Water Needs and Strategies for a Sustainable Future

Western Governors' Association ◊ June 2006

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Background - Challenges are Increasing

Population growth is continuing at an unprecedented rate in the West with ramifications not only for cities but rural communities and agricultural areas. At the same time, public support continues to grow for instream uses, which include bays and estuaries, for such purposes as fish and wildlife habitat, recreation, and water quality protection, placing additional demands on a limited resource.

Water for increasing energy needs is expected to raise additional demands on available supplies. Unquantified Indian water right claims represent further challenges which strain water resources and institutions throughout the West. Climate change represents another threat to reliable and sustainable water supplies for the West. A recent study finds that "no other effect of climate disruption is as significant as how it endangers already scarce snowpacks and water supply."[1]

While water resources are available for growth in the aggregate, they are essentially fully "appropriated" under regimes that have vested private property rights in water right holders. New uses to accommodate growth must largely rely on water obtained from changes to existing uses of surface and ground water, with limited opportunities to develop new supplies. In many instances, this will result in the reallocation of water to "higher valued uses" with accompanying third party impacts that must be considered, such as adverse consequences for rural communities and the environment.

Additional means to address the water demands of the West include surface and ground water storage, desalination, water reuse, weather modification, ground water recharge and conjunctive use. However, at the federal level, the operation and maintenance budgets of the two largest federal water supply agencies, the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation, now exceed their construction budgets. Their operation and maintenance backlog, as well as their rehabilitation and replacement needs, continues to grow. The Environmental Protection Agency's funding for the Clean Water Act and Safe Drinking Water Act State Revolving Loan Funds is declining while needs grow.

Resources, both budgetary and workforce, to accomplish the recommendations included in this report will need to come from a variety of sources. Partnerships between local, state and federal entities are likely to become more commonplace and a necessity as federal budgets become more limited.

[1] *Less Snow, Less Water: Climate Disruption in the West,* The Rocky Mountain Climate Organization, September 2005.

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Analyses and Recommendations

1. Water Policy and Growth

Analysis

Water scarcity (relative to demand) is reality in much of the West, but reservoir storage, transbasin diversions, ground water development, water right transfers, conservation, and other measures have allowed growth to continue. However, in some areas for the first time legal and physical limits are appearing on the planning horizon. In the future, we may not be able to sustain unlimited growth and still maintain our current quality of life. Difficult political choices will be necessary regarding future economic and environmental uses of water and the best way to encourage the orderly transition to a new equilibrium. Among other things, these new realities require an evaluation of the relationship between water policies and growth.

While growth management remains primarily a local prerogative, states are increasingly exercising their influence. States have the primary responsibility for water allocation and management. They have jurisdiction to sanction both new appropriations and transfers of existing uses. They also have the primary responsibility for protecting water quality, and the pivotal role in the integration of water quantity allocation and water quality protection. As a result, states can play a critical role relating to growth in the West where water is a scarce resource and competing demands vie for rights to its use. In other words, the implications of states' decisions in this arena have direct implications for growth.

It is obvious that changing demographics and values placed on various water uses is transforming the future of water management. Western states are experiencing large population percentage changes. According to the 2000 Census Bureau statistics, population growth varied significantly by region in the 1990s, with the highest rates in the West (19.7 percent). The West increased by 10.4 million to reach 63.2 million people. Because of differences in growth rates, the regional shares of the total population have shifted considerably in recent decades. Between 1950 and 2000, the percentage of the Nation's population living in the West increased from 13.3 to 22.5 percent. More recently, from 2004 to 2005, five of the six fastest growing states were: Arizona (3.5%); Nevada (3.5%); Idaho (2.4%); Utah (2.0%) and Texas (1.7%). Other western states are not far behind B Colorado (1.4%), Oregon (1.4%), New Mexico (1.3%) and Washington (1.3%). Notably, many of these states are also the driest states in the Nation!

Water continues to move from farms to cities, with expected and sometimes unexpected results. The social, economic and environmental results are important and sometimes are not well understood. Third party and other direct impacts of water transfers, water conservation, declining rural economies based on irrigation, dwindling surface and ground water supplies and other water use related changes, as well as growing instream water demands for environmental and recreational uses, are all redefining our quality of life in the West. Further, as municipal and industrial water use increase relative to older agricultural uses, the demand becomes more inelastic. A farmer can forgo a crop year when water supplies are tight; a municipal water

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system cannot cut back or shut down without serious consequences to the community served.

Growth is also occurring in agricultural areas where key water resources are often fragile and scarce. Natural amenities of the West are being subdivided and displaced. Ironically, these natural elements are key factors attracting the very population movement which is destroying them. All this is raising concerns related to sustainability.

Decisions about where and how to grow are rarely influenced by the water policy or the availability of water. Nevertheless, where a state undertakes to develop and implement a comprehensive growth-management strategy, water resources policy should be a component of that strategy. Indeed, many believe the future of growth-management efforts will revolve around natural resource constraints. State efforts should not attempt to preempt local prerogatives, but rather endeavor to inform, guide, and assist local efforts. In this context, the follow steps should be taken.

Recommendations:

1.A. To foster sustainable growth policies, states should identify water requirements needed for future growth, and develop integrated growth and water supply impact scenarios that can be presented to local decision makers.

The relationship between population growth and water resources is often significant, but too often not well understood. To encourage sustainable growth policies and plans, states should identify the water demands and impacts associated with future growth. Additionally, states should develop integrated growth and water resource scenarios so that the consequences of various growth scenarios can be evaluated for both the near and long term. Further, guidance as to appropriate methods to manage growth through access to water supplies should be provided. Such guidance should be sufficiently flexible, within the framework of relevant constitutional restraints, to give appropriate discretion to locally elected officials.

1.B. States should facilitate collaborative watershed-focused planning that balances desirable growth and protection of the natural environment that depends on surface and ground water quantity and quality.

There is a growing consensus that, as watersheds have emerged as the unit for management and action, they have become a rational framework for undertaking integrated resource management.[2] Seen in this context, addressing growth management concerns should be within the range of issues that local stakeholders involved in watershed planning may wish to

[2] It is recognized that other sub-state planning units such as "regions" are being used in some states.

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pursue. Thus, state growth management strategies should recognize and take full advantage of the potential of watershed efforts to deal effectively with issues associated with growth.

1.C. In reviewing applications for new water uses, transfers and changes in use, including instream flows, states should consider local, tribal and watershed plans and decisions regarding growth management.

Since the state's role is to encourage and assist local communities regarding growth management, then decisions reached by local, tribal, and watershed communities should be given considerable weight in determining whether new applications to appropriate water, or to transfer existing rights, including for instream flow purposes, are in the public interest. Providing explicit authority to water officials to do so, when considering public interest needs and within the framework of a comprehensive growth management strategy, would be an appropriate step in this direction.

1.D. States and local governments should consider the impacts of continued growth that relies on transfers from agriculture and rural areas, and identify feasible alternatives to those transfers.

There is understandable support for the notion of allowing markets to operate to facilitate transfers from agricultural to municipal and urban use as a means to accommodate the needs of a growing population. While such transfers have much to commend them, third party impacts should be taken into account, including adverse effects on rural communities and environmental values. Alternatives that could reasonably avoid such adverse impacts should be identified.

2. State Needs and Strategies to Meet Future Demands

Analysis

The availability of water of suitable quality clearly affects sustained growth and prosperity in western states. Virtually every western state has some type of state water plan that projects population growth and anticipated increases in water use for various purposes. Most include information on existing uses and gaps in projected supply and demand over different periods of time. Similarly, various state, federal and local agencies have developed extensive recommendations for meeting future water needs. Together, these studies provide a snapshot of current conditions and possible strategies to help meet the future water needs of the West.

In establishing and implementing water planning, a new paradigm has emerged which moves away from a top down approach to identifying problems, projecting needs and suggesting projects and programs towards a bottom up approach that relies on local stakeholders, often on a watershed level, coming together to define and bring to state and federal governments their perceived needs and most likely solutions to their water supply problems. These can then be compiled and reconciled with adjacent communities' needs in the form of a general state water plan. Federal agencies' water supply policies, programs and projects need to take into account these planning efforts and ensure their mission related activities are as consistent as possible.

The need for additional supplies to meet growing and changing water supply demands for both offstream and instream demands has been identified by virtually every western state as a priority. After several years of consecutive drought, it should not be surprising that in the arid West water supply continues to be of vital concern. Fresh water supplies are limited and many if not most surface water and ground water sources are fully appropriated or otherwise reserved for myriad uses. Environmental and recreational uses are growing and need to be accommodated by water managers. Energy demands and related water resource needs are significant concerns. As the United States expands its domestic energy production, the interaction between energy development and water use in the western states cannot be overlooked. The issues range from how to deal with water produced from extraction processes to meeting the cooling water demands of coal and natural gas fired power plants. Agriculture accounts for most of the diversions from rivers and streams in the West. Hydropower is also very important in water resources development and financing. Water is a unique public and private resource or commodity that can be bought and sold, used and reused. However, there are limits, and conflicts among these competing uses and users are increasing.

While states underscore the need generally for additional supplies, many states emphasize in particular the need to provide adequate supplies to rural communities. In some areas of the West, rural residents must still haul their own drinking water, or the water quality is poor. Drinking water systems are expensive and the costs often exceed rural water users' ability to pay.

Western states recognize the difficulty of constructing new large water projects. Instead, projects

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for the future are more likely to be more innovative, environmentally sensitive, and smaller in scale. Further, before new water supply projects are built, opportunities to conserve water in ways that will stretch existing supplies will be fully examined, and to the extent practical, implemented.

Water conservation measures and water markets can be valuable tools in achieving a new equilibrium between supply and demand. Win-win scenarios are definitely possible, but they may be difficult to achieve when third-party impacts are considered. Thus, water transfers and water conservation measures must be evaluated on a case-by-case basis.

Such measures should accompany efforts to augment existing water supplies in the West. To enhance opportunities to meet future water challenges in a sustainable way, existing and new technologies to increase supplies should be further evaluated.

There is a need for more and better water information, specifically data on water use, efficiencies and water availability, to facilitate decision making. While there exists a substantial amount of data on streamflows, much of which is now available on a real-time basis, there is less data and less reliable information related to water quality and ground water and rural water supplies. Further, some of the vital water information management systems that are now available are threatened by reductions in federal funding and lack of necessary maintenance.

Specifically, western states and water managers depend on:

- USDA's Snow Survey and Water Supply Forecasting Program under the Natural Resources Conservation Service (NRCS), National Water and Climate Center, which operates Snow Telemetry (SNOTEL) sites and the Soil and Climate Analysis Network (SCAN) directly monitoring soil moisture;
- The U.S. Geological Survey's Cooperative Water Program (CWP), National Streamflow Information Program (NSIP), National Water Information System (NWIS), National Water Quality Assessment Program (NAWQA); and USGS ground water data base;
- Remote sensing capabilities of the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), especially the USGS and NASA's Landsat thermal sensing and other imaging capabilities;

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- The National Weather Service's National Environmental Real-Time Observation Network (NERON) and cooperative weather observer network;

- The U.S. Forest Service's Remote Automated Weather Stations (RAWS) network; and other sources of data.

Additionally, there needs to be better integration of the data that is being collected. The National Integrated Drought Information System (NIDIS) is a good model for such integration.

Recommendations:

2.A. Federal and state agencies should increase support and funding for state and federal basic water data gathering activities that can serve as the basis for sound decision making. Gaps in data should be identified. Remote sensing capabilities, including Landsat thermal data, and developing technologies, such as the use of Doppler radar to measure streamflows, are important tools that need to be retained and fostered. Further, state and federal agencies must find ways to reduce costs related to gathering and disseminating real-time water data/information, including the acceptance of more in-kind contributions from cooperators. Moreover, new and stable sources of funding are needed. User-pay opportunities or voluntary non-governmental organization contributions should be explored, while recognizing the general benefits provided by basic data gathering efforts, which make it an appropriate governmental activity.

With respect to USGS streamgaging activities, the Cooperative Water Program continually faces unfunded federal salary cost increases, which have consistently led to the loss of important streamgages and related water resources data. Arguably, this can be linked to a loss or an increased risk to life and property related to extreme events such as flooding and drought. Non-USGS cooperators pay some two-thirds of the cost of the Coop program. The USGS National Streamflow Information Program and NRCS snow survey and water supply forecasting capabilities are a very critical component of water management that face similar funding problems. Moreover, the potential future loss of current Landsat thermal band capabilities is a concern, as more and more states rely on this data to determine evapotranspiration, as well as measure and monitor agricultural water use and evaluate "what if" scenarios resulting from climate change. Ground water monitoring is of growing importance, as is data on water quality. Both lag far behind surface water availability data. Rural areas also lack adequate water information for decision making.

2.B. Use the research programs at western state universities to focus research on practical applications of promising new technologies, and identify areas where the increased use of technology (e.g. remote sensing, Supervisory Control and Data Acquisition, new water and wastewater treatment technologies, energy

and water efficiency) should be promoted to enable more efficient and cost effective operations.

Funding the research, development and application of new water resources-related technologies and fostering technology transfer opportunities are important to more efficient and effective water resources management. Existing federal and state research dollars should be carefully and collaboratively allocated to focus limited resources on priority needs.

2.C. The WGA and WSWC strongly support enactment of the National Integrated Drought Information System Act of 2006 (H.R. 5136 and S. 2751) to make permanent a National Integrated Drought Information System (NIDIS), as well as broader national drought preparedness legislation. State and federal agencies should consider steps to pursue creation of a broader integrated water resources information system, which would serve as a basis for water-related planning, preparedness and response activities.

Western states have suffered and continue to struggle with the impacts of a multiyear drought. Much of the potential for drought mitigation requires extensive planning and preparation long before impacts are realized. There is no national drought policy, nor a one-stop shop for information to aid decisionmakers. Moreover, drought is but one hydrologic extreme, with flood prediction, mitigation monitoring and control equally important.

2.D. The WSWC should encourage states to develop and implement strong state water plans and compile a state-by-state and West-wide summary of existing water uses, water plans and planning efforts, current ground and surface water supplies, and anticipated future demands, then identify and evaluate trends and common themes. The summaries should address both consumptive and non-consumptive uses and demands. This summary should include both existing water supply and demand-management policies and programs, as well as planned or potential activities. The focus should be on a grassroots, watershed approach to identifying water problems and potential solutions from the ground up, integrating these efforts into individual state plans. Similarly, regional or multi-state and multiple river basin strategic plans should be comprised of these building blocks.

Virtually every western state has past and present water plans and many employ ongoing water planning efforts. These vary widely in detail, style and size, but should form the basis for any future efforts to fashion a western or national water policy or plan, as some have suggested. An evaluation of common components may lead to the broader application of successful practices. State water plans may include management responses which: (1) improve demand management and conservation strategies; (2) utilize integrated water resource management as an effective method for as-

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sessing adaptation options and their implications in the context of an evolving regulatory environment with its competing demands; (3) develop new surface or groundwater storage capacity, including new reservoirs and expansion of existing reservoirs;[3] (4) enhance ways to manage all available water supplies, including groundwater, surface water, and effluent, in a sustainable manner; (5) increase ability to shift water within and between sectors (including agriculture to urban), while mitigating any associated impacts in the basin of origin;[4] (6) reuse municipal wastewater, improve management of urban storm water runoff, and promote collection of rainwater for local use to enhance urban water supplies to the extent allowed by state water laws; (7) increase efforts to restore and maintain watersheds to improve water cycle functioning (which would include invasive vegetation removal, forest management, etc.) as an integrated strategy for managing water quality and quantity; (8) consider the energy-water nexus as a way for both increasing water use efficiency and minimizing emissions of greenhouse gases (from related energy use); and (9) develop innovative water augmentation technologies such as weather modification, desalination, and chloride control.

2.E. The WSWC should explore the relative merits and obstacles related to various programs and technologies and legal and institutional means to augment existing water supplies, including water conservation and water use efficiency, demand management (including pricing structures), water and water rights transfers, water banking, water reuse, revolving fallowing of agricultural lands, watershed protection and management, surface and ground water storage alternatives, desalination, and weather modification. Based on the findings, the WSWC should initiate discussions on an interstate level to optimize appropriate opportunities to ensure that adequate supplies of suitable quality are available to sustain the growth and prosperity of western states.

The above is the charge given to the WSWC by western governors in 1965, when water problems that are now growing acute were first addressed. The Council was created as a forum to consider future water problems, and continues to serve in an advisory capacity. Many western water challenges have already reached or are reaching critical levels that require a greater degree of regional collaboration in addressing westwide issues related to growth and water supply.

2.F. The WSWC should hold a workshop in collaboration with relevant federal agencies and other stakeholders to evaluate federal and state watershed programs and strategies, and examine in particular the commitment of

[3] Availability of acceptable sites for new dams, as well as the economic, environmental, and social costs associated with reservoir construction can be limiting factors. Further, reservoirs may be vulnerable to increased evaporation as climate warms. Aquifer storage is another storage option, however, is very energy intensive when treatment or injection wells are required; in areas where expansion of supply infrastructure is infeasible, demand management is a particularly sensible strategy to meet future water needs.

[4] Water transfer mechanisms include permanent transfers, dry-year contracts, spot markets, and water banking.

resources to the watershed approach and the level of coordination among federal agencies and between federal and state agencies, Tribes, conservation districts, municipalities, NGOs, etc.

Forestry, range, agricultural and other public/private land management practices have significant impacts on water supply and water quality. Further, many if not most water resources management problems are best addressed first at the local watershed level.

Many effective watershed based planning groups are in place across the West. These groups should be nurtured and encouraged to, where applicable, integrate all components of land and water management planning. Watershed protection and management practices are therefore a marriage of water and land management. Farm Bill 2007 and funding for USDA's Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentives Program, and Surface and Ground Water Conservation Program are very important in furthering western state water supply and water quality objectives.

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3. Water Infrastructure Needs and Promising Strategies for Meeting Them

Analysis

The future growth and prosperity of the West depends on our aging water-related infrastructure: dams and reservoirs; levees; pipelines; pumping plants; hydroelectric power plants; aqueducts, canals, laterals, and drains; water and wastewater treatment plants; stormwater management works and other facilities to control and manage the water that supports our present way of life. Much of this infrastructure is being used beyond its engineered design life, and some parts suffer from the impacts of deferred maintenance. Much of the infrastructure was put into place prior to enactment of modern safety, security and environmental requirements, and upgrades to these facilities or changes in their operation may be needed to conform to appropriate natural resources stewardship principles and meet new demands related to population growth, rural development, environmental restoration, changing societal values and national security threats.

Much of our infrastructure is inadequate due to population growth, water quality requirements and safety threats not anticipated at the time of its design and construction. Redesigning, rebuilding and reoperating public infrastructure will be costly and challenging, particularly given the fact that most of it was built by many different agencies at all levels of government with various charges. It is essential that agencies work cooperatively and "smarter" to maintain that infrastructure and to expand it to meet present and future needs. The consequences of failing to maintain our present investment in infrastructure and address our future water needs are unacceptable. Public health and safety, as well as jobs, economies and natural resources would be put at risk. Without the resiliency provided by our present infrastructure, we would be at the mercy of natural disasters.

Furthermore, as a society, we have also defined basic human rights to include access to clean and safe drinking water, wastewater treatment, flood and drought protection, and other water-related public goods and services. Providing these in an efficient and affordable manner can be challenging, especially in rural and economically disadvantaged areas, but the failure to do so can lead to greater public health risks, economic stagnation, environmental degradation, etc. Also, individuals left to meet their own needs through piecemeal private development, such as domestic water wells, septic systems, private dams and levees and other works, have no incentive to consider third-party impacts.

Underfunding needed capital improvements is a chronic problem that States and local governments will have to creatively address, finding ways to finance their water-related infrastructure needs, with or without federal assistance. Meeting our current and future infrastructure needs will require a long-term public and private financial commitment at all levels, and public education regarding the value of water as both a public and private good, the value of water-related services, appropriate water pricing, and the need for capital budgeting. In some cases, consolidation of present services may allow communities to share capital resources and reduce operation and maintenance costs associated with water related infrastructure. Further,

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changes may need to be made in the ways we design, bid, build and finance projects at all levels of government.

At the federal level, the operation and maintenance budgets of the two largest federal water supply agencies, the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation, now exceed their construction budgets. Their operation and maintenance backlog, as well as their rehabilitation and replacement wish list, continues to grow. The Environmental Protection Agency's (EPA) funding for the Clean Water Act and Safe Drinking Water Act State Revolving Loan Funds (SRFs) is drastically declining while needs continue to grow. Various agencies and organizations have published reports rating the condition of our infrastructure, identifying future needs and highlighting looming gaps in current federal funding. Increasing public support and a change in national priorities will be needed to secure sufficient federal money to address pressing public health and safety needs and meet associated federal requirements and obligations.

Further, meeting future water-related public health and safety needs in concert with various federal, state, tribal and local interests will require expanding current partnerships and building new partnerships. Increased focus must be placed on inter-regional and interstate planning and cooperation to maximize the beneficial use of our limited water and financial resources. This may eventually require reauthorization of some federal projects to include new project purposes, while protecting traditional uses. Likewise, we must fully explore opportunities to apply different management strategies and new and innovative uses of technology to solve existing infrastructure problems and improve future facility operations.

While funding and financing future infrastructure needs will be challenging under our current budget constraints at all levels of government, there remains a significant federal role in providing assistance when needs exceed state and local resources; where Tribal, environmental, or federal public health and safety requirements are involved; or where national security is threatened. At the same time, States and local agencies must plan how they will meet their own respective obligations for providing the necessary infrastructure for a sustainable future.

Recommendations:

3.A. The WGA should support continuing stable federal State Revolving Fund appropriations at a level of $1.35 billion for the Clean Water SRF and $850 million for the Drinking Water SRF, increased annually by a construction inflation index. Further, states need flexibility and fewer restrictions in addressing their priorities.

Past and present federal budget requests that propose significant reductions in SRF funding are inconsistent with the need to close the gap between projected future national clean water infrastructure needs

and current levels of spending. Further, to the extent federal law has defined a human right to a certain level of treatment for drinking water and wastewater nationwide, the federal government has an obligation to help meet those needs.

3.B. The WGA should urge Congress to increase appropriations from annual receipts (now over $1 billion) accruing to the Reclamation Fund, for authorized Bureau of Reclamation projects and purposes, to help meet western water supply needs, especially for rural communities, to maintain and replace past projects, and to build new capacity necessary to meet demands related to growth and environmental protection.

The Reclamation Act of 1902 provided for water development in the seventeen western states and created the Reclamation Fund as a source of money to pay for related costs. Receipts accrue from project water and power sales, federal mineral leasing revenues, miscellaneous land sales, and other sources. For decades, revenues were insufficient to pay for construction and program costs, but more recently receipts have exceeded expenditures, (which must be appropriated by the Congress). The estimated unobligated balance in the Reclamation Fund for FY2006 is just under $6 billion, and by the end of FY2007 it is projected to be over $7.2 billion. These revenues from western resources are authorized for Reclamation purposes, and should be so spent. However, discretionary budget spending limits on appropriations in effect allow the federal government to use these revenues for other purposes.

3.C. The WGA should ask Congress to enact S. 895 ("The Rural Water Supply Act of 2005") to assess rural water supply needs and authorize federal loan guarantees under Title II to better enable non-federal project sponsors to obtain private financing for reimbursable extraordinary operation and maintenance, rehabilitation and replacement costs.

According to EPA's 1999 Needs Assessment, approximately 45,000 of the Nation's 55,000 community water systems serve fewer than 3,300 people. Regardless of their size and configuration, small water systems face many unique challenges in providing safe drinking water to consumers. The substantial capital investments required to rehabilitate, upgrade, or install infrastructure represent one such challenge.

Federal loan guarantee authority should be provided to allow the Bureau of Reclamation to guarantee the repayment of state and local bonds for the rehabilitation, betterment, and construction of projects. At present, given federal ownership, non-federal project sponsors – many with project operation and maintenance responsibilities – lack the collateral to secure private financing to meet their repayment obligations for needed rehabilitation and betterment work or extraordinary maintenance. Title II's federal loan guarantees would help remedy this problem.

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3.D. Congress needs to enact new authority for the U.S. Army Corps of Engineers, the Water Resources Development Act (WRDA), which includes many projects important to the West, and carefully consider planning and prioritization changes to encourage achievement of the maximum regional and national benefits.

This legislation authorizes hundreds of navigation improvement, flood protection and environmental restoration projects, project modifications and investigations by the U.S. Army Corps of Engineers. It has been five years since the last omnibus Corps authorization bill was passed.

3.E. The WGA should encourage all levels of government to maximize opportunities for a coordinated regional and/or watershed approach under state and federal water pollution control laws to source water protection, stormwater management and non-point source pollution.

A holistic watershed or problemshed approach to water problems is practiced with increasing success at different levels of government. It is gaining growing acceptance as an effective means to find solutions and reduce costs. Federal EPA and USDA spending on related programs is important to meet both water supply and water pollution control goals.

3.F. The WSWC should identify the beneficiaries of our existing water infrastructure and opportunities to expand the range of interests to build a coalition to support necessary funding, as well as evaluate any opportunities to consolidate delivery of water-related services.

The rehabilitation, replacement and reconstruction of much of our current water-related infrastructure, including watershed and dam rehabilitation that will take place over the next few decades present a continuing opportunity to both reevaluate and expand the range of beneficiaries and project purposes to be served in the future. Win-win scenarios may emerge as conservation, legal and financing mechanisms allow water to move between users to more uses in return for cost sharing assistance in maintaining existing infrastructure (and the associated benefits) while accommodating new uses and their beneficiaries.

3.G. The WSWC should identify successful water resources-related infrastructure and natural resources management partnerships and evaluate organizational opportunities for public/private, federal/state/local, agency/agency, agricultural/urban and other effective partnerships.

Past partnerships should be evaluated to identify transferable programs, policies and operating agreements that will allow more interests to participate effectively in identifying and meeting our future water needs. Innovative organizational opportunities and collaborative mechanisms may need to be created.

3.H. The states should develop coordinated public education and other outreach programs to help survey and communicate the need for adequate public infrastructure investments at all levels of government, highlight the consequences of a failure to address our present problems, and stress the need to price water-related goods and services so as to allow for necessary capital budgeting for project rehabilitation and replacement.

A consistent, long-term public education and outreach program is needed to help people understand future challenges, our choices, and the consequences. For many reasons water often is undervalued and markets and other price-setting mechanisms are sometimes skewed in such a manner that appropriate future investments in water are discouraged.

3.I. The WSWC should organize a series of ongoing biennial symposia designed to: (a) bring stakeholders together to try and find ways to meet our growing western water, wastewater, watershed protection and restoration, and public safety-related infrastructure funding needs; (b) find ways to quantify, evaluate and prioritize funding those needs; and (c) highlight the benefits of integrated watershed, riverbasin, regional and interstate planning and management.

The Council's successful biennial symposia on Indian Water Rights Negotiations, with WGA's support, is a model for bringing together various interests on a continuing basis to help develop partnerships, while searching for ways to design and prioritize solutions to our future water and related infrastructure challenges.

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4. Resolution of Indian Water Rights

Analysis

For the past two decades, the Western Governors have strongly and consistently supported the negotiated settlement of Indian land and water disputes. Their most recent policy statement reads: "The Western Governors continue to support negotiated rather than litigated settlements of Indian water rights disputes. The federal government has major responsibility for ensuring successful conclusion of the process, including providing information and technical assistance to the tribes, providing federal negotiating teams to represent one federal voice and further the process, seeking approval of agreements, fully funding the federal share and insuring that the settlements are implemented."

The Western States' sovereign counterparts, the Indian nations claiming water rights, have also supported negotiated settlement of these difficult legal issues. The National Congress of American Indians (NCAI) "believes that the settlement of tribal water and land claims is one of the most important aspects of the United States' first obligations to Indians and is of vital importance to the country as a whole."

It is critical that Western States and tribes take stock of the settlement process, what remains to be accomplished and whether the current federal policy – and more importantly, practice – is effective in moving the remaining settlements forward.

Over the past 25 years, more than 21 settlements of Indian land and water rights have been reached in the western states and approved by Congress. The settlements have provided practical solutions, infrastructure and funding, while saving millions of dollars of private and public monies through avoidance of prolonged and costly litigation, and have fostered conservation and sound water management practices and established the basis for cooperative partnerships between Indian and non-Indian communities.

This successful process is currently threatened by federal fiscal and legal policies. While the Department of Interior continues to espouse settlement, it is taking an increasingly narrow view of its trust responsibilities to tribes and its willingness to fund settlements that benefit non-Indians as well. In coordination with the Office of Management and Budget (OMB) and the Department of Justice (DOJ), it has been asserting that its contribution to settlements should be no more than its calculable legal exposure and that even this can be narrowly drawn so that often its financial obligation is little or none.

It has long been the accepted premise that meeting the cost of Indian water and infrastructure in Indian water rights settlements is the trust responsibility of the federal government. At the same time, it must be acknowledged that an appropriate share of these costs of settlement, which correspond to non-Indian water and infrastructure benefits, increasingly a component of Indian water rights settlements, should be borne by the states. The states and the federal government must work together to jointly design and fund settlement projects that provide the greatest benefit for Indian and non-Indian water users alike in those situa-

Artist's rendition of completion of Ridges Basin Dam, being built pursuant to implementation of the Colorado Ute Settlement Act of 2000.

tions where the interests are inextricably combined by practical reality.

Funding for tribes' attorneys and technical experts has been so severely reduced over the past few years that it is making it difficult for tribes to meaningfully participate in the process. The Bureau of Indian Affairs (BIA) has also recently announced further cuts to these vital services to pay for $7 million in attorneys' fees for the Cobell litigation. To deny the tribes the funds necessary to ensure competent legal and hydrologic expertise is tantamount to denying them the right to defend a basic component of their physical and cultural survival.

The Western States and Tribes have continued to work hard to conclude water settlements but can no longer continue to do so in a virtual vacuum of meaningful federal participation and financial commitment. Settlements in Montana and New Mexico languish because the Interior Department has pulled back on its funding commitments. The impending crisis may not be as dramatic as a hurricane, but the long-term impacts are no less real. Failure to conclude meaningful water right settlements will undermine the Western States' planning for sustainable growth and disrupt their ability to meet long-term water demands. Litigation could result in substantial disruption of non-Indian uses. Further, if tribes are forced to litigate to protect their water rights, their eventual quantification may be meaningless without federal dollars to develop their water supplies for their homelands.

It must also be observed that unlike responding to random natural catastrophes, the national obligation of Indian water rights settlements is a finite list of pending problems, one that grows shorter with each settlement. It is a national obligation that can be met in full, once and for all, by concluding settlements with those tribes and pueblos whose rights have not yet been adjudicated. But, while the number of pending settlements is set, the cost of implementing them will continue to rise - meaning that postponing this duty only increases its cost to the nation, as it perpetuates the hardship to Indian people unable to enjoy the full use of their water rights and the inability of non-Indian governments to plan for water use in the absence of firm data on respective use entitlements.

Recommendations:

4.A. Reaffirm the resolution of the Western Governors' Association on settlement of Indian water right claims.

The Western States and Tribes must renew their commitment to this most important process.

4.B. Building on the successes of the past two decades, the WGA should engage Congress in an important discussion of what federal policy should be and how these settlements can be funded.

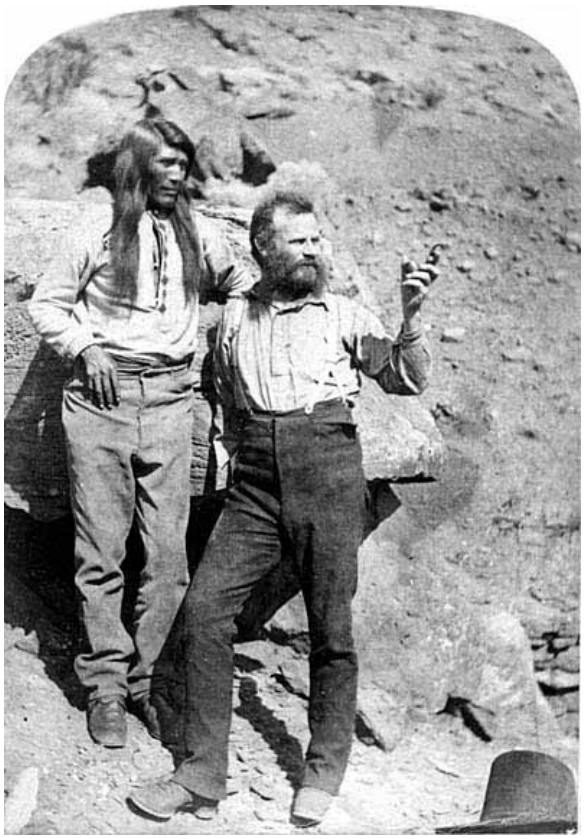
Whether through oversight hearings or high-level policy meetings, the message should be clear: there is an impending crisis in western water if this vital settlement process is allowed to languish. The costs of failure for the states and tribes will be too high and op-

"Failure to conclude meaningful water right settlements will undermine the Western States' planning for sustainable growth and disrupt their ability to meet long-term water demands. Further, if tribes are forced to litigate to protect their water rights, their eventual quantification may be meaningless without federal dollars to develop their water supplies for their homelands."

portunities lost will be gone forever if we do not act cooperatively now.

4.C. The WGA should appeal directly to the new Secretary of Interior to begin a meaningful dialog on the Departments' trust and programmatic responsibilities related to Indian water right settlements.

Discussions with the new Secretary should also include a review of the benefits of settlements to non-Indian communities throughout the West.



Tau-gu, Chief of the Paiutes, overlooking the Virgin River with John Wesley Powell, Circa 1873, (Photo from the Grand Canyon National Park Museum Collection , courtesy of the National Park Service.)

5. Preparations for Climate Change Impacts

Analysis

During the past century, global surface temperatures have reportedly increased at a rate near 1.1ºF. The rate of temperature increase has been three times larger since 1976, with some of the largest temperature increases occurring in the high latitudes. Average temperatures in the West have reportedly risen 2-5ºF during the 20th century—greater than in other regions of the contiguous United States. As the West has warmed, snowfall and snowpack have diminished in major portions of the West, and an increasing fraction of winter precipitation is falling as rain, rather than snow. Additionally, Western snowpacks are melting earlier with peak runoff coming 10 to 30 days earlier in many cases. The region has generally had increases in precipitation, with significant increases in some areas. However, other areas have become drier and experienced more droughts. Wildfire in the West has increased, particularly in the last two decades. Of the major mountain ranges in the West—the Cascades, the Sierra Nevada, and the Rockies—trends are more pronounced in the Cascades and the Sierra Nevada and less so in the Central and Northern Rockies, due in large part to the temperatures at the affected snowline altitudes in the Sierra Nevada and Cascades being closer to 32ºF to begin with.

Although the research on projections for climate change in the future does not have nearly the same degree of certainty as the observed climate change to date, it does suggest that rising global surface temperatures and associated climate changes may continue over the next several decades and beyond. According to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), global surface temperatures are projected to rise by 3-10ºF by the end of the 21st Century. Precipitation predictions show a greater range of possibilities, thus they are considered more uncertain. The American West could heat up more than the worldwide average, with regional climate models suggesting temperature increases in the West could be 4-13ºF. Projected impacts that could accompany this warming in the West include the following:

- **Smaller snowpacks**—winter precipitation could fall as rain instead of snow; periods of snowpack accumulation could be shorter; and snowpacks could be smaller, which has serious implications for reservoir storage.
- **Earlier snowmelt**—warming earlier in the year could melt snowpacks sooner further increasing the length of time between peak water flows and the summertime peak water needs of cities, farmers, utilities, etc. requiring more reservoir storage to capture the earlier runoff.
- **Flood-control releases**—water managers may be forced to make changes in reservoir operations and rule curves.
- **More extreme flood events**—extreme events could be more common causing more frequent and larger floods. In some cases, existing flood control 'rule curves' should be reformulated.
- **Receding glaciers**—some have suggested Glacier National Park could be void of glaciers by 2030 as a result of warming.
- **More evaporation and dryness**—higher temperatures could increase evaporation from streams and reservoirs, soil dryness, and the needs of crops and other plants for supplemental water.
- **Less groundwater**—less availability of surface water supplies may lead to increased pumping from groundwater aquifers further stressing groundwater supplies and hydraulically-connected surface water supplies.

"The American West could heat up more than the worldwide average, with regional climate models suggesting temperature increases in the West could be 4-13ºF."

- **More droughts**—more intense, frequent, and longer-lasting droughts could result.

- **More wildfires**—there could be an increase in number and severity of wildfires and an extended wildfire season.

- **Water quality challenges**—diminished streamflows during drought could result in less dilution of discharges; sediment loading from storm events that follow wildfires, saltwater intrusion along the coast resulting from rising sea levels, and warmer lake temperatures leading to algae blooms could follow.

- **Hydroelectric generation**—climate changes that alter overall water availability and timing could reduce the productivity of hydropower facilities; changes in the timing of hydroelectric generation can affect the value of the energy produced.

- **Water-borne shipping**—decreases in river flows could reduce the periods when navigation is possible; increase transportation costs; and increase conflicts over water allocated for other purposes.

- **Ecosystems**—natural ecosystems have limited ability to adapt or cope with climate changes that occur over a relatively short time frame, which could lead to irreversible impacts, such as additional species extinctions.

- **Recreation impacts**—due to lower lake and stream flow levels, recreation opportunities and economies could be significantly reduced.

Notwithstanding the seriousness of these potential impacts, it is nevertheless not currently possible to predict if and how they will affect a particular area within the region at any particular time, given the existence of a number of variables. According to the National Assessment Synthesis Team, which is a part of the US Global Change Research Program, climate is not static. Assumptions about the probability, frequency, and magnitude of extreme events should be considered accordingly.

Nonetheless, it must be recognized that there is already substantial stress on the water sector today even in the absence of climate change. There are many watersheds that are already over-appropriated, and new stresses are coming from population growth, land use changes, and water needs for instream uses, including those necessary to meet federal laws like the Endangered Species Act and the Clean Water Act. In some areas, the new demands may cause major shifts in water supply and water rights. Climate change may pose additional stresses and could result in thresholds being reached earlier than currently anticipated.

Because many of the impacts of climate change are not predictable, more flexible institutional arrangements are needed in order to adapt to changing conditions including not only climate change, but other existing stresses as well. Supply-side options are more familiar to most water managers, but demand-side options are becoming increasingly prevalent.

Recommendations:

While recognizing the uncertainties inherent in climate prediction, efforts should be made to focus on vulnerabilities and building increased resiliency to climatic extremes.

5.A. Data Collection

The federal agencies must continue and expand funding for data collection networks and activities necessary for monitoring, assessing, and predicting future water supplies as addressed earlier herein by the Water Needs and Strategies group recommendation (2A).

5.B. Improved Prediction, Modeling, and Impact Assessment

Climate change could result in an extended fire season.

The Western Governors should urge Congress and the Administration through the Climate Change Science Program (CCSP) to fund research for improving the predictive capabilities for climate change, and assessment and mitigation of its impacts. Additionally, given the complex climatology in the West, it is important that climate change modeling be conducted at a much finer resolution, e.g. watersheds and subwatersheds. It is also important that the federal government implement research funding recommendations associated with Goals 4 and 5 of the 2003 CCSP Strategic Plan, including the area of increased partnerships with existing user support institutions, such as state climatologists, regional climate centers, agricultural extension services, resource management agencies, and state and local governments.

5.C. State Planning

1) The Governor of each state should direct their state climatologist, relevant water and environmental agencies, and universities to assess historical, current, and projected climate trends for their particular state and relate these to potential changes in water supply and water quality, in order to prepare for and mitigate the impacts from climate change and climate variability. Such assessments should include an inventory of data sources available for each state, with analysis appropriate to watershed-level management. The Governors should seek necessary funding to support these activities.

2) States should maintain various water-related plans, including state water plans, watershed plans, state drought plans, reservoir management plans, flood plans, etc. These plans should be expanded or enhanced accordingly to include climate change scenarios. Particular emphasis should be placed on climate change within the context of watershed planning. States, similarly, should expand or enhance other state plans that include water-related concerns—such as forest management, energy, and economic development plans—to include the impact of climate-change scenarios.

3) States should coordinate with and include local governments in their climate change planning efforts. Local governments are an ever-increasing player in water issues, for example, through land use policies, as the developer of new water supplies, water transfers, and in implementing water restrictions and water use efficiency programs.

4) States should evaluate and revise as necessary the legal framework for water management to the extent allowable to ensure sufficient flexibility exists to anticipate and respond to climate change.

5.D. Ongoing Coordination & Information Sharing Between Scientists, Policy-Makers, and Water Users

The Governors should convene ongoing, broad stakeholder meetings between state water managers, local water supply managers, scientists, federal agencies, universities, and others to make sure water managers understand what the science is saying about climate change and what new tools exist, and, conversely so that scientists understand the data and research needs of water managers and users.

"States should evaluate and revise as necessary the legal framework for water management to the extent allowable to ensure sufficient flexibility exists to anticipate and respond to change."

6. Coordination and Cooperation in Protecting Aquatic Species under the Endangered Species Act

Analysis

Conflicts have arisen since the enactment of the Endangered Species Act (Act) in 1973 between development and management of state water systems for traditional purposes and protection of endangered aquatic species that are dependent on rivers, streams and wetlands. From the Tellico Dam snail darter to the Rio Grande silvery minnow, balancing water-related economic and environmental needs has been challenging. In 1982, recognizing the need for greater coordination, the Congress incorporated a policy statement in the Act directing federal agencies to "cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." (ESA Section 2(c)(2)). Further, ESA section 6(a) requires that ". . . the Secretary shall cooperate to the maximum extent practicable with the States . . . . [and consult] with the States concerned before acquiring any land or water, or interest therein . . . ."

Despite these Congressional pronouncements, conflicts have continued to occur between management and use of water and the needs of endangered and threatened species in the West. Greater cooperation and coordination between federal and state water and fish and wildlife agencies is necessary to improve the prospects for aquatic species conservation and recovery and to assure the continued economic vitality of the West. Congress did not address this reality in its last significant amendments to the Endangered Species Act (1988).

As stated in a 1997 Senate report accompanying proposed legislation (S. 1180); "the respective relationship of the States and the Federal Government over the use or allocation of water has never been precisely fixed. Consequently, the boundaries between State and Federal responsibility have been the subject of much discussion and debate for many decades in a variety of contexts . . . . It was ultimately determined that a delineation of the boundaries between the States and the Federal Government over the use or allocation of water was not possible in . . . the [context of] reauthorization of the Act. A position of neutrality on this issue is reflected in this bill." S. 1180 did not pass. None of the bills pending before the current Congress move away from this position of neutrality in that they do not deal with the above-described boundaries between states and the federal government over water allocation and use.

Administrative steps have been taken in the past to accommodate some landowner and state resource agency concerns. More needs to be done at both the federal and state level to expand the use of administrative and management mechanisms. Policy directives are needed to implement the Congressional pronouncement of ESA Section 2(c)(2) that Federal agencies "cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." Further, given their primary role in water allocation and protection, states should enhance their ability to avoid conflicts under state water law.

"Greater cooperation and coordination between federal and state water and fish and wildlife agencies is necessary to improve the prospects for aquatic species conservation and recovery and to assure the continued economic vitality of the West."

Recommendations:

6.A. Working with representatives of the federal implementing agencies, and soliciting input from other federal agencies and stakeholders, western state representatives under the auspices of the WSWC should establish a protocol outlining objectives and principles for implementing ESA Section 2(c)(2). Its objective should be to minimize conflicts arising between the use of water for the needs of listed species and other water uses and to foster cooperation and consultation between Federal and State governmental entities to enhance species protection and recovery, while protecting rights to water use.

The protocol should be proactive not only in terms of addressing issues in advance of potential crises, but in avoiding subsequent actions under the ESA such as future listings. The protocol should provide a road map and pathway for the State water development and management agencies and the signatory federal agencies to enter into appropriate agreements that are mutually beneficial.

The protocol should allow for the uniqueness of each local situation and each unique natural resource that may be at risk thereby allowing agencies to tailor agreements appropriately. It is important to note that the protocol should not grant any new authority, nor should it prohibit the exercise of existing authority. The protocol should recognize that there are certain limitations that agencies have, but encourage those agencies, wherever and whenever possible, to advance the expressed objectives and principles.

The development and implementation of the protocol would represent a further important step in the states' proactive efforts in the development of collaborative solutions to the water challenges posed by the ESA. The states have been supportive of the successes that have been garnered by basin-wide species recovery efforts such as that in the Upper Colorado River. States support the expansion of this approach to other basins, such as those being formulated in the Platte and Missouri River basins. The basic tenets that form the foundation of the protocol are critical to effective, efficient application of the ESA. Implementation of the provisions of the protocol through partnership efforts between the federal implementing agencies and the states would move us toward uniform application across the regions, support further basin-wide recovery efforts and assure that state primacy over water allocation decisions remains intact.

6.B. Identify tools under western state water law that can be used to provide water for threatened and endangered species protection.

Actions at state and local levels are often the most successful in dealing with water issues involving threatened and endangered species. In their primary role in managing water resources, it is therefore important for western states to consider various approaches for obtaining water necessary for threatened and endangered species. It is likewise important for the federal government, particularly the U.S. Fish and Wildlife Service

"The development and implementation of the protocol would represent a further important step in the states' proactive efforts in the development of collaborative solutions to the water challenges posed by the ESA."

(FWS), NOAA Fisheries, and federal action agencies, to recognize the availability of state tools to acquire water for species protection. Indeed, the federal government should avail itself of these tools in order to provide greater protection for species where required, while acting pro-actively to avoid the conflicts which have too often characterized the implementation of this Act.

A report on this subject should include an analysis of: (1) the use of public interest standards/criteria as a means to protect water for species; (2) state approaches to using instream flow laws as a tool to provide water for aquatic species; (3) other instream protection strategies, such as flow release conditions, or the creation of state wild and scenic rivers; (4) water "banking" and market approaches; (5) an analysis of cooperative state and federal efforts in river and reservoir operations to provide water for species; and (6) the merits of federal action to help expedite state general stream adjudications as a means to enhance the protection of species.

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