on the limited pool of municipal water suppliers, including public utilities, to supply water to those systems now excluded from MWL, and developers will likely seek to obtain water from municipalities and other water providers. The practical result of the decision may be that cities, PUDs, water districts, and, in particular, developers will be left without clear guidance as to who is a "municipal water supplier" and what amount of water they have available for future use.

Reactions to the MWL Decision

WA/Ecology and WA/Health are examining the trial court's MWL decision but have not yet issued any guidance on how they will apply the decision. The Washington Water Utilities Council, like the state, is deciding how to respond to the decision (see Editors' Note, below).

Environmental and tribal interests praised the decision. "In general, this is a victory for the fish and the environment," said John Hollowed, legal advisor to the Northwest Indian Fisheries Commission. Robert McClure, *Judge's water ruling a blow to builders,* Seattle Post-Intelligencer, June 11, 2008. "Shaun Goho, an Earthjustice lawyer who represented environmental groups and fishermen, said despite the mixed ruling, 'the parts of the law the judge struck down are those we consider most problematic.'" *Id.*

Appeals Likely

Appeals from the decision are almost certain and it is possible that either the trial court or the appellate courts will stay the decision's effect pending the outcome of such appeals. It is very likely that the defendants in the *Lummi* and *Burlingame* suits, WA/Ecology and WA/Health, the Washington Water Utilities Council, Cascade Water Alliance, and Washington State University will seek to appeal the trial court's decision directly to the Washington Supreme Court. The appeal deadline is July 11, 2008.

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The author wishes to acknowledge John Kounts, Water Program Director for the Washington Public Utilities District Association, for his review and comments on a draft of the article.

Editors' Note

On Monday, July 7, The following update concerning the MWL lawsuit was forwarded to the Washington State Water Supply Advisory Committee members and interested parties:

As you may already be aware, on June 11, King County Superior Court Judge Jim Rogers struck three sections of the Municipal Water Law. One section concerns water rights, and the others provide definitions of the terms "municipal water supplier" and "municipal water supply purposes."

On July 7, the Office of the Attorney General filed a notice of appeal on behalf of the Governor and our agencies to the state Supreme Court, seeking to overturn the ruling. The issues are complex, as you know, and the appeal process will take time to resolve.

In the meantime, we wanted to share with you how the Departments of Health and Ecology will do business until the appeal is resolved.

Because the ruling immediately affects the administration of water rights by Ecology and the oversight of public water systems by Health, the agencies are developing interim policies for staff to follow.

Until final court action occurs, we will not change any reviews and decisions made between the time the Municipal Water Law was enacted in 2003 and June 11, 2008, when the judge announced his ruling.

Given the current uncertainties, our goal is to minimize inconvenience to the public and provide clear guidance to water suppliers.

We'll keep you informed as the case progresses. Please let us know if you have questions and concerns.

Best regards,

Denise Clifford, Director, Office of Drinking Water, Washington State Department of Health

Ken Slattery, Manager, Water Resources Program, Washington State Department of Ecology

For info: Leslie Gates, WA/Health, 360/ 236-3098 or email: leslie.gates@doh.wa.gov

Stormwater

Urban Watershed Benefits

Holistic Approach

Contaminants of Concern

TMDL Tie-Ins

Early Plant Use

PHYTOTREATMENT OF STORMWATER

PHYTOTREATMENT FINDINGS BETOKEN A PROMISING FUTURE

by Anne MacDonald, CEG (Portland, OR), David Dods (Overland Park, KS), Kathi Futornick, LEED AP (Portland, OR), and Ari M. Ferro, Ph.D. (Morrisville, NC) — all of URS Corporation

OVERVIEW

As a general term, phytotreatment refers to the cultivation of particular plants selected for their ability to absorb specific contaminants from soil and groundwater through their roots or foliage. These "cultivars" (i.e., plants selected for useful characteristics which are retained upon propagation) are now being used for a variety of pollution mitigation and remediation purposes.

Recent and ongoing research and development of stormwater phytotreatment indicates such systems represent the next substantive opportunity to produce high-quality runoff and maintain more natural runoff hydroperiods over large portions of urban watersheds. Stormwater phytotreatment systems are more than just "green" and aesthetically pleasing infiltration devices; they represent real, practicable opportunities for sequestering and/or degrading urban and industrial stormwater pollutants. Indeed, when their proven pollution reduction attributes are considered in combination with their ability to effectively manage stormwater volume, planted systems become the single most effective class of stormwater **b**est **m**anagement **p**ractices (BMPs). Stormwater phytotreatment: improves the quality of stormwater runoff; reduces stormwater volumes to take pressure off of municipal infrastructure; and increases the integrity of receiving waters.

This article describes the potential of a more holistic approach in the use of plants for stormwater phytotreatment that recognizes the role of physical, horticultural, and plant/rhizosphere physiological processes in sequestering or degrading stormwater pollutants. We describe some of the challenges faced by the stormwater management community, along with guidance from colleagues versed in phytoremediation and plant ecology that would enable this approach to be more widely applied.

BACKGROUND

Stormwater originating from both industrial and municipal sources invariably contains a complex mixture of contaminants. Stormwater managers have historically focused on removing sediment, oil and grease, nutrients, and metals from urban stormwater. However, the broader loading of toxics in stormwater is receiving increased attention as the reduction of impacts from diffuse pollutant sources becomes more important for improving receiving water and sediment quality (e.g., McCoy and Black, 1998; Baldwin et al., 2003; Bertrand-Krajewski et al., 2008). For example, stormwater has been found to contain **p**olycyclic **a**romatic **h**ydrocarbons (PAHs), pentachlorophenol, phthalates, pesticides, dissolved metals, and other persistent bioaccumulative toxics (e.g., mercury) that have typically not been evaluated by monitoring programs required in most municipal or industrial permits (Pitt et al., 2004). These toxic pollutants may originate from: air sources; local (municipal or industrial stormwater) point sources; non-point sources (e.g., agricultural soil erosion, including conversion of agricultural land to residential use); and from common materials in our urban environment (e.g., plastics, telephone poles, asphalt). What these pollutants have in common are ambient water quality criteria or Total Maximum Daily Load (TMDL) allocations so low that typical stormwater BMPs may not meet desired concentrations in discharges to receiving water bodies (MacDonald, Dean, and Jett, 2007).

More robust treatment of stormwater requires treating larger portions of the urban watershed, and providing more effective pollutant removal during treatment. Since initial use of stormwater BMPs, plants have had a role in stormwater treatment. The remainder of this paper outlines the evolution of the use of plants in stormwater treatment.

PHYTOTREATMENT EVOLVEMENT

Phytotreatment Beginnings

When stormwater BMPs were first gaining use in response to the federal National Pollutant Discharge Elimination System (NPDES) stormwater regulations, plants typically filled a purely physical role: they were used for erosion control, or were used to increase the "hydraulic roughness" of BMPs (i.e. to impede runoff to promote sediment settling in structural stormwater treatment facilities such as detention ponds and swales).

Stormwater

Sediment Removal

Plant species were selected primarily on the basis of their tolerance to the moisture conditions at the particular facility-site (e.g., Shaw and Schmidt, 2003) and their effectiveness in providing hydraulic roughness. Uniform stands of blade-shaped vegetation (e.g., turf grass, cattails) were preferred for this purpose. This physical configuration could also be managed by mowing and could regenerate or be inexpensively replaced following maintenance to remove accumulated sediment.

The primary pollutant removed in such vegetated facilities is sediment. Pollutants bound to the sediment (e.g., metals, phosphorus, or hydrophobic organic compounds) are also removed. Nitrogen is typically converted, but not much is removed (remaining in either the soil or plant tissue). Final sequestration of pollutants occurs when accumulated sediment is removed from the facility and transported to a solid waste disposal site. Infiltration and evapotranspiration could occur, but are rarely design considerations. Runoff volume or peak flow rate reductions are primarily achieved through the facility sizing and outlet design, with an additional contribution from evapotranspiration restricted to events occurring during the growing season.

Multiple Benefits

Expanded Phytotreatment Use

The next level of sophistication in plant phytotreatment is now maturing. The use of horticultural features provides multiple roles, including: aesthetic enhancements; reduction of stormwater volumes through infiltration; and the enhancement of pollutant removal. Such features include "raingardens" — which are designed to promote infiltration of stormwater through their selection of deep rooted perennial plants. In some cases, infiltration may be additionally enhanced by soil engineering or amendment.

Plant Selection

Plant selection is driven by a combination of factors, including: suitability to the moisture regime in the raingarden; ability to persist in the landscape due to adaptations to local climatic patterns; and ecological or aesthetic appeal. The above-ground configuration of the chosen plant(s) typically has little role in pollutant removal, though it may contribute to the aesthetics of the garden. Maintenance is virtually identical to any garden, consisting of weeding and mulching and, if necessary, irrigation during the plant establishment periods. Sometimes equated to raingardens, "bioretention cells" (e.g., Culbertson and Hutchinson, 2004) represent a more engineered stormwater facility using similar pollutant removal mechanisms,. However, bioretention cells are typically designed to filter the stormwater, rather than promote infiltration, and are often less horticulturally interesting.

Raingardens

It is precisely this ease of maintenance and the aesthetic appeal of raingardens that helps them to be used broadly over the urban landscape, on either public or private land (Schmidt, Shaw, and Dods, 2007), providing for more effectively distributed stormwater treatment than has otherwise proved available. Infiltration is maintained in part by soil texture. However, the major contributor to enhanced infiltration capacity is the dense and deep rooting of the chosen plants, which are often native species or cultivars similar to native species. Demonstration projects in locations such as Burnsville, Minnesota and Portland, Oregon (Barr Engineering, 2004; Liptan, 2007) demonstrate the effectiveness of these features in reducing stormwater runoff. This immediately limits the transport of stormwater pollutants to receiving waters, and provides the added benefit of reducing the hydromodification of streams from high runoff volumes and peak flows if used in sufficient numbers in a watershed. It is important to note that because of their relatively small size (a few thousands of square feet each is a typical maximum area), isolated raingardens have a negligible impact on providing stormwater treatment. Instead, a great many of them are needed over a watershed to ensure a net measurable treatment effectiveness. Experience in the Pacific Northwest would suggest that a net area in raingardens of approximately 6% of the effective impervious surface area is needed to provide flow control of detectable magnitudes. A higher density may be required in other parts of the country with more severe storm patterns. The recharge induced by the raingarden typically attains a maximum at a facility-area ratio of 15% (Atchison et al., 2006).

Net Area

New Seasons Market – Street Planters and Rain Garden

City of Portland, Oregon - Bureau of Environmental Services – May 22, 2008
Stormwater Marketplace Feasibility Study (#X3-83220701-0)

Stormwater

Natural Processes

Phytotreatment Advances

The most advanced approach to the use of plants in stormwater treatment incorporates the recognition that biological processes can assist with pollutant removal. Over the last 20 years, considerable published research describes the ability of planted systems to remove or stabilize contaminants in the course of hazardous waste cleanup or in mine site reclamation. As described by Pivetz (2001), "phytoremediation takes advantage of the natural processes of plants. These processes include water and chemical uptake, metabolism within the plant, exudate release into the soil that leads to contaminant loss, and the physical and biochemical impacts of plant roots." Phytoremediation is typically ideal for managing low concentrations of toxics in water or soil, a situation analogous to the distribution of toxic pollutants from stormwater. One of the limitations of phytoremediation in remediating contaminated land or groundwater is that often plant roots do not penetrate to the full depths of contamination. However, in a stormwater treatment situation, where water and pollutants are applied to the soil surface surrounding the plants, this is not as substantial an issue.

Pollutant Degradation

Based on the phytoremediation research, it is clear that phytotreatment of stormwater can effectively promote the sequestration or degradation of many pollutants via processes described above. These phytotreatment processes promote pollutant immobilization in the root-zone, plant uptake and translocation, and accumulation in plant tissue. For organic contaminants, other potential processes include: pollutant degradation by microbes in the root-zone of the plants; pollutant transformation by plant enzymes into forms less toxic and/ or less bio-available; and phytovolatilization (e.g. through vaporization resulting from the plants' transpiration process). Examples of phytoremediation approaches are shown in Table 1.

Use Examples

Table 1
Documented Examples of Phytoremediation of Potential Stormwater Pollutants

Treatment Mechanism	Contaminant(s)	Media	Plant	Status
Degradation	Pentachlorophenol	Soil	Crested Wheatgrass	Field Demo
Degradation	Atrazine, nitrates	Surface Water	Poplar	Applied
Degradation	Landfill Leachate	Groundwater	Poplar	Applied
Degradation	Total Petroleum Hydrocarbons	Soil	Grasses, Crops	Field Demo
Extraction/ Concentration in Shoot	Lead	Soil	Indian Mustard (typically combined with soil amended with a chelating agent such as EDTA)	Field Demo
Extraction/ Concentration in Shoot	Uranium	Surface Water	Sunflower	Field Demo
Extraction/ Volatilization	Selenium	Soil & Surface Water	Various	Applied

Emerging Pollutants of Concern

There is an emerging class of stormwater pollutants generating scrutiny due to their widespread occurrence in urban stormwater (many originating from commonly used materials) combined with their aquatic toxicity. Pentachlorophenol represents an example of this class of pollutants. The ambient water quality criterion is in the upper range of observed stormwater concentrations. Bench and field trials demonstrate that at least one grass species, crested wheatgrass (*Agropyron cristatum*), can effectively mineralize this compound into carbon dioxide and chloride (Ferro et al., 1994, 1997).

Organic Compounds

Other organic compounds, such as PAHs, appear to benefit from the major role that root exudates have on rhizospheric microbial processes, resulting in rhizodegradation (Corgie et al., 2003). Plants can enhance the fundamental microbial processes to increase the rate or the capacity of pollutant degradation. Crested wheatgrass, tall fescue (*Festuca* arundinacea), annual ryegrass (*Lolium multiflorum*), and yellow sweet clover (*Melilotus officinalis*) are some of the many plant species that have been effective agents for promoting biotic degradation of PAHs (Ferro, 1997; Parrish et al., 2004).

Metals

As a result of decades of study of mine reclamation and biosolids land application, phytoremediation of metals-contaminated soils is reasonably well understood. With metals, the pollutant removal mechanism in planted systems is a combination of filtration and sequestration in the soil (where metals are adsorbed and bound in the form of metal chelates by humic substances, iron oxides, and clays) with uptake of the metals into the plant tissue and subsequent harvesting and disposal of above-ground plant material (Alkorta et al., 2004). Excellent metals removal rates have been observed in bioretention BMPs (Davis et al. 2003).

Stormwater

Metals Accumulation

This is a particularly important result for treatment of dissolved metals. Non-infiltration based BMPs cannot achieve the currently desired concentrations of dissolved copper, for instance, that range between one and two microgram(s)-per-liter (Baldwin et al., 2004). The metals removal mechanism is primarily based on physical filtration of particulate bound metals. Plant-enhanced infiltration promotes this process, and provides longer contact time to allow binding of dissolved metal cations.

However, Davis does point out that these facilities run the risk of becoming a "pollutant depot" due to long term metals accumulation. Using median stormwater concentrations of metals reported by Pitt (2004), Davis predicted that soil concentrations could exceed regulatory soil concentration limits (per Part 503 biosolids regulations) at approximately 50 to 80 years (for cadmium, and lead or zinc, respectively). Zinc phytotoxicity could be reached in as little as 30 years for native plants suitable for raingardens such as yarrow (*Achillea millefolium*), blue flax (*Linum perenne*), Palmer's penstemon (*Penstemon palmeri*), and Rocky Mountain penstemon (*Penstemon strictus*) (Paschke et al., 2006). Phytoremediation approaches, including use of metal hyper-accumulating plants that would have some of their above-ground biomass harvested or periodically removed, combined with regular refreshing of mulch could extend the life of raingardens in locations where long-term metals accumulation is a concern.

CHALLENGES OF PHYTOTREATMENT

The challenges of beginning and intermediate phytotreatment approaches are reasonably well understood. Typical BMPs employed in beginning phytotreatment require adequate land to be set aside for a single use and that the BMPs be designed, installed, and maintained correctly. Such BMPs, however, rarely achieve effluent concentrations suitable for discharge into sensitive receiving water bodies (e.g., those with TMDLs for stormwater pollutants or those supporting species listed as threatened or endangered under the federal Endangered Species Act).

Sufficient Involvement

The primary challenge associated with intermediate phytotreatment revolves around the need to get sufficient numbers of facilities installed in a watershed to realize observable improvements in stormwater quality and reduce stormwater peak flows or flow volumes. This may require considerable education of and outreach to the general public, as these features may need to be retrofitted into sites on private land. Secondary challenges include: optimizing siting; plant selections; and soil amendments for local conditions.

Advanced phytotreatment faces unique challenges because it requires the "cross-pollination" of practitioners and disciplines that previously have not had much occasion to collaborate (e.g., hazardous waste site remediation and urban stormwater management).

Salient Challenges

Advanced phytotreatment challenges include:

- Extrapolating from plants used in phytoremediation (which typically are selected for fast growth and ease of cultivation, usually as a monoculture) to a more horticulturally appealing and diverse selection of plants applied in stormwater management and landscaping applications
- Understanding the relative importance of plant and rhizospheric processes in pollutant degradation or sequestration, and how to maintain both processes
- Evaluating appropriate strategies to manage the buildup of heavy metals in raingardens and bioretention structures, i.e. how do we assess and recognize a design life and manage for it?
- Scaling pilot or bench studies up to facility designs and developing design criteria for stormwater systems
- Adopting integrated urban watershed management approaches which include phytotreatment as a stormwater BMP with concurrent support from regulators and appeal to the public

Stormwater

Collaboration Needs

CONCLUSIONS

The marriage of vegetation and stormwater management is a crucial step toward improving runoff water quality, particularly as more and varied types of pollutants become important in this process. Plants can slow water down to allow deposition of pollutant laden sediments, and they can improve the infiltration capacity of most soils. Plants collected into suitably sited gardens also provide an aesthetic way for communities to better understand their role in stormwater management, as noted in the Minnesota Blooms Program, 10,000 Rain Gardens Initiative in Kansas City, Seattle SEA Streets, or Portland, Oregon Green Streets (see websites below).

Taking the use of vegetation a step further, understanding the biological processes associated with the plant/rhizosphere environment provides us with the potential for even more robust pollutant removal and, with respect to organic pollutants, the opportunity for pollutant degradation. We urge a greater collaboration between researchers and practitioners in the fields of urban stormwater management, horticulture, and plant physiology/phytoremediation to further evaluate phytotreatment of urban runoff. In this way, the promise of phytotreatment can gain greater recognition and support of integrated watershed approaches from the regulating agencies, from land managing agencies, and from the public.

Acknowledgments

The authors wish to acknowledge the support of our many colleagues in stormwater management and remediation efforts within and beyond URS Corporation. The passion and faith that they bring to their work inspires us to greater creativity than we could hope to accomplish on our own.

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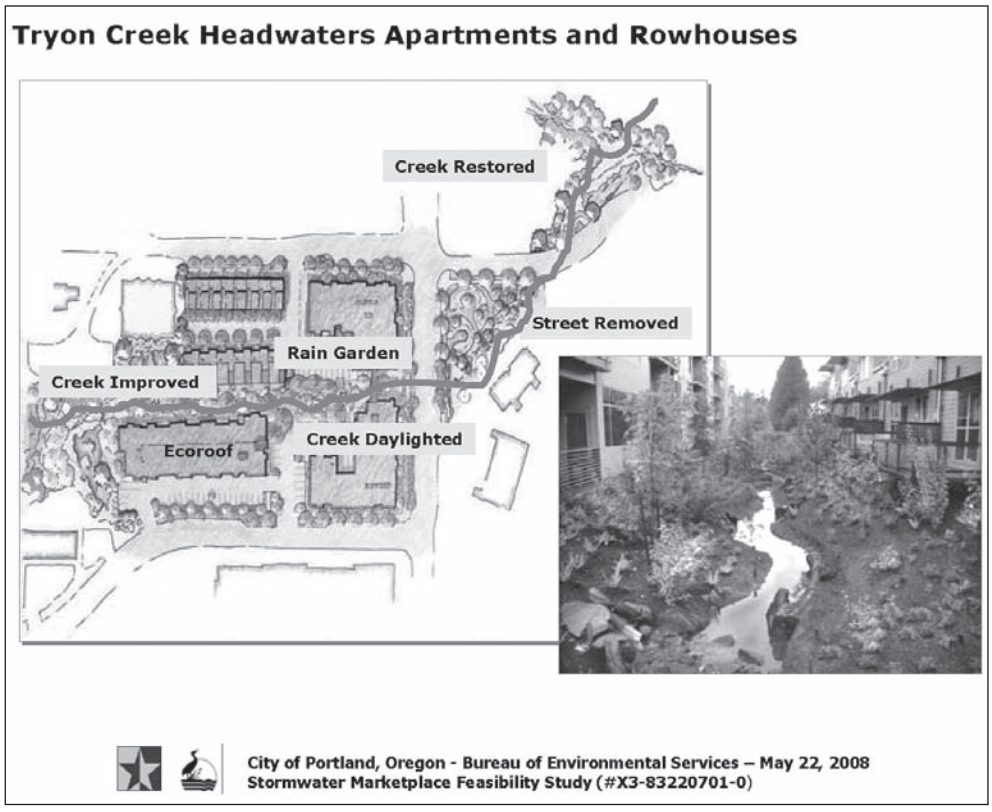
Phytotreatment program websites:
Minnesota Blooms Program: www.metroblooms.org
Kansas City 10,000 Rain Gardens Initiative: www.rainkc.com
Portland (OR) Green Streets: www.portlandonline.com/BES/index.cfm?c=44407&
Seattle SEA Streets: www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Street_Edge_Alternatives/index.asp



Stormwater

City of Portland Stormwater Management

Editors' Note: At a recent conference in Portland, Oregon ("Ecosystems Markets: Taking Action"—presented by the Northwest Environmental Business Council) Dan Vizzini of the City of Portland described the City's comprehensive approach to stormwater management, an approach that incorporates many phytoremediation aspects. What follows is an account of Mr. Vizzinni's presentation that appeared in an article by Greg Bryden (Kennedy Jenks Consultants) in the July edition of our sister publication, the Oregon ***Insider***). We are also indebted to Mr. Vizzini for the photos accompanying this article.

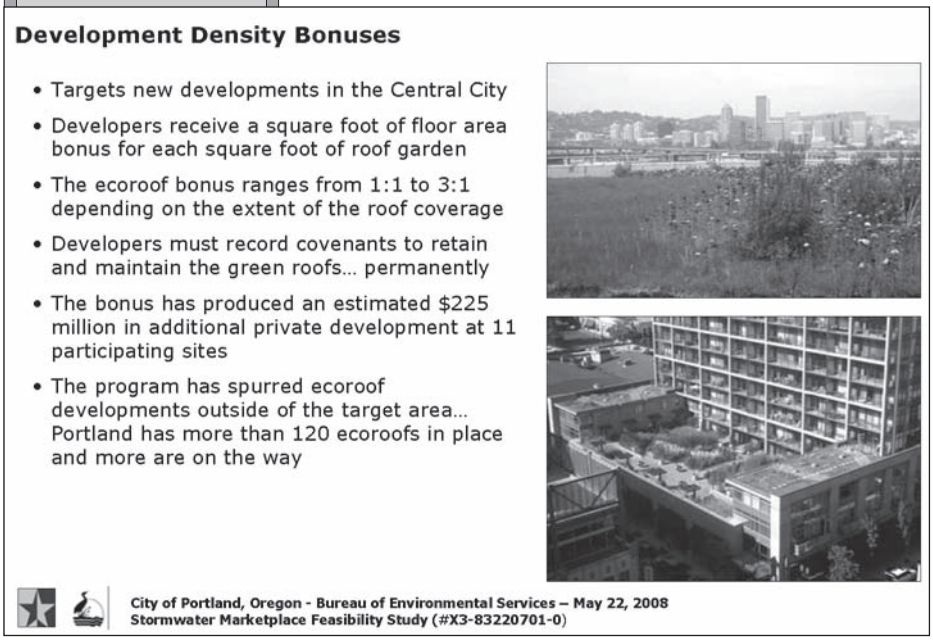
The City of Portland is moving away from centralized stormwater management toward sustainable localized approaches that provide multiple benefits. Regulation, technology and economics drive the change as stormwater management becomes more than just diverting runoff to rivers. These drivers also represent a shift from pubic to private funding for stormwater management alternatives and a systems approach to management that looks at stormwater as a resource for groundwater recharge, stream base flow, and habitat. Portland has been a showcase for onsite stormwater management. Examples include onsite stormwater management designs for the Oregon Museum of Science and Industry (OMSI) and various New Seasons Markets parking lots to pilot "green streets" and numerous "ecoroofs" and raingardens. The City's program strives to reduce costs and obstacles to alternative stormwater management while increasing motivation of the public to do more to reduce impacts.

Portland's market incentives for onsite stormwater management already include:

- Development Density Bonuses
- Discounted Utility Charges
- Downspout Disconnection Program
- Leveraged Local Improvement Projects
- Watershed Stewardship Grants.

The City's Development Density Bonus Program targets new developments in the central city, where developers receive a square foot of floor area bonus for each square foot of roof garden. The ecoroof bonus ratios range from 1:1 to 3:1 depending on the extent of the roof coverage. Developers must record covenants to retain and maintain the green roofs permanently. So far, the bonus has produced an estimated $225 million in additional private development at 11 participating sites, and has spurred ecoroof developments outside of the target area. Portland has more than 120 ecoroofs in place and more are on the way. Downspout disconnection and onsite stormwater treatment discounts on stormwater bills have also spurred investment in onsite stormwater treatment by the public.

Leveraged Local Improvement Projects have coupled watershed enhancement and stormwater management improvements with local street improvements. On SE Texas street, the City partnered with local property owners to design green facilities and a wetland into the streetscape. The City used stormwater utility investments to leverage property owner support for an equal amount of special assessments to pay for local street improvement. The benefits included increased safety on a local residential street, improved access to individual properties, created a neighborhood amenity (a wetland), and eliminated a major source of particulates and pollutants at the headwaters of a local stream.



Watershed Stewardship Grants of up to $5,000 provide community groups funding for community-initiated projects to improve watershed health. The program fosters community partnerships and provides technical assistance, financial support and training to volunteers. Projects have included ecoroofs, parking lot swales, habitat restoration and downspout disconnections. Between 1995 and 2005, the program awarded 108 grants, engaging more than 27,000 citizens who donated nearly 140,000 volunteer hours. To date, nearly $450,000 in City grants have attracted more than $1.9 million in matching funds.

Portland Stormwater Marketplace Project Contact Information:
Dan Vizzini, Portland Bureau of Environmental Services, 503/ 823-4038 or email: danv@bes.ci.portland.or.us

Stormwater

PHYTOTREATMENT OF STORMWATER

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WATER BRIEFS

IDAHO WATER LAW CLARIFICATION ID

The Water Report #52 included a story on Idaho Water Law that contained the following at page 20-21: "Among some of the interesting findings of the study is that in Idaho groundwater is *not* tributary to surface water, so stream flows in the Spokane River in Washington are not affected by groundwater recharge or groundwater pumping in Idaho. Instead, the river's flows are totally dependent on outflow from Post Falls Dam." Thanks to an alert from subscriber Bruce Howard of Avista Utilites, TWR checked with Guy Gregory of the Washington Department of Ecology to clarify the statement.

Mr. Gregory explained that groundwater pumping or recharge (in Idaho) have no influence at all on river flows in Idaho. In Idaho — and in the Washington portion of the Spokane River above Sullivan Road, about 7.5 miles west of the state border — the flow in the Spokane River is nearly wholly dependent upon discharge from Post Falls Dam. Groundwater is not tributary to the river in this reach. However, below Sullivan Road in Washington, the aquifer contributes a significant proportion of river flow. Groundwater is tributary to the river in this reach.

The result is that groundwater pumping (in Idaho and Washington) does negatively impact flows in the Spokane River *in Washington*, by intercepting water that would otherwise move from the Spokane Valley-Rathdrum Prairie aquifer to the river. This manifests itself as lower Spokane River flows in Washington.

MISSISSIPPI NUTRIENTS US

GULF DEAD ZONE

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force on June 16 released an Action Plan that involves state and federal partners in reducing hypoxia in the Northern Gulf of Mexico. The 2008 Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico and Improving Water Quality in the Mississippi River Basin builds upon the 2001 plan by incorporating emerging issues, innovative approaches, and the latest science, including findings from EPA's Science Advisory Board.

Excess nutrients, particularly nitrogen and phosphorus, can harm water quality by feeding algae blooms and creating oxygen-deprived "dead zones" where marine life can not survive. Pollution from the whole 31-state Mississippi River watershed is carried downstream to the Gulf of Mexico by the Mississippi and Atchafalaya Rivers. Nutrients flowing downstream from agricultural and developed land, soil erosion, factory and wastewater treatment plant discharges, and even from the air trigger excessive algal growth that deplete the oxygen in the water when they die, sink to the bottom and decompose.

Improvements include more accountability through an Annual Operating Plan, better tracking of progress, state as well as federal nutrient reduction strategies, and a plan to increase awareness of the problem and implementation of solutions. The plan connects upstream and downstream problems to solutions in sustaining the Mississippi River Basin and its tributaries.

The Task Force, made up of state and federal officials, leads efforts to promote and support nutrient management in the Mississippi/Atchafalaya River Basin and works to accelerate efforts to reduce the size of the zone through building strong partnerships, developing voluntary and regulatory approaches, and increasing national awareness.

EPA noted its committment to meeting its ambitious goals through innovative approaches such as numeric nutrient standards in permits, restoring or creating wetlands for purifying runoff, and encouraging nutrient cap and trade systems for improved water quality.

For info: Latisha Petteway, EPA, 202/564-4355, email: petteway.latisha@epa.gov or website: www.epa.gov/msbasin/

DROUGHT ACTIONS CA

WATER TRANFERS INSTITUTED

New water transfer agreements have been instituted in California following Governor Schwarzenegger's statewide drought proclamation on June 4 and his State of Emergency proclamation on June 12 for nine counties affected by severe water shortages. Up to 50,000 AF of groundwater will be pumped into the State Water Project (SWP) this summer. This water comes from groundwater wells in the Westlands Water District (WWD) and will be transferred to other parts of the WWD service area that do not have groundwater access. California's Department of Water Resources (CDWR) is lending 37,500 AF of water to Central Valley Project (CVP) contractors out of the San Luis Reservoir. An additional 25,000 AF is being made available by Metropolitan Water District of Southern California to benefit both CVP and SWP contractors.

In addition to the water transfers and exchanges, CDWR will expedite $12 million in grants to water agencies and non-profit organizations. The funds can be used for water conservation activities including rebate programs, public education and outreach, leak detection, and retrofit of systems

WATER BRIEFS

for greater water efficiency. Of the $12 million, $2 million is earmarked for disadvantaged communities and $10 million for other agencies and organizations. More information on the grant program is available at: www.owue.water.ca.gov/finance/index.cfm

To help communities finance new investments in water management funding DWR has awarded $6.4 million in grant funding to 31 public agencies from the Local Groundwater Assistance Program. Funding will support development of groundwater management plans and programs, installation of groundwater monitoring wells, hydrogeologic studies of groundwater basins, development of groundwater models and data storage systems, and other actions to enhance groundwater management and usage. The agencies and projects receiving grants is posted at: http://www.grantsloans.water.ca.gov/grants/assistance.cfm

CDWR and the State Water Resources Control Board will also award up to $58 million to four Integrated Regional Water Management (IRWM) efforts. CDWR will provide the San Diego County Water Agency up to $25 million and the County of Humboldt up to $2.1 million. The State Water Resources Control Board previously awarded $25 million to the Santa Barbara County Water Agency and $6 million to the Kings River Conservation District. The funding will support a wide variety of water management activities including landscape water efficiency projects, recycled water and desalination projects, groundwater recharge facilities, water and wastewater infrastructure improvements, watershed management activities, and design work for new water management facilities. Additional information about the IRWM program is available at: www.grantsloans.water.ca.gov/grants/irwm/integregio.cfm

For info: Ted Thomas, CDWR, 916-653-9712

RAINWATER RULES WA

The Washington Department of Ecology (Ecology) has begun rulemaking to clarify regulations governing the collection and use of rainwater. Ecology doesn't require homeowners to obtain water right permits to collect and store small amounts of rainwater. The proposed rule for the first time would define how much rainwater can be collected and used before a permit is required. The rule isn't intended to regulate storage and release of rainwater when no "beneficial use" will be made of the water. Under state law, beneficial uses include recreation, irrigation, residential water supplies and power generation.

Washington law identifies rainwater as a water resource of the state. Residential rainwater collection systems can range from a 50-gallon rain barrel to cisterns of 30,000 gallons or more. Commercial systems can be much larger. Ecology is seeking public comment on what the threshold should be for requiring a water right permit for those systems that could affect the water supply of senior water right holders or stream flows in some river basins.

Non-potable uses of rainwater typically include toilet flushing and irrigation for gardens. In water-short areas such as the San Juan Islands, some homeowners use rainwater as the sole source of their water supply. Ecology is especially interested in encouraging rainwater collection in urban areas like Puget Sound where it can be used to reduce stormwater runoff and supplement municipal water supplies.

The new rule won't affect the current rainwater permit in the City of Seattle or future permits in San Juan County. Seattle Public Utilities received a regional water right permit from Ecology to capture and put to use approximately 23,000 acre-feet of rainwater that falls on rooftops in areas of the city served by combined stormwater/sewer systems. Beginning this fall, island-wide water right permits will be issued in San Juan County where some island residents use rainwater for their water supply.

For info: Kurt Unger, Ecology, 360/407-7262, email: kung461@ecy.wa.gov or website: www.ecy.wa.gov/programs/wr/hq/rwh.html

STORMWATER PERMIT US

ELECTRONIC FILING

Construction sites and industrial facilities seeking coverage under EPA's stormwater permits are able to use EPA's Electronic Notice of Intent (eNOI) system to file their forms electronically. EPA has released a new version of this system to make it easier for permittees to obtain and terminate permit coverage under EPA's Construction General Permit, modify and amend previously filed forms, calculate and file a low-erosivity waiver, and more. This new system will be expanded to include the Multi-Sector General Permit for Industrial Activities when this permit is finalized.

For info: EPA website: www.epa.gov/npdes/eNOI

COALBED METHANE WY

WATER CASE DISMISSED

On May 30, State District Judge Peter Arnold in Cheyenne dismissed a lawsuit that alleged the State Engineer's Office and the Wyoming Board of Control failed to adequately regulate water discharged by coalbed methane wells. The plaintiffs had claimed that the state entities were not upholding obligations to protect Wyoming's groundwater, resulting in damages to their ranches. Kate Fox of Davis & Cannon, the plaintiffs' attorney, informed The Water Report that a notice of appeal has been filed to take the case to the Wyoming Supreme Court.

The judge's ruling was enigmatic in that he essentially ruled for the plaintiffs in rejecting the state Attorney General's separation of powers argument (judicial authority versus executive and legislative authority): "As discussed above, the court has authority to determine the constitutionality of statutes and laws." The judge then goes on to dismiss the lawsuit, refusing to exercise this authority, and instead noting that "However, any decision by this court would not resolve the current case and controversy. Instead, any decision by this court most certainly

will evoke political, administrative, philosophical and/or academic debate or argument…the current efforts by the Legislative and Executive branches to resolve the issues related to CBM water would continue and any alleged harm to Plaintiffs might still continue. If this court makes a decision in this case, the only result would be to create more political, administrative, philosophical, and/or academic debate or argument." Order at 8-9.

The judge ultimately decided to dismiss the plaintiffs' case based on his finding that they lacked "standing." Specifically, the judge stated that "the court holds that the current case and controversy would not be resolved by a decision by this court. Instead, as evidenced by the current Legislative and Executive initiatives to address CBM water issues, the appropriate forum for a resolution of the problems and controversies associated with CBM water is in the hands of the Legislative and Executive Branches of the Wyoming Government. As such, Plaintiffs lack standing to bring the current action…" Order at 9.

Earlier in the decision, the judge cited a case involving "standing" that noted the element of standing involved in this decision: "The controversy must be one upon which the *judgment of the court may effectively operate*, as distinguished from a debate or argument evoking a purely political, administrative, philosophical of academic conclusion." (emphasis added; Order at 7). The narrow question for the appellate court is whether or not the "standing" requirement that the "*judgment of the court may effectively operate*" is equivalent to the judge's finding — that "any decision by this court most certainly will evoke political, administrative, philosophical and/or academic debate or argument."

The regulation and disposal of groundwater that is a byproduct of coalbed methane production is a controversial topic that is coming to the fore in several Rocky Mountain states. The issues include, first, whether or not coalbed methane production results in a diversion of groundwater that requires producers to obtain water right permits and presumably not harm senior water users by the use. Secondly, issues arise over what regulations and controls apply to the discharge of the byproduct, which potentially results in damage to the overlying landowner or downstream water users.

For info: Kate Fox, Davis & Cannon, 307/ 634-3210 or email: kate@davisandcannonchey.com

SEVEN RIVERS PIPELINE NM
AUGMENTATION WELLS

Another milestone was reached in the implementation of the Pecos River Settlement Agreement on June 23 as the Interstate Stream Commission (ISC) celebrated the completion of the Seven Rivers Pipeline Project near Carlsbad, NM. "This pipeline is an integral part of implementing the Pecos Settlement. It will help us meet our interstate compact requirements and improve the water supply outlook for the Carlsbad Irrigation District," said New Mexico ISC Director Estevan López. "The completion of this pipeline demonstrates that the money appropriated by the New Mexico State Legislature and signed by Governor Richardson is producing tangible results."

Augmentation pumping sites have been developed at three locations, including the primary site in the Seven Rivers area. This well field has 10 artesian wells that were drilled and tested during the period of March 2005 to June 2006. These wells and an additional three private wells have been connected by this series of pipelines that can carry approximately 20,000 gallons per minute from the wells in the Seven Rivers area to Brantley Reservoir on the Pecos River. It is 12 inches to 36 inches in diameter, approximately 10 miles long and has the capacity to deliver in excess of 15,750 acre-feet of water per year to the river as required under the terms of the Pecos Settlement.

In 2003, the State of New Mexico, Carlsbad Irrigation District (CID), the Pecos Valley Artesian Conservancy District (PVACD), and the US entered into the Pecos River Settlement Agreement, that when implemented, will put an end to 50 years of litigation and will result in the adjudication of the CID's Project water rights. Additionally, the settlement will help the state comply with obligations under the Pecos River Compact as decreed by the United States Supreme Court in 1988.

The US Bureau of Reclamation (Reclamation) contributed $1 million to the Seven Rivers Pipeline Project through the Department of Interior's Water 2025 Program for work related to water efficiency and supply supplementation in compliance with the Settlement Agreement. Reclamation is also cooperating through a licensing agreement allowing the project to cross Reclamation land.

For info: Karin Stangl, Office of the State Engineer (New Mexico), 505/ 699-4923 or website: www.ose.state.nm.us/

WATER QUALITY RULING CA
KLAMATH DAMS

On June 12, Sonoma County Superior Court Judge Elaine Rushing ordered the North Coast Regional Water Quality Control Board (Board) of California to reconsider whether it has authority to regulate water quality (toxic algae) coming from PacifiCorps' hydroelectric dams on the Klamath River. The decision may have broad implications for dams throughout California that face water quality issues during FERC relicensing proceedings. The ruling stems from a lawsuit filed by Klamath Riverkeeper, the Karuk Tribe, and the Pacific Coast Federation of Fishermen's Associations (the Petitioners) against the Board.

The Board initially refused the petition to regulate the toxic discharge from the dams into the river based on California's Porter-Cologne Water Quality Act. The Board had decided that the Federal Energy Regulatory Commission (FERC) had authority over the issue under the Federal Power Act, due to FERC's on-going dams relicensing process.

The petitioners asserted that the Porter-Cologne Act or any state water quality laws are not subsumed or preempted merely because a FERC relicensing process is pending — those are independent issues. Petitioners are maintaining that if there is a discharge of a known pollutant (and

toxic algae are now on the 303(d) list in the Klamath), there is a state obligation to regulate it. It is irrelevant whether there is a separate FERC relicensing proceeding as the Federal Power Act does not preempt state water quality law in this field, according to the petitioners.

Judge Rushing ruled that the Board must reconsider its decision that the Porter-Cologne Water Quality Control Act (Water Code §13000 *et seq*.) is preempted by the Federal Power Act (16 U.S.C. § 793a *et seq*.) "in light of all of the relevant law, including the Clean Water Act, the recent United States Supreme Court cases applying state law to hydroelectric projects and the cases stating that the FPA preempts state law." Judgment at 2.

The judge's ruling gives the Board 90 days to reconsider the groups' petition and act. Executive Officer Catherine Kuhlman of the Board informed the parties, in a letter dated June 18, that the Board approved a motion on June 12 directing her to review the record and conduct the required legal analysis and make a recommendation to the Board as to how it should proceed. A decision is expected late this summer — Kuhlman indicated that she would notify the parties and interested persons when her analysis is complete. If the board accepts the petition and acts to regulate PacifiCorp's toxic discharge, the ruling could result in the Board's issuance of water quality requirements and enforcement orders requiring PacifiCorps to take steps to reduce its pollution of the Klamath River.

In a related action on March 13, the EPA reversed itself regarding a 303(d) listing decision by the state of California concerning the toxic algae. EPA decided to include on the 303(d) list, a Klamath River segment as impaired due to the presence of elevated concentrations of microcystin toxins (specifically the Iron Gate Dam segment which includes Copco and Iron Gate reservoirs). See Water Briefs, TWR #50.

For info:
Craig Tucker, Karuk Tribe, 916/ 207-8294, email: ctucker@karuk.us or website: http://karuk.us/press/press.php

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FERC WQ PERMIT **WA**

401 CERTIFICATION

The Washington Department of Ecology (Ecology) has submitted a "401 Water Quality Certification" to the Federal Energy Regulatory Commission (FERC) for relicensing of Avista Utilities's four Washington dams on the Spokane River. The 401 certification refers to Section 401 of the federal Clean Water Act and includes ways for Avista to comply with state water-quality standards and other relevant state environmental regulations. The document, similar to a permit, ensures the dams will be operated in a way that protects water quality in the Spokane River. With the help of the public, the final permit is designed to ensure: more water left in the Spokane River; downtown Spokane waterfalls all year long; improved water quality throughout the entire river system; and a healthier native trout population. The dams include the Upper Falls Dam, the Monroe Street Dam, the Nine Mile Dam and Long Lake Dam on Lake Spokane.

Avista will have 10 years to fulfill the certification's requirements. This schedule is especially important for implementing dissolved gas control measures and evaluating the effects of flow fluctuations on the Spokane River (dissolved gas is generated by dam spills and can cause "gas bubble trauma" in fish). It includes plans to monitor, evaluate, report and implement conditions designed to demonstrate that the dams are complying or will comply with state water-quality standards. Significant water quality improvements are required before a major review is conducted in 10 years. Avista will continue to work towards quantifying the company's contribution to the dissolved oxygen problem. Avista also plans to modify the structures inside Long Lake Dam to decrease the total dissolved gas that is released on the downstream side.

The document also contains aesthetic flow requirements that are designed to allow downtown visitors and local residents to see more water flowing through the North Channel, which is currently dry for much of the summer. The proposed flow increase would take place at 10 a.m. until 30 minutes after sunset. In general, minimum flows during dry times, would increase by approximately 300 cubic feet per second.
For info: Jani Gilbert, Ecology, 509/ 329-3495, email: jagi461@ecy.wa.gov; 401Certification is available at: www.ecy.wa.gov/programs/wq/ferc/draft-wq_certs.html

STORMWATER FINES **AZ**

HIGHWAY CONSTRUCTION

Arizona Department of Environmental Quality Director Steve Owens announced on June 18 that Kiewit Western Company (KWC) will pay $80,000 in civil penalties for water quality violations at construction sites on Highway 260 and Highway 191 in Gila and Greenlee counties. In 2002, while involved in construction along Highway 260, KWC built a drainage ditch and bulldozed a total of more than 100,000 gallons of silt-laden stormwater into forest streams in Gila County. During 2002-2003, the silt drained into several waterways that flow into Christopher Creek and, later, Roosevelt Lake, with each discharge lasting from at least one day to two weeks or longer. In addition, at its Highway 191 bridge construction site east of Safford in 2003, KWC stockpiled rock and other materials that discharged into a dry wash flowing to the Gila River watershed. ADEQ notified the company repeatedly that its erosion and sediment control structures were inadequate in light of anticipated monsoons in 2003.

The US Fish and Wildlife Service has designated sections in Tonto Creek, 12 miles downstream of Christopher Creek, as critical habitat for the spiked dace and loach minnow, both protected fishes under the federal Endangered Species Act. The discharged silt caused by KWC's construction activity on Highway 260 changed the color of the surface water, settled on the creek bottom and formed bottom deposits. The pollution created risks to aquatic life and recreational uses in the creek.

In addition to violating the state's surface water quality protection laws, KWC also failed to comply with the state's permitting requirements regulating discharges into state water bodies.
For info: Mark Shaffer, ADEQ, 602/ 771-2215 or email: communications@azdeq.gov

CALENDAR

July 14-16 CO
CUAHSI Biennial Colloquium on Hydrologic Science and Engineering, Boulder. UCAR. Sponsored by Consortium of Universities for the Advancement of Hydrologic Science Inc. For info: CUAHSI website: www.cuahsi.org/biennial/index.html

July 14-18 CA
Hydro Vision 2008 Conference, Sacramento. Convention Center. For info: HCI website: www.hcipub.com

July 14-18 UT
Short Course: Principles and Practice of Stream Restoration, Part I, Logan. Utah State University. For info: USU website: http://uwrl.usu.edu/streamrestoration/default.htm

July 15 WA
Puget Sound Restoration Workshops, Kingston. Port Gamble S'Klallam Tribe-House of Knowledge, 1-5pm. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 16 OR
West Coast Forum on Climate Change, Waste Prevention, Recovery and Disposal: Compost & Landfill Issues, Portland. Oregon DEQ Hdqtrs, 811 SW Sixth Avenue, 1pm-3:30pm. Sponsored by EPA Regions 9 & 10; Webinars Available. For info: Dana Warn, EPA, 206/ 553-6390 or website: www.epa.gov/region10/westcoastclimate.htm

July 16 WA
Puget Sound Restoration Workshops, Grapeview-Allyn. Horton Community Center, 8am-12pm. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 16-17 WA
Stormwater Monitoring & Data Analysis Under New NPDES Phase I & II Regs, Lacey. Lacey Community Center. Sponsored by Northwest Environmental Training Center. For info: NWETC website: http://nwetc.org/hyd-408_07-08_lacey.htm

July 16-18 CA
4th Young Water Professional Conference, Berkeley. Clark Kerr Campus of the University of California. For info: Email: flocdoc@pacbell.net or website: www.iwa-ywpc.org

July 16-18 MN
13th Annual National Gathering of Tribal Drinking Water and Wastewater Professionals and Tradeshow, Prior Lake. Mystic Lake Casino Hotel. Sponsored by the Native American Water Association. For info: NAWA website: www.nawainc.org/gathering.htm

July 16-20 UT
Stream Restoration Short Courses, Logan. Utah State University. For info: College of Natural Resources, 435/ 753-9152 or email: laelp@cc.usu.edu

July 17 OR
Oregon Water and Wastewater Infrastructure Finance Summit, Silverton. The Oregon Garden Resort, 895 W. Main Street. For info: Chris Marko, Rural Community Assistance Corporation, 503/ 228-1780 or email: cmarko@rcac.org

July 17 NV
15th Indigenous Environmental Network: Protecting Mother Earth Conference, Lee. For info: IEN, 218/ 751-4967 or website: www.ienearth.org/

July 17 OR
Solar Power: Projects & Permitting Seminar, Portland. World Trade Center. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

July 17 WA
Puget Sound Restoration Workshops, Port Angeles. Red Lion Hotel. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 17-18 GA
Climate Change: The Issues, Registries, Forestry Offsets & Industry Strategies, Atlanta. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

July 17-18 OR
Oregon Department of Fish and Wildlife Commission Meeting, Prineville. For info: Director's Office ODFW, 503/ 947-6044, email: odfw.commission@state.or.us, or website: www.dfw.state.or.us

July 17-18 NM
Natural Resources Damages Litigation Seminar, Santa Fe. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

July 17-19 CO
Rocky Mountain Mineral Law Institute 54th Annual Meeting, Snowmass/Aspen. For info: RMMLF, 303/ 321-8100, email: info@rmmlf.org, or website: www.rmmlf.org

July 18 OR
"Water, Wetlands, Carbon and Biofuels: Creating Environmental Capital" Seminar, Portland. World Trade Center. For info: The Seminar Group, 800/ 574-4852, email: info@theseminargroup.net, or website: www.theseminargroup.net

July 18 OR
ODFW Public Hearing: Reintroduction of Anadromous Fish to the Oregon Section of the Klamath River, Sisters. Five Pine Lodge & Conference Center, 750 Buckaroo Trail. Last Date for Comments 7/18/08. For info: Casaria Tuttle, ODFW, 503/ 947-6033

July 20-25 Brazil
International Wetlands Conference, Cuiaba. For info: Conference website: www.cppantanal.org.br

July 21 WA
Puget Sound Restoration Workshops, Friday Harbor. Friday Harbor High School, 1-4pm. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 22 WA
Puget Sound Restoration Workshops, Silverdale. Silverdale Community Center, 1-5pm. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 22 MO
Innovative Energy Management Workshop for Water and Wastewater Treatment Utilities, Kansas City. The EPA Cave. For info: EPA, 913/ 551-7286 or EPA Region 7 website: www.epa.gov/region07/news_events/events/index.htm

July 22 WA
Puget Sound Restoration Workshops, Mount Vernon. Best Western Cottontree Inn, 1-5 pm. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 22 OR
Oregon Invasive Species Summit, Salem. Northwest Viticulture Center. Sponsored by the Oregon Invasive Species Council. For info: Lisa DeBruyckere, OISC, 503/ 704-2884, email: lisad@createstrat.com or website: http://oregoninvasiveshotline.org

July 22-24 NC
International Water Resources: Challenges for the 21st Century & Water Resources Education, Durham. Sponsored by UCOWR & NIWR. For info: UCOWR, 618/ 536-7571, email: ucowr@siu.edu or website: www.ucowr.siu.edu/

July 24 OR
"Flow: For Love of Water" Film Premiere, Portland. Hollywood Theatre. Sponsored by Engineers Without Borders (Portland Chptr.). For info: EWB website: www.ewbportland.org

July 24-25 CA
CEQA Conference, Sacramento. For info: CLE International, 800/ 873-7130 or website: www.cle.com

July 25-27 OR
"SolWest" Solar Fair, John Day. Grant County Fairgrounds. RE: Energy Efficiency, Solar & Wind Energy, Alternatively Fueled Vehicles & More; Sponsored by the Eastern Oregon Renewable Energies Non-profit. For info: Jennifer Barker, Solwest, 541/ 575-3633, email: info@solwest.org or website: www.solwest.org

July 28-29 CA
Environmental Resource Litigation, San Francisco. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

July 28-August 1 OR
Riparian & Aquatic Ecosystem Monitoring Workshop, Milwaukee. Johnson Ck Watershed Council Office. For info: Mary Ann Schmidt, email: maryanns@pdx.edu or website: www.swrp.org

July 29 CA
3rd Major WCI Stakeholder Meeting, San Diego. Marriott Hotel & Marina; Webinar/Teleconference Available. RE: WCI's Design Recommendations for Cap-and-Trade Program. For info: Conference website: www.regonline.com/Checkin.asp?EventId=622922

July 30 WA
Puget Sound Restoration Workshops, Tukwila. Tukwila Community Center, 1-5. Sponsored by the Puget Sound Partnership. For info: PSP, 800/ 547-6863, email: actionagenda@psp.wa.gov or website: www.psp.wa.gov/aa_home.php

July 31-August 1 NM
New Mexico Water Law Seminar, Santa Fe. The Eldorado Hotel. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 3-7 FL
7th Annual StormCon Stormwater Pollution Prevention Conference, Orlando. For info: StormCon website: www.stormcon.com/sc.html

August 4-5 CA
California Climate Change Law Conference, San Francisco. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 4-5 TX
Water: Desalinization, Process and Wastewater Issues and Technologies, College Station. Texas A&M. RE: 4th Annual Shortcourse: Hands-On Workshop. For info: Carl Vavra, TAMU, 979/ 845-2758, email: cjvavra@tamu.edu or website: www.tamu.edu/separations

August 4-5 AZ
Arizona Water Law Conference, Phoenix. For info: CLE International, 800/ 873-7130 or website: www.cle.com

August 5 OR
West Coast Forum on Climate Change, Waste Prevention, Recovery and Disposal: Accounting Systems, Modeling, and Economic Incentives, Portland. Oregon DEQ Hdqtrs, 811 SW Sixth Avenue, 1pm-3:30pm. Sponsored by EPA Regions 9 & 10; Webinars also available at your site. For info: Dana Warn, EPA, 206/ 553-6390 or website: www.epa.gov/region10/westcoastclimate.htm

August 5 CA
Workshop on Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams, Ukiah. Ukiah Conf. Center, 1-5pm. Workshop by State Water Resources Control Board. For info: Steve Herrera, SWRCB, 916/ 341-5337 or website: www.waterrights.ca.gov

(continued from previous page)

August 6 CA
Workshop on Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams, Santa Rosa. Wells Fargo Center for the Arts, 1-5pm. Workshop by State Water Resources Control Board. For info: Steve Herrera, SWRCB, 916/ 341-5337 or website: www.waterrights.ca.gov

August 6-11 WI
International Conference on Mercury as a Global Pollutant, Madison. Monona Terrace Community and Convention Center. RE: Scientific Advances Concerning Environmental Mercury Pollution. For info: James Hurley, 608-262/ 0905, fax: 608/ 262-0591, or website: www.mercury2006.org/

August 6-8 TX
20th Annual Texas Environmental SuperConference, Austin. Four Seasons Hotel. For info: Texas Enviro & Nat. Res. Law Section, email: texenrls@gmail.com or website: www.texenrls.org/calendar.html

August 7-8 WA
Renewable Energy in the Pacific Northwest, Seattle. Washington State Convention & Trade Center. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

August 8 OR
Oregon Department of Fish and Wildlife Commission Meeting, Salem. For info: Director's Office ODFW, 503/ 947-6044, email: odfw.commission@state.or.us, or website: www.dfw.state.or.us

August 9-11 OR
Natural Resources Information Council Annual Conference, Eugene. University of Oregon. For info: NRIC website: www.nric.info

August 10-15 CA
Geomorphic and Ecological Fundamentals for River and Stream Restoration: Short Course, Truckee. Sagehen Creek Field Station. For info: Sagehen website: http://sagehen.ucnrs.org/courses/geomorph.htm

August 11 TX
Water Sales & Transfers Seminar, Corpus Christi. For info: Lorman Education Services, 866/ 352-9539 or website: www.lorman.com/seminars/

August 11-12 WA
TMDLs in the Pacific Northwest, Seattle. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

August 12 NM
2008 New Mexico Water Research Symposium, Socorro. Macey Center, New Mexico Tech. For info: Cathy Ortega Klett, WRRI, 575/ 646-1195 or website: http://wrri.nmsu.edu

August 12-13 MT
Montana Water Policy Interim Committee Meeting, Helena. For info: Krista Lee Evans, Lead Staff, 406/ 444-1640; Committee website: www.leg.mt.gov

August 14-15 CA
CEQA Conference, Los Angeles. Millenium Biltmore. For info: CLE Int'l, 800/ 873-7130 or website: www.cle.com

August 14-16 CO
Steamboat CLE Conference: 5th Annual Water Law; 5th Annual Environmental Law; 2nd Annual Natural Resources & Energy Law; & 17th Annual Ag & Rural Law Roundup, Steamboat. Sheraton Steamboat Resort. Combined Conference Sponsored by Colorado BAR Sections. For info: Colorado Bar: 888/ 860-2531 or website: www.cobar.org

August 15 WA
Sustaining Living Rivers: Biological Monitoring Workshop, Everett. Northwest Stream Center, McCollum Park. For info: Northwest Stream Center, 425/ 316-8592, email: aasf@streamkeeper.org or website: www.streamkeeper.org/opportun/calendar.htm

August 15 HI
National Environmental Policy Act & Hawai'i EIS Law Seminar, Honolulu. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

August 16-20 ON
American Fisheries Society Annual Meeting, Ottawa. For info: AFS website: www.fisheries.org/afs/

August 17-23 Sweden
World Water Week: "Progress & Prospects in Water"- Stockholm. RE: Focus on Sanitation. For info: Katarina Andrzejewska, Stockholm International Water Institute, email: katarina.andrzejewska@siwi.org or website: www.siwi.org

August 18-22 UT
Short course: Principles and Practice of Stream Restoration, Part II, Logan. Utah State University. For info: USU website: http://uwrl.usu.edu/streamrestoration/default.htm

August 19-21 WA
Advanced ArcGIS 9 for Fisheries and Wildlife Biology Applications Course, Olympia. Evergreen State College. Sponsored by Northwest Environmental Training Center. For info: NWETC website: www.nwetc.org

August 20-22 CO
Colorado Water Congress Summer Convention, Vail. Vail Marriott Mt. Resort & Spa. For info: CWC, 303/ 837-0812 or website: http://cowatercongress.org

August 25-26 OH
Geothermal and Horizontal Drilling Forum: Diversification and Cross-training Strategies, Columbus. Sponsored by National Ground Water Association. For info: NGWA, 800/ 551-7379, email: customerservice@ngwa.org, or website: J186 www.ngwa.org

August 26-27 WA
Introduction to ArcHydro - Managing and Mapping Hydrologic Data with ArcGIS Course, Olympia. Evergreen State College. Sponsored by Northwest Environmental Training Center. For info: NWETC website: www.nwetc.org

August 28-29 CA
Environmental Litigation Seminar, Los Angeles. For info: Law Seminars Int'l, 800/ 854-8009, email: registrar@lawseminars.com, or website: www.lawseminars.com

September 2-3 WA
Ecology of Pacific Salmonids Course, Seattle. The Seattle Aquarium. Sponsored by Northwest Environmental Training Center. For info: NWETC website: www.nwetc.org

September 2-5 CA
Floodplain Management Association 2008 Conference, San Diego. Paradise Point Resort. For info: FMA website: www.floodplain.org

September 4-5 WA
Pacific Salmonid Spawning Habitat Restoration Course, Seattle. The Seattle Aquarium. Sponsored by Northwest Environmental Training Center. For info: NWETC website: www.nwetc.org

The Water Report
Water Rights, Water Quality & Water Solutions in the West
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